

EST Co.,Ltd. Comprehensive Catalog

EDUCATION CATALOGUE

Vol.1

Smart Factory / IoT / VR / AR / Smart Car / 3D Printer / Drone
Robot / AI / Automatic Control / Renewable Energy / Software
Electricity / Electronic / Measuring Instrument

EST Co., Ltd. Catalog

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Vol.1

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Robot / AI / Automatic Control / Renewable Energy
Electricity / Electronic / Software
Measuring Instrument

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Case of Installation

Smart Factory Lab

Smart Car Lab

Electric Car Simulator Lab

3D Printer Lab

Drone Lab

Robot Lab

Industrial Robot Control Lab

Automatic Control Lab

Renewable Energy Lab

Hydraulic Pneumatic Lab

Safety Lab

Electric and Electronic Lab

Power System Diagram

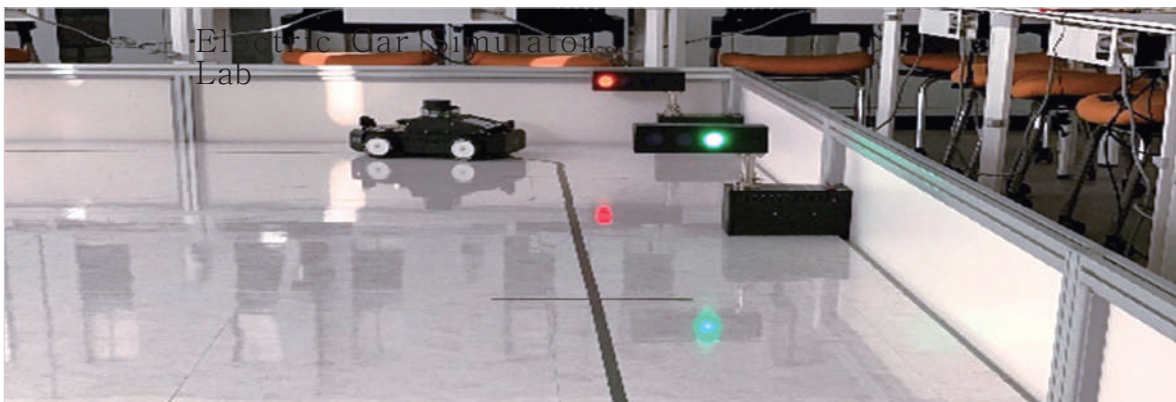
Wiring Demonstration Equipment

Measuring Instrument Lab

Smart Factory Lab



Smart Car Lab



Electric Car Simulator Lab



설치사례

3D Printer Lab



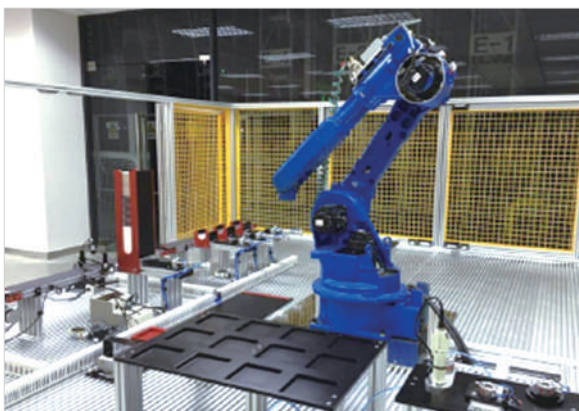
Drone Lab



Robot Lab



Industrial Robot Control Lab



Automatic Control Lab



Renewable Energy Lab



설치사례

Renewable Energy Lab



Hydraulic Pneumatic Lab



Safety Lab



Electric and Electronic Lab



Power System Diagram



Wiring Demonstration Equipment



Measuring Instrument Lab



EDUCATIONAL SMART TECHNOLOGY

Smart Factory / IoT / VR / AR / Smart Car / 3D Printer / Drone
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Electricity / Electronic / Software
Measuring Instrument

EST-4020

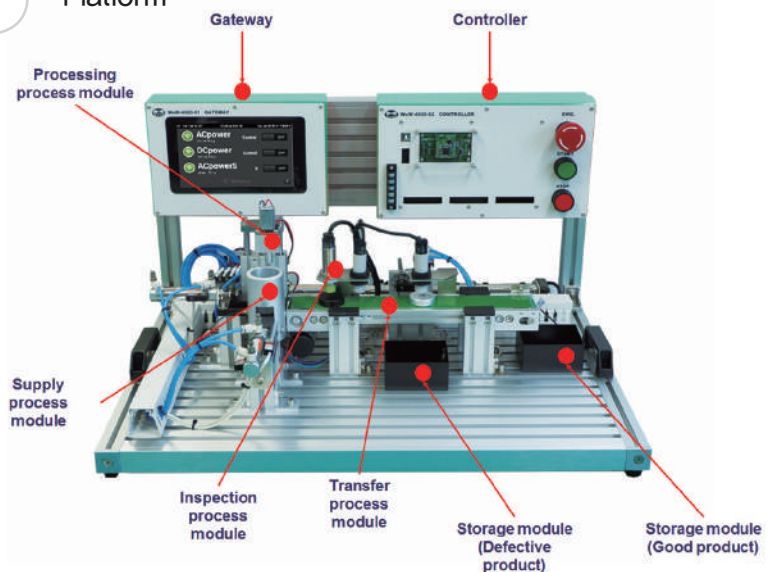
Smart Factory System



KT IoTMakers Compatible Program Accreditation

- Practice of smart factory system implementation by combining production automation system and IoT technology
- Real-time monitoring and remote control with IoT platform
- Composition by reducing the supply/process/transfer/extraction and storage processes of production automation
- Sequential practice from basic control for each process to implementation of smart factory system
- Provide basic/application example programs for various exercises
- Implementation of IoT service to set up interworking control event under specific conditions using process information of IoT Platform

Main Composition



Education contents

[Production automation process]

- | | | | |
|------------------------------------|--|--------------------------|--------------------------------------|
| • LED Lamp control | • LED lamp control according to material detection | • Conveyor motor control | • Supply/Processing/Transfer process |
| • LED control with switch | • LED lamp control according to proximity sensor | • Supply process | • Transfer/Extraction process |
| • Supply/Transfer cylinder control | • Processing motor control | • Extraction process | • Entire process implementation |
| • Processing cylinder control | | • Transfer process | |
| • Extraction cylinder control | | • Processing process | |

[IoT fusion automation process]

- | | | |
|------------------------------------|--|--|
| • Establishment of IoT environment | • LED Interlocking control according to sensor detection | • Extraction process Interlocking control |
| • Sensor monitoring | • LED Interlocking control using switch | • Count |
| • LED control | • Supply process Interlocking control | • Error processing |
| • Cylinder control | • Processing process Interlocking control | • Process control by external sensor |
| • Motor control | • Transfer process Interlocking control | • IoT fusion entire process implementation |
| • Monitoring by cylinder control | | |

EST-SF400 (A/B/C/D)

Smart Factory System

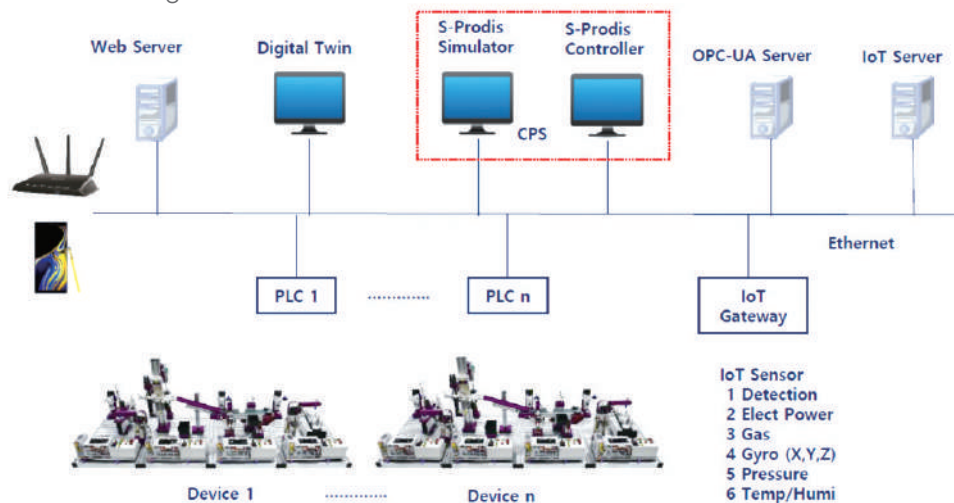


- Supply → Inspection → Transfer
→ Storage System H/W System
- A core element of Smart Factory experiment and practice
 - PLC, IoT, OPC-UA, Digital Twin, CPS, etc.
- Systematic experiment and practice by step of H/W composition
 - Assemblies – Wiring → Control → Data Collection (IoT) → Connection (OPC-UA) → Digital Twin → CPS
- CPS experiment and practice
 - Productivity improvement practice (needed for all production sites)
 - A perfect integration of Cyber and Physical
- Individual experiment practice
- Product composition in practice :
PLC + OPC-UA + Digital Twin + IoT+ CPS
(which users can connect and control directly)

Main Composition

Smart Factory System Diagram

– PLC + H/W + OPC-UA + Digital Twin + IoT+ CPS



Education contents

CPS (Cyber Factory Construction)

- Efficient factory operation plan
- Smart factory integrated operation

OPC-UA & PLC (Equipment control practice)

- Understanding and establishing OPC-UA
- Remote control understanding and practice
- Digital twin implementation practice

IoT (Understanding IoT platform)

- Sensor data collection
- Local server operation
- KT server operation

Equipment assembly & control (Assembling equipment)

- Wiring
- PLC control

EST-4052

Smart Factory Demo System

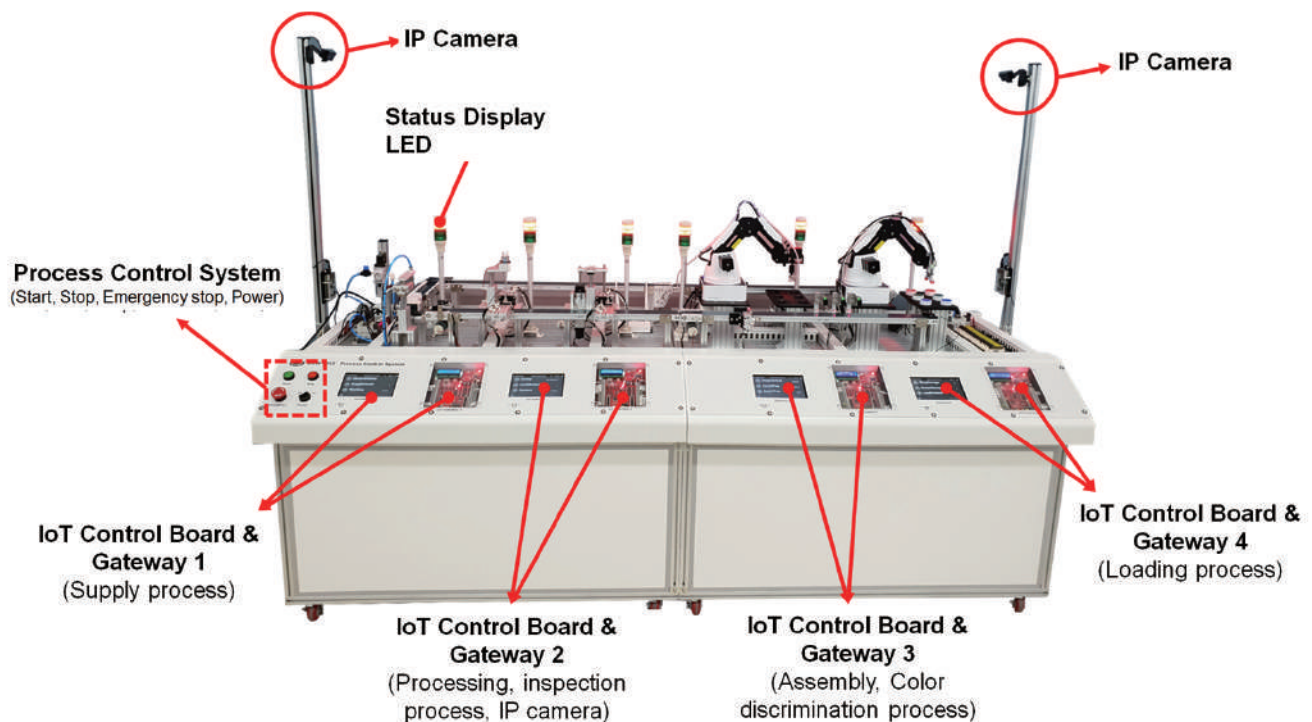


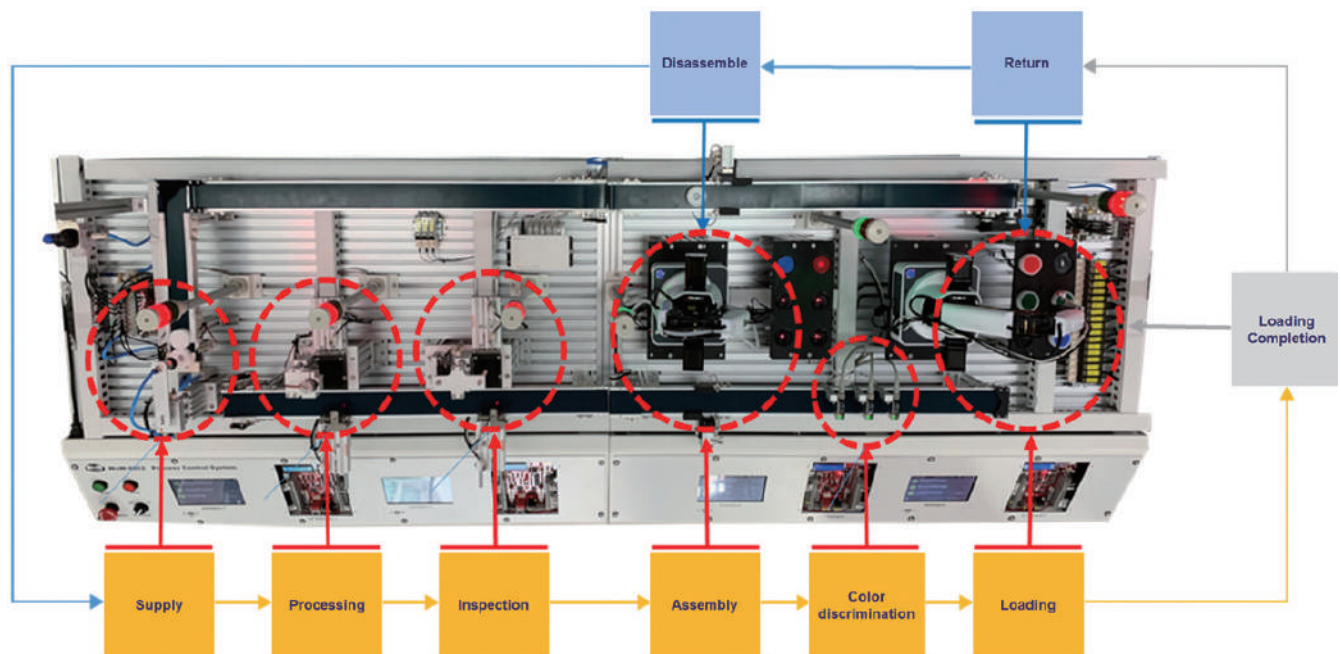
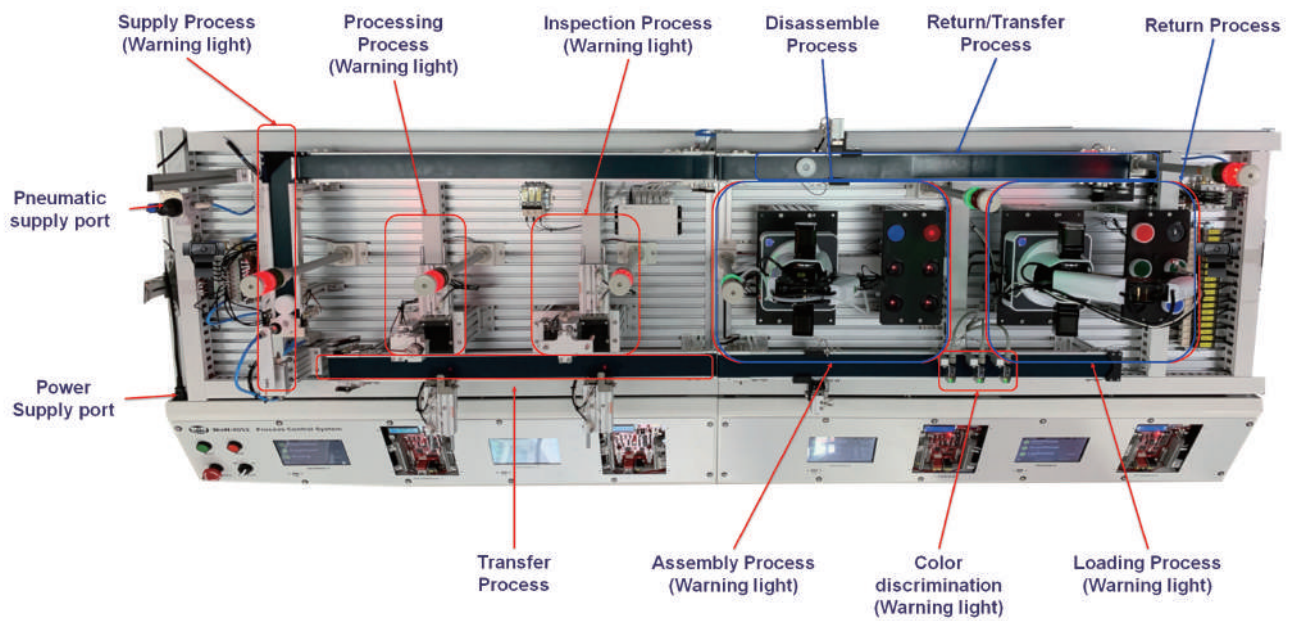
KT GIGA IoTMakers Compatible Program Accreditation

Accurate Smart Factory system Implementation

- The connection between IoT technology and the Manipulator robot can control the extended production automation process.
- Coordinate values of the Manipulator robot are linked to the IoT Platform to provide precise remote monitoring of robot status and operation.
- The smart factory operation is efficient because it can monitor the production rate of both good and defective products compared to the supply quantity.
- Each process can be operated independently by categorizing the work into four processors and linking them with RS485 communication.
- Not only the process from supply to loading, but also the process of disassembling loaded goods through the return process.

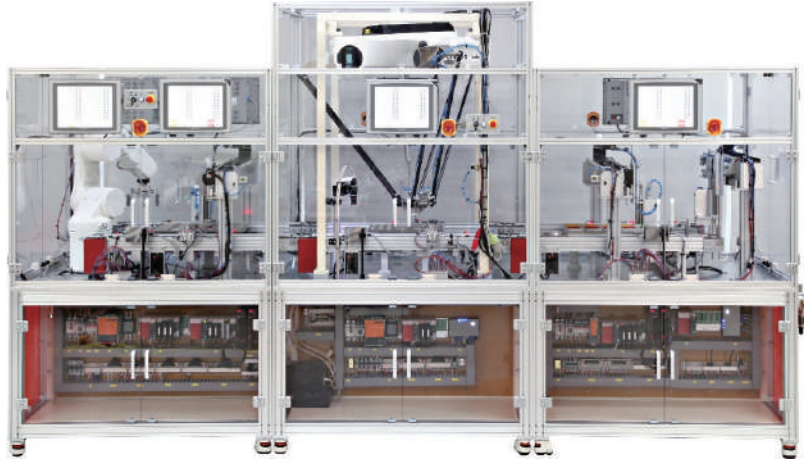
Main Composition





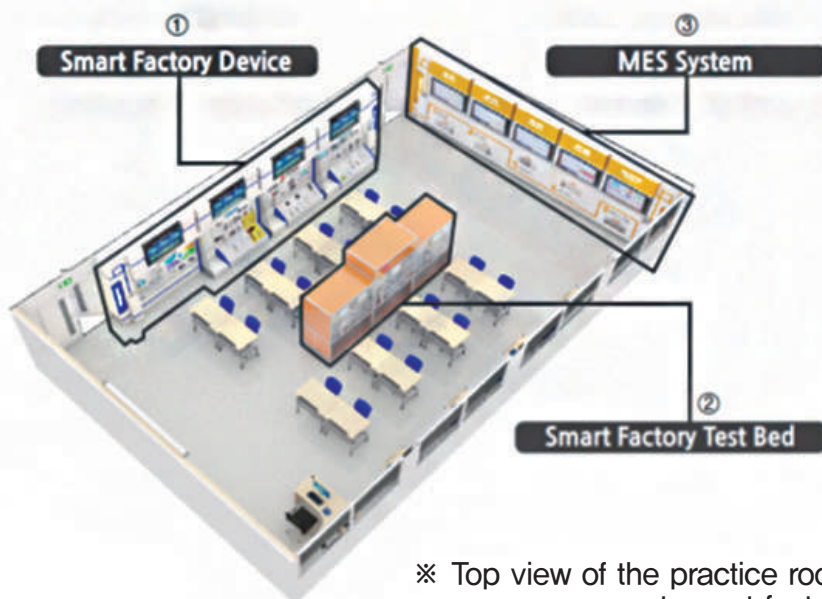
EST-3434

Smart Factory System



- It is smart factory equipment, education equipment of the integrated manufacturing process system through the optimization of smart factory systems, which enables monitoring in connection with automation process control, real-time data process and the system.
- Various practices on automation systems available by being applied to the manufacturing processes at industrial sites from the assembly process to disassembly process.
- Teaching-Learning through the composition of PLC-based industrial network system (Fieldbus Network)
- Big data practices based on the real-time data collection and analysis process of the core device through the OPC server (DB)
- Monitoring the current status of the facilities available by utilizing the real-time data including targeted production volume, material input status and inspection, final products production status, facility operation rate and so forth.
- Interlocking controlling of mobile & tablet, and the real-time monitoring available by using applications

Main Composition



※ Top view of the practice room at smart factory

- ① Smart Factory Device

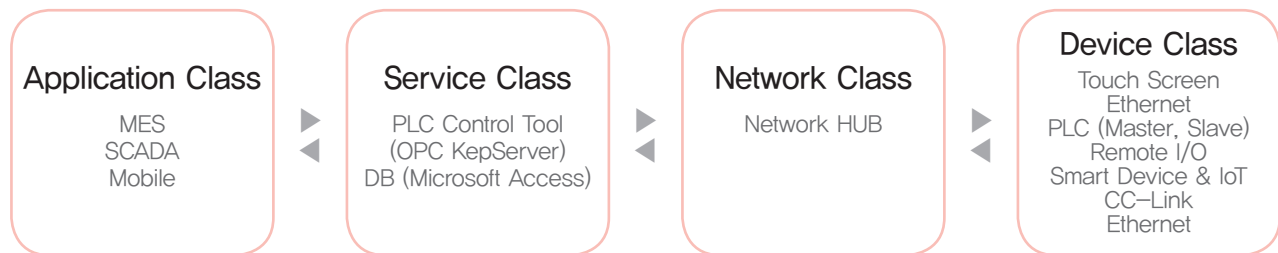
- ② Smart Factory Test Bed
 Raw material supply and product Assembly
 ↓ ↑
 Product disassembly stage
- ③ Virtual MES System
 Smart Factory Test Bed
 Real Time Data Monitoring

Smart Factory Device

- Core devices in MITSUBISHI, OMRON, SIEMENS
- Actuator(Inverter & Motor, Sensor, Safety and the like) data collectio
- Date processing (MES & Mobile SCADA) through OPC Server(DB)

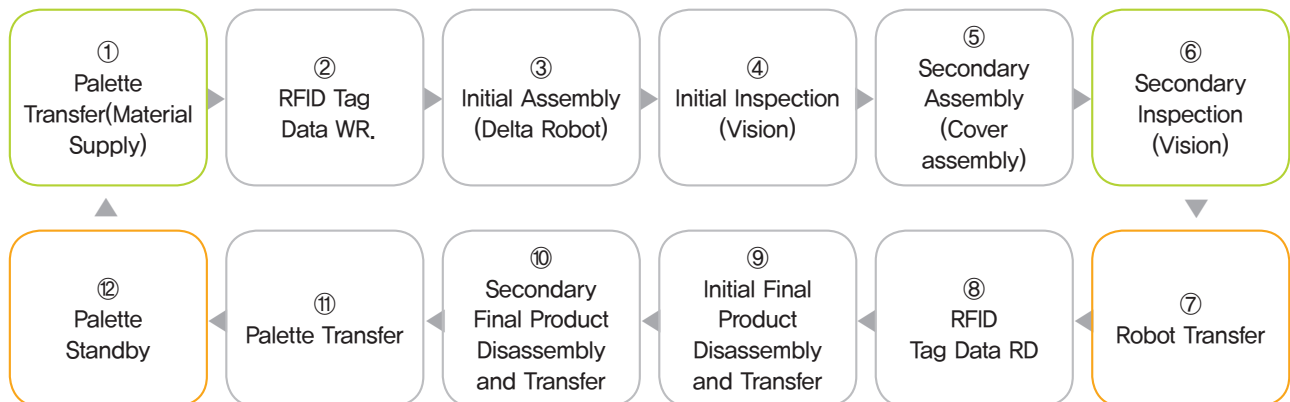
Smart Factory Test Bed + MES System

- Establishing processes from raw material supply to final products assembly and disassembly (Cell phone battery assembly)
- Real-time data collection through the FieldBus Network(RFID, Vision, Robot and so forth)
- Processing the production records and facility operation data through the connection with the MES system



Stage of the Smart Factory Test Bed Manufacturing Process

■ Product Manufacturing Process



◆ Product Disassembly Process

Smart Factory Test Bed Main Device



Large-Joint Robot

Product Displacement Inspection (Analog Sensor) and Assembled Final Product Transfer



Delta Robot

Customized Assembly According to Product Features(Materials, Colors)



Vision Camera

Assembly and External Appearance Inspections according to Product Features(Materials, Colors)



Pneumatic Cylinder

Product Supply(Rodless/ Double acting cylinder), Product Locking(Stopper)



RFID & Sensor

Controlling Product Record(RFID) and obtaining Process Data(Sensor)



PLC

Collecting all sorts of Device Data and connecting Upper Class

EST-4022

Smart Factory System



- Station-integrated equipment capable of practicing by modeling various processes
- Golf ball order production system consisting of the concept in which production can immediately start with the order of user
- Two color packaging boxes and three color golf balls can be freely combined, and this system allows a smart manufacturing process to produce products according to the taste of consumers, not mass production of uniform products



Main Composition

Composition technique

- 4 Stations factory control (individual practice available)
- Application of TwinCAT controller
- Application of Industrial Network EtherCAT
- Pallet transfer type conveyor system
- Industrial six-axis multi-joint robot
- Packaging process
- Application of RFID technology
- Weight Test & Vision Test
- Sorting process
- Conveyor (AC motor + Inverter control)

Process Station

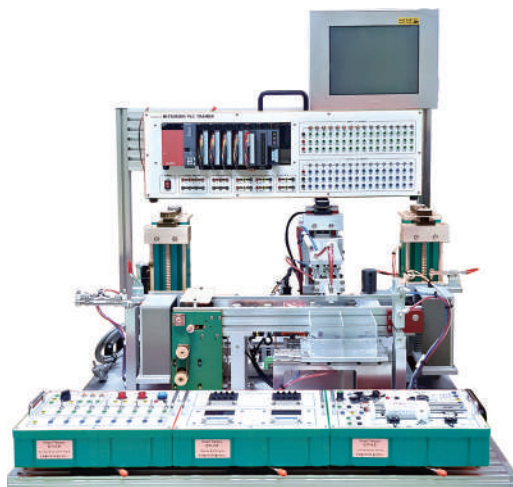
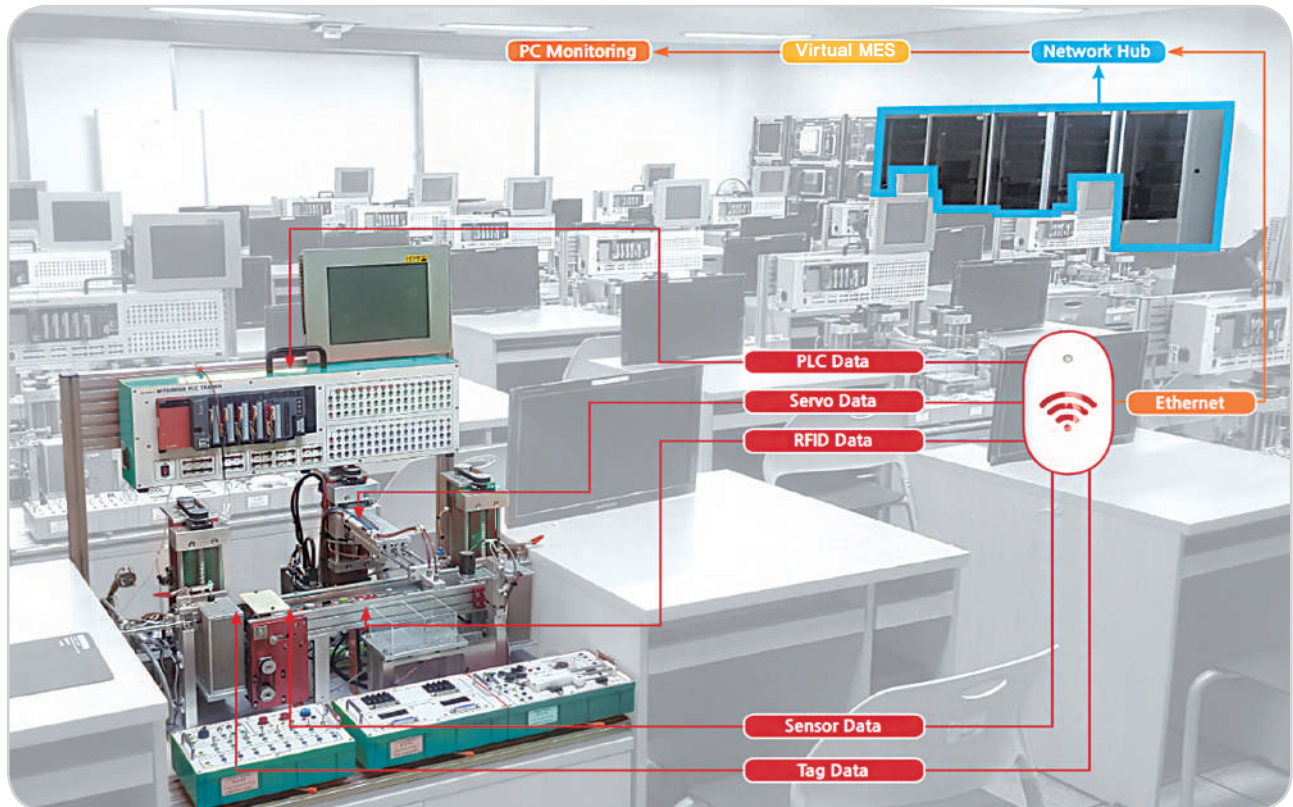
- Box supply station
- Ball supply station
- Packaging/Inspection station
- Storage/Release station

Education Contents

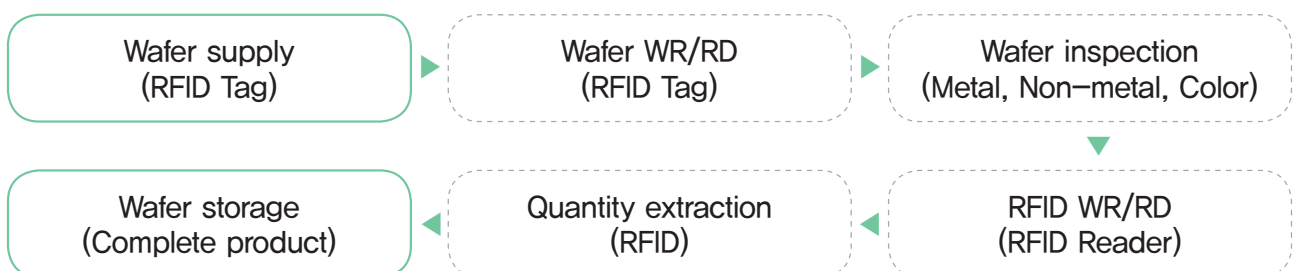
- Introduction to Smart Factory
- I/O and Motor Control using Industrial Real-time Network
- Original Equipment Manufacturing(OEM) system through the web
- Data communication between PC and PLC
Production data handling using RFID
- Factory Internet of Things(IoT)
- OPC-UA Concept and Data Integration Practice
- Storage and reading of production data using database
- Monitoring and control of production system using mobile devices
- Factory Energy Management System (FEMS)

EST-3435

Smart Logistics System



- Practicing controlling through the concept of smart factory network system and the interface technology
- Controlling the smart factory system by applying smart devices (RFID, Vision, Sensor and so forth)
- Monitoring available through the connection of the basic automation process controlling and the smart device system
- Forming automatic loading and unloading process by forming a virtual wafer supply device
- Big data analysis available through networks as to the various data drawn from the practice device
- Practicing various big data algorithms available including real-time data collection and analysis

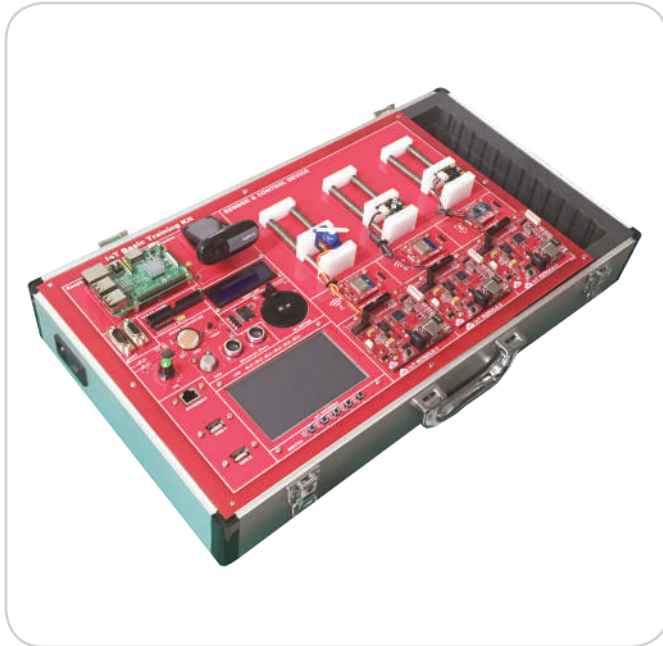


EDUCATIONAL SMART TECHNOLOGY

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Robot / AI / Automatic Control / Renewable Energy
Electricity / Electronic / Software
Measuring Instrument

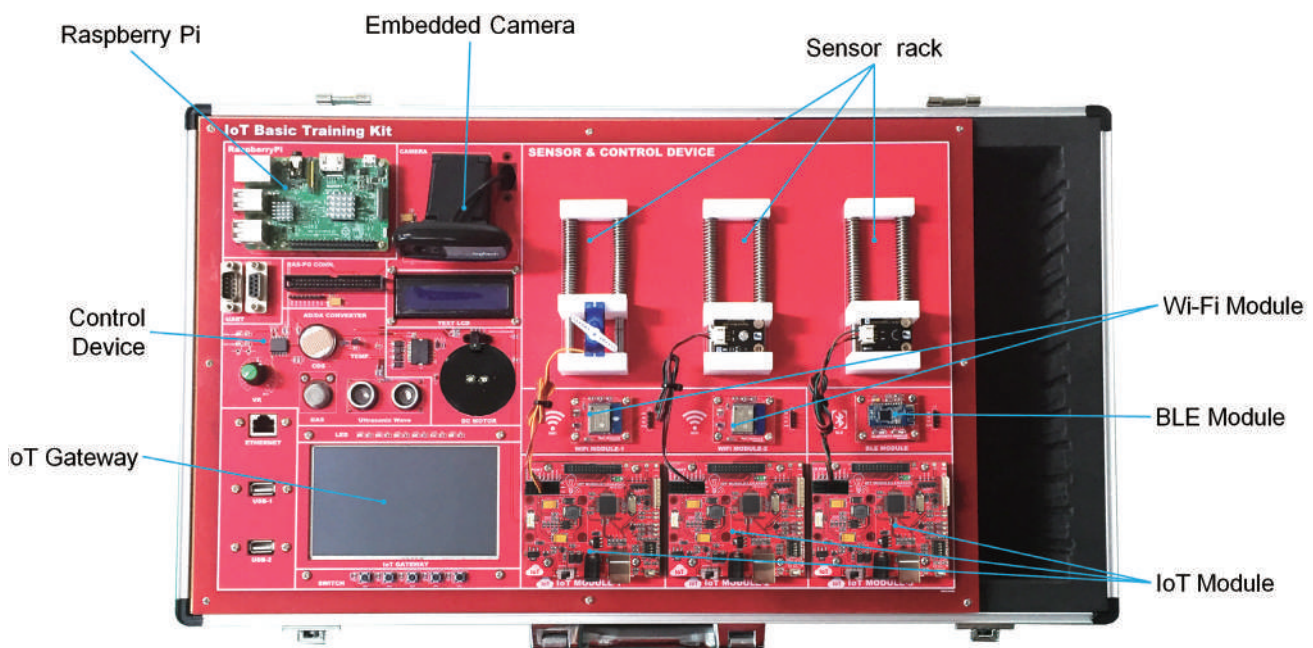
EST-4044

IoT Basic Trainer



- Understanding the entire flow of the Internet of Things(IoT) connected to 'IoT Device – IoT Platform
- IoT device production practice by Wi-Fi/ BLE Communication using Arduino firmware
- IoT device individual connection and grouped connection practice using IoT gateway
- Open IoT platform (KT IoTmakers) to practice commercial IoT service implementation
- Local IoT platform and Cloud IoT platform individual practices
- Textbook composition based on NCS firmware development learning module
- 27 different modules available (e.g., provided) including Sensor, Actuator, and Display
- Create Gateway, Wi-Fi Device, and BLE Device as On Board types
- Simultaneous use of Local IoT Platform and Cloud IoT Platform (when building a local network)

Main Composition



Education Contents

Local IoT Platform

Basic IoT Practice Using Local IoT Platform

- IoT overview
- IoT Basic Practical Equipment
- Building a Development Environment

[WIFI DIRECT practice]

- PSD Sensor monitoring service firmware development
- Touch Sensor monitoring service firmware development
- LED Module control service firmware development
- Device Interlink Event Firmware development

[GATEWAY practice]

- PSD Sensor monitoring service firmware development
- Ambient Sensor monitoring service firmware development
- LED Module control service firmware development
- FND Module control service firmware development
- SERVO Module control service firmware development
- Device Interlink Event Firmware development
- Beacon service firmware development

Cloud IoT Platform

Basic IoT Practice Using Cloud IoT Platform

- IoT overview
- IoT Basic Practical Equipment
- Building a Development Environment

[WIFI DIRECT practice]

- Push Button monitoring service firmware development
- Rotation Sensor monitoring service firmware development
- LED Module control service firmware development
- FND Module control service firmware development
- Device Interlink Event Firmware development

[GATEWAY practice]

- Rotation Sensor monitoring service firmware development
- LM35 Sensor monitoring service firmware development
- SERVO Module control service firmware development
- LED Module control service firmware development
- FND Module control service firmware development
- Device Interlink Event Firmware development
- Beacon service firmware development

EST-4017

IoT Basic Trainer



- Understanding the entire flow of the Internet of Things(IoT) connected to 'IoT Device – IoT Platform – IoT Service'
- IoT device production practice by Wi-Fi/BLE Communication using Arduino firmware
- IoT device individual connection and Grouped connection practice using IoT gateway
- Implementation of various IoT devices using sensor, actuator, display etc.
- Battery embedded to secure mobility of device
- Open IoT platform (KT IoTmakers) to practice commercial IoT service implementation
- Local IoT platform and Cloud IoT platform individual practices
- Textbook composition based on NCS firmware development learning module

Main Composition

Name	Core Specification
IoT Gateway	Quad-core ARM Cortex-7, Wi-Fi, BLE, Gateway Program
Wi-Fi Device	ATmega32U4, Battery, Wi-Fi Module
Embedded Device	Quad-core ARM Cortex-7, Camera module, Wi-Fi module
BLE Device	ATmega32U4, Battery, BLE module
USB Charger	4 Port
Sensor & Actuator	Relay, RED LED, White LED, Green LED, Blue LED, Grayscale, Temperature, Light Sensor, Vibration, Tilt, Push Button, Touch, Magnetic, Sound, Carbon Monoxide, Voltage Divider, Rotation, Servo Motor, Flame, Accelerometer, Infrared motion, Distance, Moisture, FND

Education Contents

- IoT overview
- IoT Basic Practical Equipment
- Building a Development Environment
- Beacon service firmware development

[WIFI DIRECT practice]

- Push Button monitoring service firmware development
- Rotation Sensor monitoring service firmware development
- LED Module control service firmware development
- FND Module control service firmware development
- Device Interlink Event Firmware development

[GATEWAY practice]

- Rotation Sensor monitoring service firmware development
- LM35 Sensor monitoring service firmware development
- SERVO Module control service firmware development
- LED Module control service firmware development
- FND Module control service firmware development
- Device Interlink Event Firmware development

EST-4018

IoT Home Service Trainer

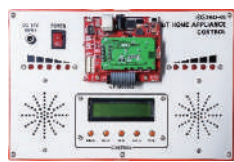
02

Internet of Things



- Understanding the entire flow of the Internet of Things(IoT) home service connected to 'IoT Device – IoT Platform – IoT Service'
- Modulation of home-use sensors and devices into 8 concepts: Power Control, Light Control, Gas Control, Door, Lock, Air conditioning, Appliance, IP Camera, Security
- Individual monitoring and control of sensors and devices of each module, event Interworking control
- Implementation of IoT home device using Arduino firmware
- Provide basic/application example programs for practice
- Image output practice of IP camera using Android App
- Monitoring and remote control of IoT home device data stored in IoT platform in real time

Main Composition

모듈	모듈
 Power Control Module	 Air Conditioner Module
 Door Control Module	 Appliance Control Module
 Light Control Module	 Security Module
 Gas Control Module	 IP Camera Module

Education Contents

- IoT overview
- IoT Basic Practical Equipment
- Building a Development Environment
- IoT Convergence Power Control Service Practice
- IoT Convergence Light Control Service Practice
- IoT Converged Air-conditioner/Heater Service Practice
- IoT Convergence Gas Detection and Valve Control Service Practice
- IoT Convergence Security Service Practice
- IoT Convergence Door Control Service Practice
- IoT Convergence IP Camera Application Service Practice
- IoT Convergence Appliance Control Service Practice
- Security Module Event Practice
- Gas Control Module Event Practice
- Light Control Module Event Practice
- Gas & Security Linked Event Practice
- Light & Air-conditioner/Heater Linked Event Practice

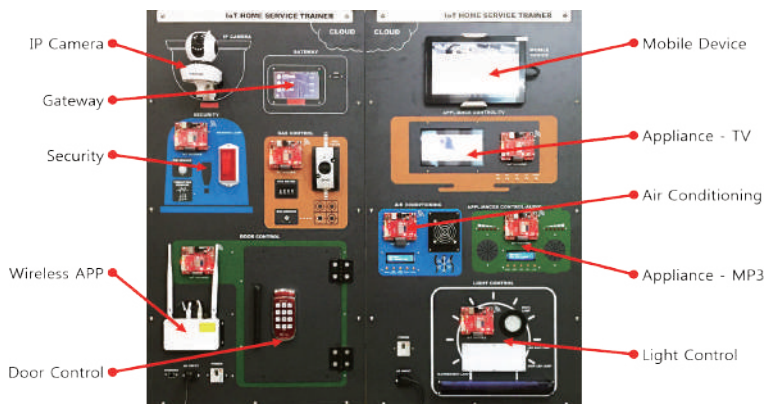
EST-4031

IoT Home Service Trainer



- Understanding the entire flow of Internet of Things connected to 'IoT Device – IoT Platform – IoT Service'
- Understanding the operating principles and system structure of the IoT home service at a glance
- 7 concepts of Light Control, Gas Control, Door Control, Air Conditioning, Appliance (TV, MP3), IP Camera, and Security which are sensors and devices used primarily in the home
- Individual or interlocked monitoring and control of each device using WI-Fi Communication
- Provide a basic/application example program required for various practices.
- Graph Output and Control Practice of Device Data using Android App
- Sensor/device data of each part can be monitored and controlled in real time in the IoT platform

Main Composition



Installation Case



KT Smart City Platform

Education Contents

- IoT overview
- IoT Basic Practical Equipment
- Building a Development Environment
- IoT Convergence Light Control Service Practice
- IoT Converged Air-conditioner/Heater Service Practice
- IoT Convergence Gas Detection and Valve Control Service Practice
- IoT Convergence Security Service Practice
- IoT Convergence Door Control Service Practice
- IoT Convergence IP Camera Application Service Practice
- IoT Convergence Appliance Control Service Practice
- Security Module Event Practice
- Gas Control Module Event Practice
- Light Control Module Event Practice
- Gas & Security Linked Event Practice
- Light & Air-conditioner/Heater Linked Event Practice

EST-4048

IoT Home Service Demo Room

02

Internet of Things



KT IoT Makers Compatible program

- KT IoT Makers Compatible Program certified product can be educated using KT's open type of IoT platform

- Device management through network, Device status through dash board, Real-time data monitoring and Device control through Android App

Element Technology Education of the Internet of Things(IoT)

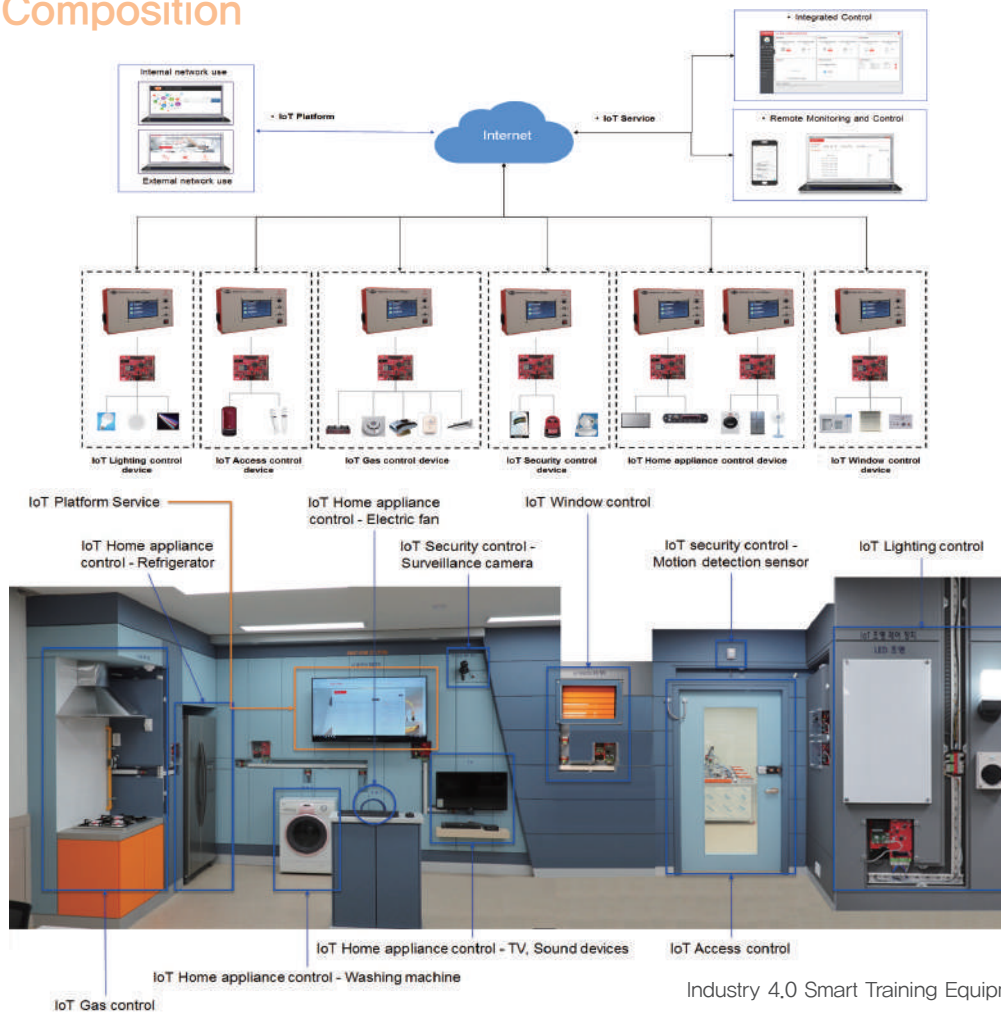
- By combining IoT elemental technology to the real home device, it is possible to intuitively confirm control and monitoring contents, maximizing interest, and educational effect

Mecca for Human Resource Development in the Fourth Industrial Revolution

- The training of human resources through IoT technology, which is the most basic in the era of super-connected-based intelligent revolution triggered by new technology

- When interviewing freshmen and visiting outside personnel on campus, it is possible to present and promote the direction of the department's operation in preparation for the fourth industrial revolution.

Main Composition



EST-2015

IoT Healthcare Trainer



Smart Healthcare

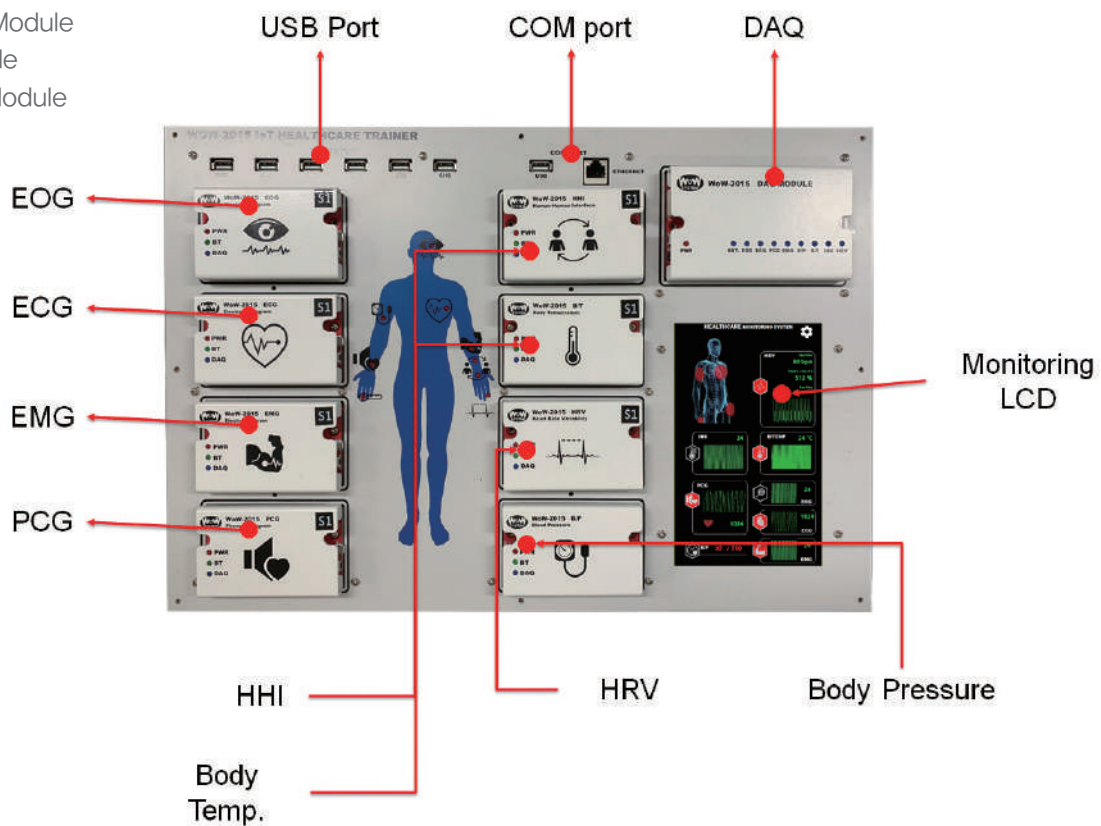
- The basic concept of the Internet of Things [Smart Devices – Gateway – Communication – IoT Platform – IoT Service] is configured for each step of learning.
- This technology combines the Internet of Things and healthcare.
- To learn the process of remote monitoring and service development step by step using measured data.

Diverse Contents and Trusted Platforms

- It consists of Pulse/Oxygenation, Body temperature, Blood pressure, ECG(Electrocardiogram), Phonocardiogram, EMG(Electromyogram), and Electrooculogram instruments to measure 8 different biological signals.
- Touch-type monitoring panel for easy viewing of measured data
- Practice to develop firmware for each module
- KT IoT Platform, operated by Korean telecommunication company, enables remote monitoring of data with various dashboards and graphs and enables various IoT service development and learning through event function.

Main Composition

- Bluetooth Module
- DAQ Module
- Gateway Module



Education Contents

- IoT and Smart Healthcare
- IoT Converged Healthcare Service Lab Equipment
- Establishment of IoT Converged Health Care Service Lab Equipment Environment
- Measurement of body temperature using arduino
- Measurement of EMG using arduino
- Measurement of ECG using arduino
- Measurement of EOG using arduino
- Measurement of HRV using arduino
- Measurement of Blood Pressure HRV using arduino
- Application of PCG using arduino
- Application of HHI using Aduino
- IoT-based program structure
- Measurement of HRV based on IoT
- Measurement of body temperature based on IoT
- Measurement of ECG based on IoT
- Measurement of EMG based on IoT
- Measurement of EOG based on IoT
- Measurement of Blood pressure based on IoT
- IoT-based Thermometer Interworking Service
- IoT-based HRV Interworking Service
- IoT-based Dashboard Interworking Service

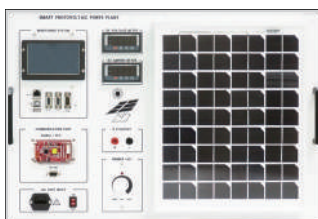
EST-3048

IoT Smart Grid Trainer

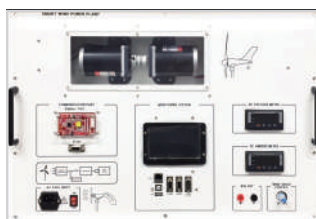


- Implementation of smart power management system by integrating IoT into existing power grid
- Energy flow training from energy generation to transmission/distribution, and power consumption control of home appliances
- All stages from energy generation to processing are integrated
- Checking power generation through individual Embedded monitors of solar, wind, and fuel cell power generation modules
- Check the energy conversion phase values and the amount of electricity used without a separate measuring instrument with build-in AC and DC voltage/current meter and watt meter
- Real-time monitoring of energy consumption data
- Remote monitoring of the data from the appliance stored in platform in real time
- Rapid charging for battery charging and built-in protection circuits for battery short circuits

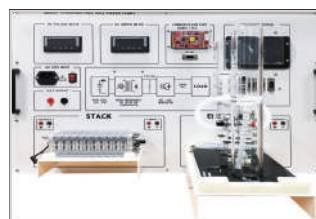
Main Composition



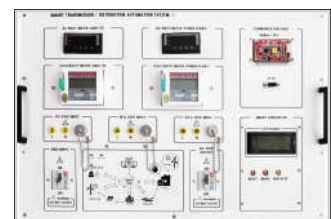
PHOTOVOLTAIC POWER PLANT



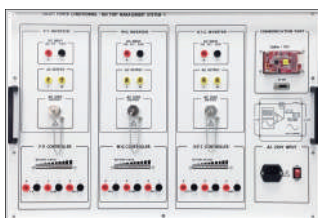
WIND POWER PLANT



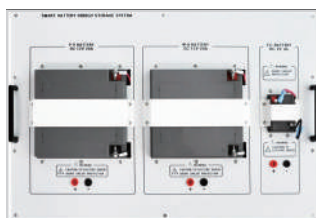
HYDROGEN FUEL CELL POWER PLANT



TRANSMISSION / DISTRIBUTION
AUTOMATION



POWER CONDITIONING / BATTERY
MANAGEMENT



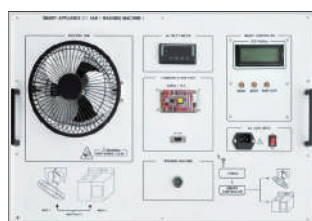
BATTERY STORAGE



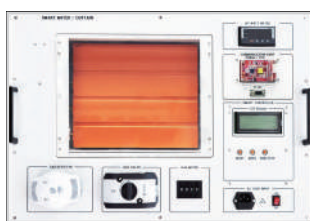
SERVER ENERGY MANAGEMENT



APPLIANCE 1 (ILLUMINATION / FAN)



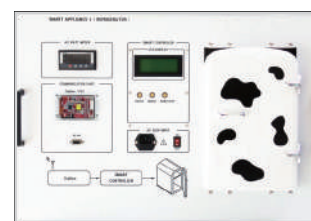
APPLIANCE 2 (FAN / WASHING MACHINE)



METER / CURTAIN



APPLIANCE 3 (TELEVISION)



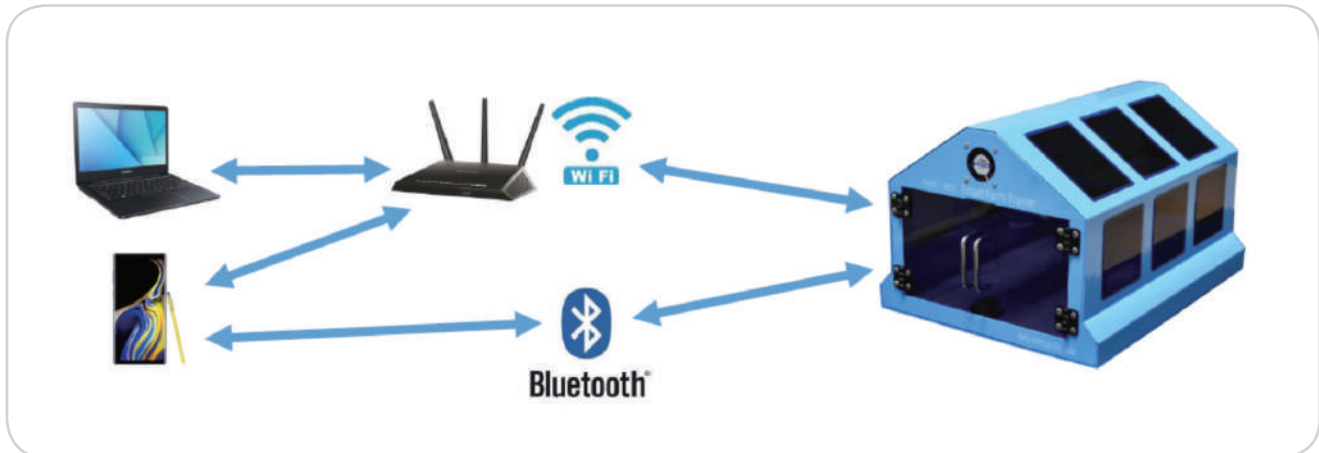
APPLIANCE 4 (REFRIGERATOR)

Education Contents

- Concept of Smart Grid
- The Necessity of Smart Grid
- Propulsion Trends of Smart Grid
- Smart Grid and Renewable Energy
- Information and Communication Technology (ICT) of Smart Grid
- Power management system of the Smart Grid
- PowerGrid of the Smart Grid
- Growth Industry of the Smart Grid Era
- Smart appliances
- Photovoltaic Power Generation by Solar radiation quantity
- Solar power generation according to the shadow area
- Efficiency measurement of the PhotoVoltaic(PV) Panel
- Fuel cell generation principle
- Wind power generation according to wind speed
- ZigBee communication understanding (ZigBee HAN Network)
- Electrostatic recovery by distributed power
- Electrical control according to the ESS available capacity during power outage
- Energy storage using ESS
- Standby/drive power monitoring of home appliances
- Remote monitoring and control of home appliances
- Electrical control according to the maximum power consumption
- Smart Monitoring

EST-2020

Smart Farm Control System



- Control the input and output signals of temperature, humidity, soil sensor, CDS, pump, LED, motor, ventilator, etc. to Bluetooth and WiFi by smart phone
- Smart Farm H/W can be directly controlled by mobile phone using Arduino + WiFi + Bluetooth board
- WiFi modules support AP mode, STA mode, built-in web server function, and UI service for web servers
- Internet cloud server interworking function and Description command function for the self-server interworking
- Control with a built-in Bluetooth module for remote control
- The bridge language support coding S/W enables user-level development language support, block mode, script mode, C language sketch input support
- Real-time sketch code generation for block and script languages with private library
- Practice of Arduino board upload and practice of typing serial communication console support code
- Power AC220V/DC5V built-in and house principle structure designed to facilitate movement
- Command mode : Korean, English selection
- Block language is converted into C language in real time
- Development S/W Application by Students' Level

Main Composition

1. Main Composition

- Microcontroller : ATmega328
- Clock : 16MHz
- Digital I/O Pins : 12ea
- Analog Port Pin : 6ea
- PWM CH : 6
- Flash Memory : 32 Kbytes
- SRAM : 2 Kbytes
- EEPROM : 1 Kbytes
- USB cable

2. Smart Farm

- Size : 320(W) × 410(D) × 250(H) mm
- Sensor : Temperature, Humidity, Soil sensor, CDS
- Potted Water Cycle Pump (LED Water Flow Display)
- Lighting LED
- Ceiling Opening Motor (Linear Step Motor) × 2EA
- Fan
- Model flower bed
- Power supply : AC 220V / DC5V power built in

3. WiFi Serial Board

- AP mode support
- STA mode support
- All-in-one sensor shield communication via 4-pin serial cable
- Built-in web server function
- UI service function for web server
- Internet cloud server interworking function
- Description Command Function for Self-Server Interworking
- Dedicated library provided

4. Communication training module for remote control

- Bluetooth module

5. Coding S/W for Bridge Language Support

- Development language support for user level
- Block mode, script mode, C language sketch input support
- Generation function of Real-time sketch code for block and script languages
- Arduino board upload function
- Serial communication console window function
- Sensor & Motor Control

Education Contents

1. Introduction to Arduino

- Introduction to Arduino
- Development SW Installation
- Development SW Setup
- Installation of Arduino Block Coding SW

2. Digital Command

- Digital Command
- Digital Parts Connection
- LED Control
- Setup Function
- Output of Value to Console
- Control LED with Button
- Implementation of Toggle Switch
- Application Practice

3. Analog Command

- Analog Command
- Analog Parts Connection
- Illumination Measurement
- Device that turns on itself when it gets dark
- Distance Measurement
- Creating Body Recognition Device
- Map Function

Temperature and humidity sensor and Motor control

- Temperature and humidity Sensor connection
- Measurement of temperature and Humidity value
- DC fan operation
- Motor pump control

5. Bluetooth communication

- Reading serial communication values
- LED control by serial communication
- Preparing App Inventor 2
- Tasting App Inventor 2 coding
- App Inventor 2 bluetooth coding
- LED control with smartphone

6. WiFi connection and control

- WiFi serial board connection
- Library installation
- AP mode setting and data reading
- AP mode sensor value transmission
- Network scan
- STA mode setting and data reading
- STA mode sensor value transmission
- Send sensor values to the cloud server
- Data reading from a cloud server

EDUCATIONAL SMART TECHNOLOGY

Smart Factory / IoT / VR / AR / Smart Car / 3D Printer / Drone
Robot / AI / Automatic Control / Renewable Energy
Electricity / Electronic / Software
Measuring Instrument

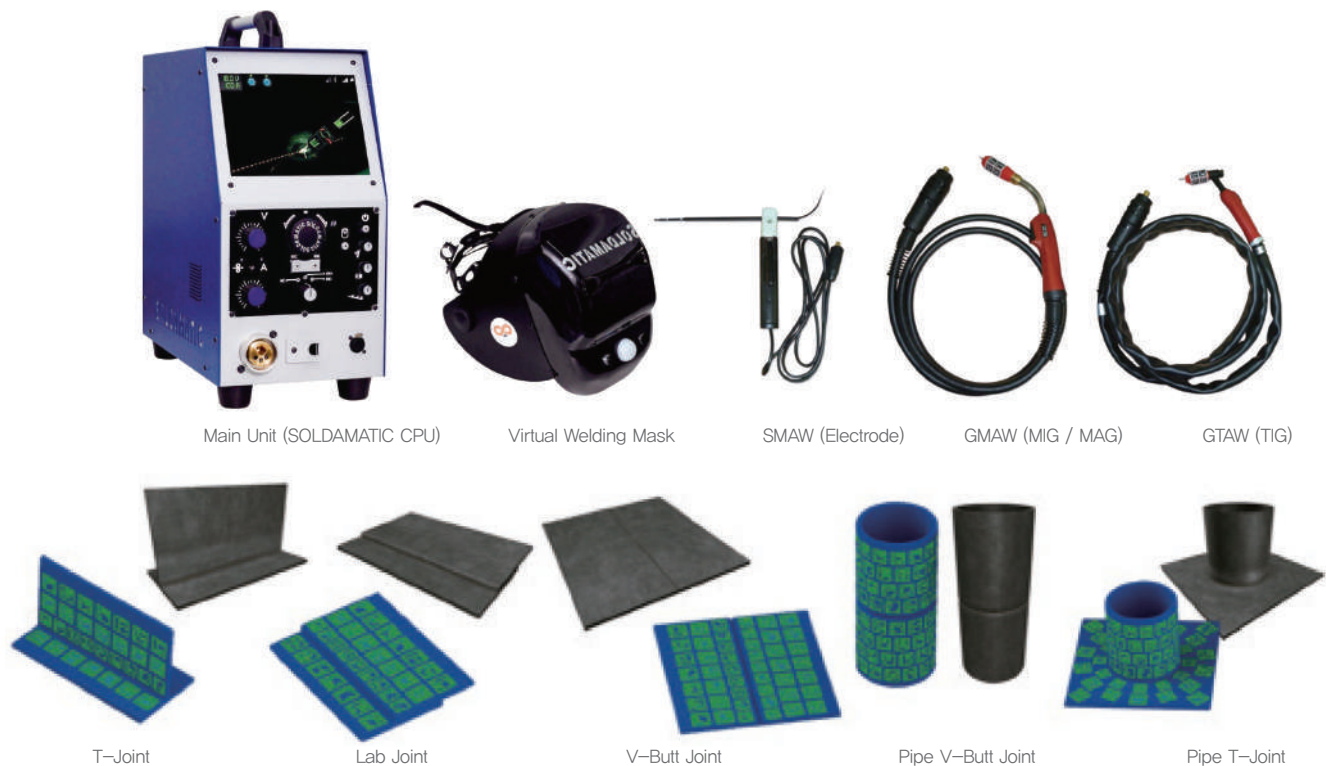
SOLDAMATIC

VR Virtual Welding Simulator



- Educational welding simulator equipment designed to practice welding technology in a virtual environment with a computer-based training system
- Eco-friendly training equipment that does not generate material waste associated with existing welding training and does not use electric energy compared to actual equipment
- Enables efficient welding skills for welding booths
- Maximize the practical effects by providing the same graphics, movements, and sound as the actual site
- Each individual device is networked, allowing teachers to acquire and collect all data from their PCs
- Support for teacher software

Main Composition





SOLDAMATIC Server



Wi-Fi Router



Welding Gloves



Working Carpet



Worktable (Desk fixed type)



Aviation case



Anti-Shock syste

Installation Case



Vuforia Studio (ThingWorx Studio) AR Production Platform



- Augmented Reality (AR) platform for business
- Authoring and publishing an AR environment that dramatically changes manufacturing, service, and education processes without extended programming or costly custom designers
- Enables enhanced efficiency, better product development, and enhanced safety and productivity by using the insights provided by the rich 3D and IoT
- Drag & Drop-based production environments that allow you to easily and quickly create and share AR experience
 - Reduced content production speed: Reusable 3D data, including the use of existing 3D CAD and animation sequences
 - Simplified enterprise scalability: Experience access and viewing in a single app.
 - Simple Insight: Real-time IoT and business system data utilization
- The case of Vuforia Studio
 - Visualization of data through AR
 - Improve worker efficiency by working guidelines such as step-by-step assembly and design
 - Reduce time and cost for worker training, and acquire smooth maintenance skills
 - Quick communication between the people in charge

Main Contents



Drag and Drop
Authoring



On-Line and Offline
Experiences



Advanced Spatial and
Model Tracking



Certified Hosting Cloud
and On-prem



Assisted Reality



Native IoT Integration



Universal Viewer



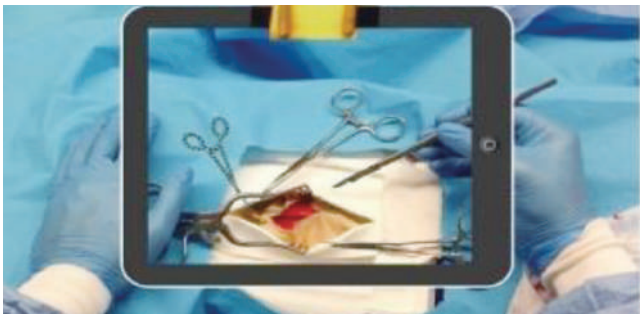
Global Scalability



Case of Application



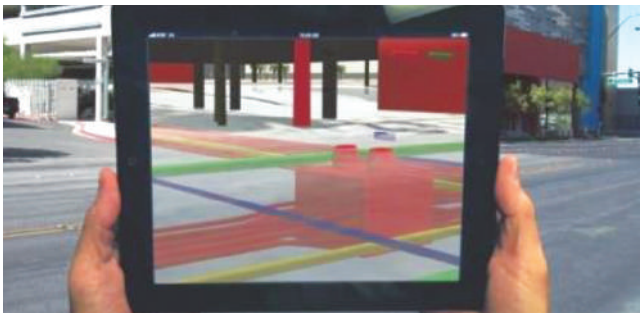
Design, Engineer, Architect



Medical care



Factory, Plant, Shipbuilding



Public facilities



Agriculture

EDUCATIONAL SMART TECHNOLOGY

Smart Factory / IoT / VR / AR / Smart Car / 3D Printer / Drone
Robot / AI / Automatic Control / Renewable Energy
Electricity / Electronic / Software
Measuring Instrument

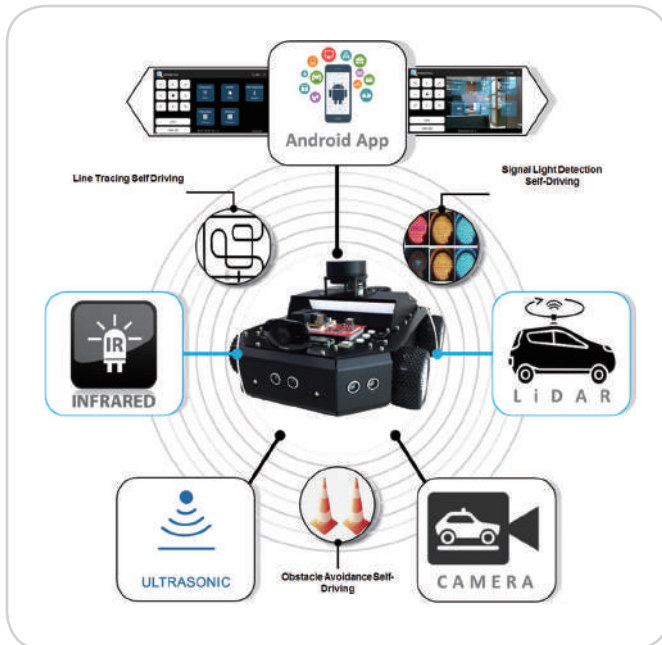
PART 4

Self-driving / Electric Motor Vehicle

46	EST-5022	Smart Car Trainer
48	EST-EV120	Electric Vehicle Simulator (IONIQ)
49	EST-6210	Hybrid Automobile Training System
49	EST-6200A	Automotive Electrical Electronics Lab Equipment
50	EST-1034	Automotive Basic Electrical and Electronic Trainer

EST-5022

Smart Car Trainer



Autonomous Smart Car

- Line- Tracing Self-Driving using floor sensor
- Detection of distance from front vehicle using distance detection sensor
- Self-Driving by automatically adjusting speed
- Recognize signal light using camera images and automatically stop and drive
- Recognize surrounding obstructions using the object detection sensor and drive automatically

Recognize surrounding obstructions using the object detection sensor and drive automatically

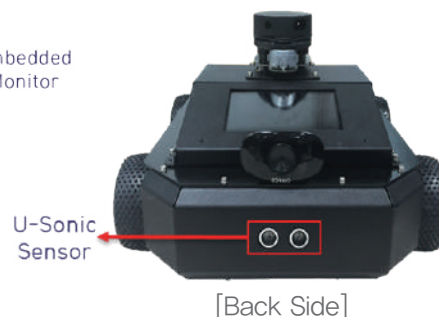
- Embedded systems and Arduino systems are configured to measure and collect sensor values attached to each location through serial communication and send control commands for Self-Driving.
 - Signal light recognition driving using camera image
 - Obstacle avoidance self driving using forward detection sensors
 - Maintain vehicle distance through forward detection
 - Line
 - Tracing Driving through the floor detection sensor
 - Light, Buzzer, LCD, Motor (Direction) Control

Main Composition



Android App

- Using the Android app, data from smart cars such as sensors, batteries, and driving images can be remotely received, monitored and controlled.



Education Contents

- Smart cars Introduction
- Equipment configuration and of development environment establishment
- Buzzer & Light module control
- Switch monitoring
- CLCD control
- Remaining battery power monitoring
- IR Sensor Monitoring
- Smart Car DC Motor Control
- Smart Car Driving and Switching direction Control
- Running speed monitoring using encoder
- Environmental sensors monitoring
- Front/rear detection sensor monitoring
- LiDAR sensor monitoring
- Obstacle avoidance driving using front/rear detection sensor
- Line Tracing Control using IR sensors
- Vehicle distance maintenance using front/rear detection sensor
- Smart car control using application
- Self-driving control through signal light detection

Installation Case



EST-EV120

Electric Vehicle Simulator (IONIQ)



- Customized education program for the structure and operation method of electric vehicle
- Useful educational program for field personnel interested in the development and production of parts in the field of electric vehicles

Detail Composition



Open type engine room



Battery part cutting and check terminal



External driving controller

Installation Case

- Electric vehicle overview
- Electric vehicle type
- Electric motors for electric vehicles
- Electric vehicle electric flow
- Electric vehicle operation principle
- Battery consumption check during driving
- Electric vehicle components
- Electric vehicle drive motor
- Charging apparatus
- Steering apparatus
- Air-conditioning and heating apparatus
- Check the charge amount when charging the battery
- Generator and AC/DC converter
- Motor control program of electric vehicle
- Motor control program of the electric vehicle
- Acceleration/Deceleration of vehicle, Torque control of motor
- Regenerative braking of the electric vehicle
- Understanding the application range of electric vehicles
- Checking battery consumption during air conditioning and heating operation

EST-6210

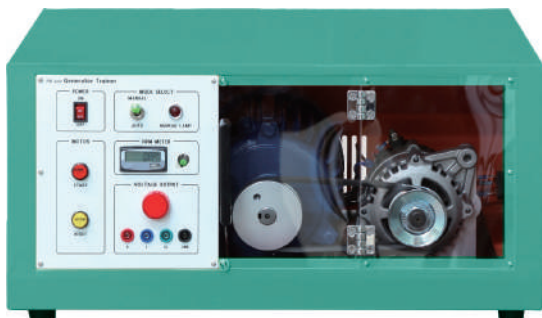
Hybrid Automobile Training System



- System control simulation practice of SONATA Hybrid Vehicle with hybrid system of parallel TMED (Transmission Mounted Electric Device) System
- Application of the hard-type hybrid system that runs in EV mode (drive motor) in low start and load driving mode
- Driving control system that applies 1/30 scale of a real hybrid drive system
- The DAQ module of NI is mounted to change the driving mode and implement the data measurement system (Waveform measurements and analysis by driving mode of the battery and the BLDC motor)
- Construction of GUI system using NI Labview S/W, Implementation of change/control system of driving mode

EST-6200A

Automotive Electrical Electronics Lab Equipment



- Basic principles for electrical and electronic education of automobile
- Experiment/practice from basic theory of electrical and electronics by practice items to the application of electrical and electronics in the automobile field
- Each module is mounted on the main body and supply power using the 4Ø terminal, and output data measurement experiment/practice
- The power supply device which steadily can supply the DC24V,12V,5V power source in the constant voltage supply device AC220V
- Each practice module is made of an injection case capable of expanding the side by a hinge method of insulating plastic material for safety.

EST-1034

Automotive Basic Electrical and Electronic Trainer



Real car component configuration

- It is composed of the part Relay(4 pin / 5 pin) and Lamp(2 kinds) used in the real car and it can practice with the realistic feeling

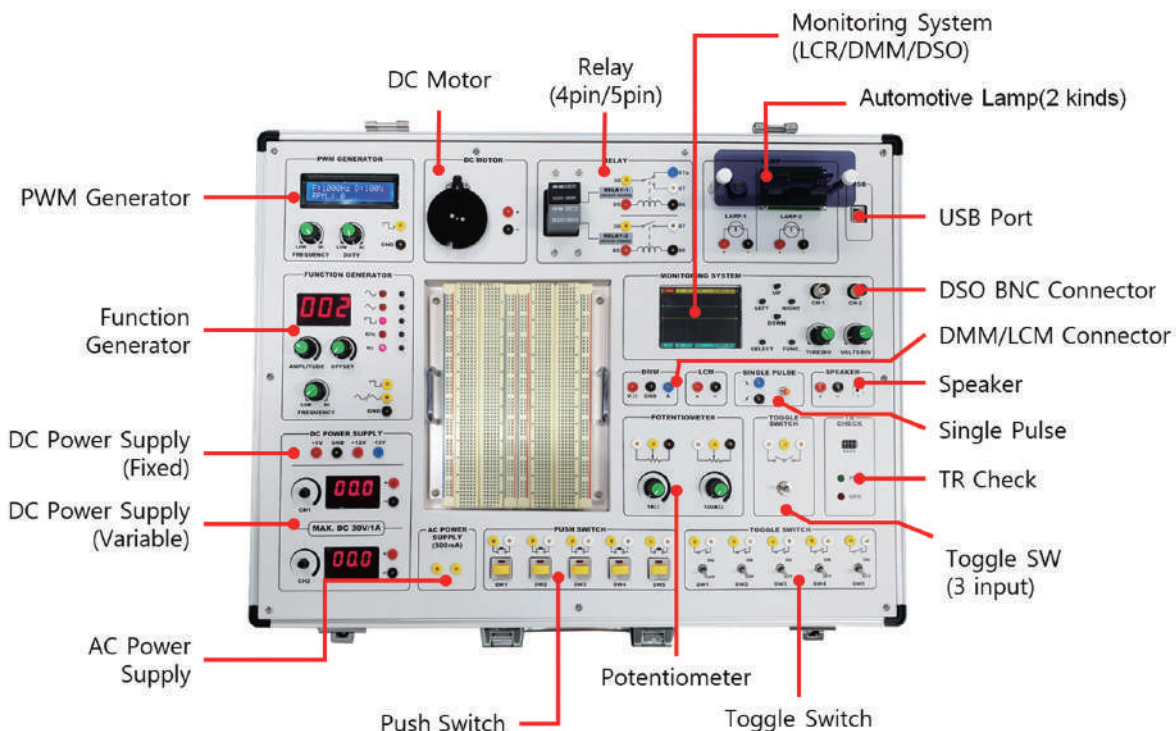
All-in-One configuration of the comprehensive instrument

- 2Ch Oscilloscope, Multi-Meta, LC Meta, Function Generator, AC/DC Power Supply is embedded and sufficient practice available without a separate measuring device
- Convenient confirmation of measurement value of comprehensive measuring instrument through 2.8-inch TFT LCD
- Measurement of oscilloscope waveforms (sine wave, triangle wave, square wave) using PC software

Practical scalability

- Supply of DC +5V, $\pm 12V$ fixed voltage and 2Ch DC variable power supply, and AC 12V (500mA) fixed voltage
- Variable resistance of 1 k Ω , 100 k Ω , speaker, and TR Check embedded
- Practice of rotation change of DC Motor by controlling frequency and duty of PWM Generator
- Digital practice with Push Button Switch and Toggle Switch

Main Composition



Education Contents

[Basic electricity]

■ Understanding fundamental knowledge

- Understanding fundamental knowledge
- History and substance of electricity
- Static and dynamic electricity
- Types of electricity, and three elements
- Electricity and waterways, electricity flow
- Direction of electron and current
- Characteristics of Voltage/Current/Resistance
- Conductor and semiconductor

■ Understanding of terms and laws

- Ohm's Law and Kirchhoff's law
- Loads / Power source and earth / Plus and minus
- Disconnection and short circuit / Open & closed circuit
- Inrush current and electric power
- Frequency and cycle / Duty
- Waveform Types / Analog and digital
- Self-induction action and mutual induction action

■ Understanding electrical circuit

- Circuit configuration and basic circuit
- Serial circuit / parallel circuit / serial parallel circuit
- Variable resistance circuit
- Series lamp circuit with different capacity
- Voltage distribution switch circuit

[Automotive electronics and material]

■ Understanding of automotive electronics

- Configuration of automotive power supply
- Battery and generator
- Motor and light bulb
- Type and characteristics of automobile power
- Vehicle ground / wire / circuit protection device
- Fuse and circuit breaker
- Connector and switch
- Relay, coil and electromagnet
- Solenoid and valve
- Heating apparatus

■ Understanding of electric and electronic material

- Resistor and condenser
- Rectification / generator / light emitting diode
- Transistor
- Field effect transistor
- Light receiving element
- Photo diode and a photo transistor
- CdS and thermistor
- Piezoelectric and hall elements
- Magnetic inductive and thermoelectric elements

■ Automotive electronics and material

- Understanding Car Sensors
- Temperature detection sensor
- Pressure detection sensor
- Flow detection sensor
- Rotary number detection sensor
- Position detection sensor
- Gas detection sensor
- Vibration detection sensor

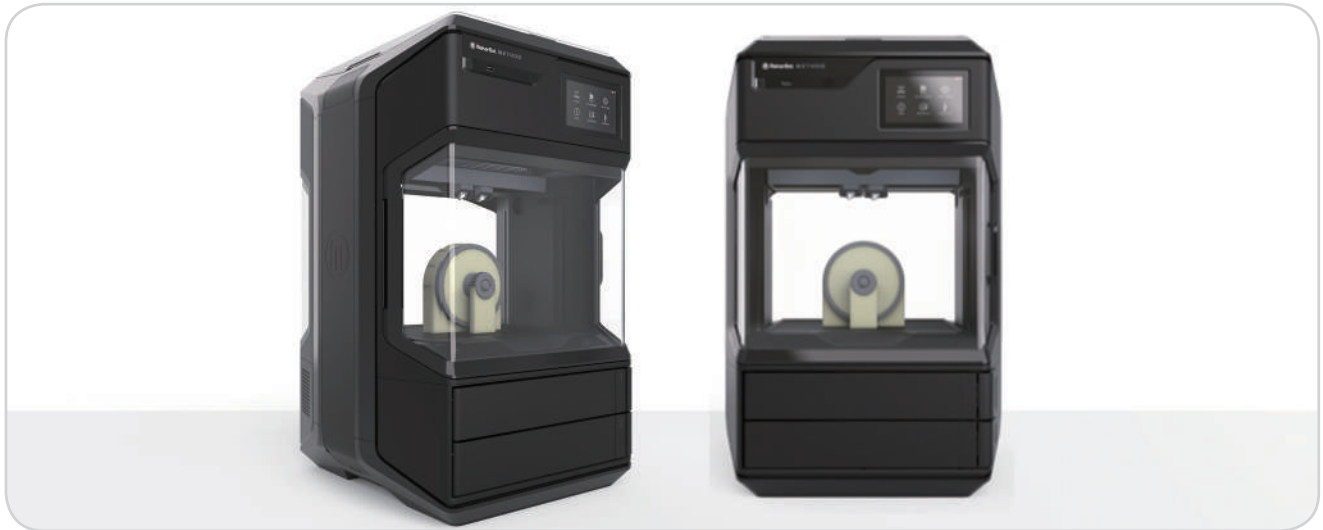
■ Understanding applied circuits

Method

MakerBot Industrial 3D Printer

MakerBot's first industrial 3D printer

Resolve the difference between industrial 3D printers and desktop 3D printer



Industrial reliability + Precision

- Design size customization
- Dimensional accuracy : $\pm 0.2\text{mm}$

Super high speed CAD-TO-PART

- Up to twice as fast as a desktop 3D printer
- Smooth printing work

Maximum innovation + Minimal investment

- The first year of ownership cost for industrial 3D printers for beginners is about 1/3, so no engineer is needed
- The design process is speeding up and the risk is reduced, saving time and cost

Inter-output heat cycle systems

Print to ensure dimension precision, layer adhesion, and improved part strength by adjusting the heat of all layers.

Dual Performance Extruders

- High-performance extruder with elongated thermal cores, optimized torque and industry's best sensor product line
- Maximize material extruded amount at a high speed by providing consistent and reliable extrusion on all layers

Precision dissolution PVA support

- To use precision dissolution PVA allows easy and fast removal of support without affecting the part design or dimension precision

Sturdy metal frame structure

- The overall length of the body is structured in an optimized metal frame to offset the bending.
- If the bending is small, the accuracy of the part increases and the error decreases, making the print quality more consistent.

Smart sensor + Connectivity

- 21 intelligent sensor networks are installed throughout the printer, making it easy to manage materials and prints and to control them overall.

Dimensional accuracy • $\pm 0.2\text{mm}$

Layer resolution

- Range: 20 – 400 microns

Product dimensions & Weight

- 43.7 L x 41.3 W x 64.9 H cm / 29.5 kg

Maximum build v+A15:D15e

- Single extrusion / 19 L x 19 W x 19.6 H cm
- Dual extrusion / 15.2 L x 19 W x 19.6 H cm

Extruder

- Double high-end extruder (model and support)

Build surface

- Spring steel build plate having a grip surface mounted thereon

Material storage

- Filament cartridge (Dry-Sealed Material Bays) and humidity / temperature sensor

Supported materials

- Precision Materials • TOUGH, PLA, PVA

Specialty Materials • PET-G, more to come

Connectivity • Wi-Fi, Ethernet, USB Drive

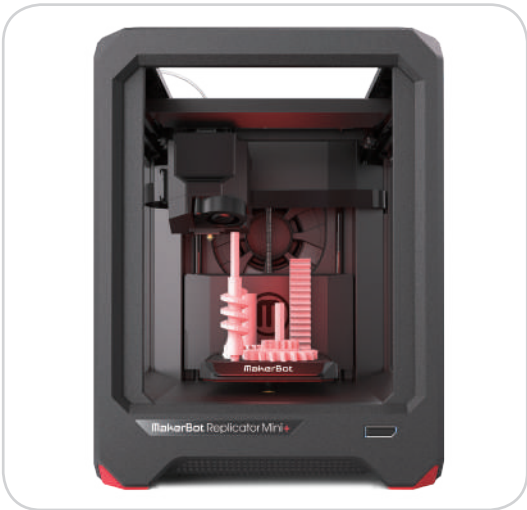
Power requirements

- 100~240V • 4A, 50~60Hz • Max. 400W

Replicator Mini+

MakerBot Compact 3D Printer

Printer with continuous reliability and performance



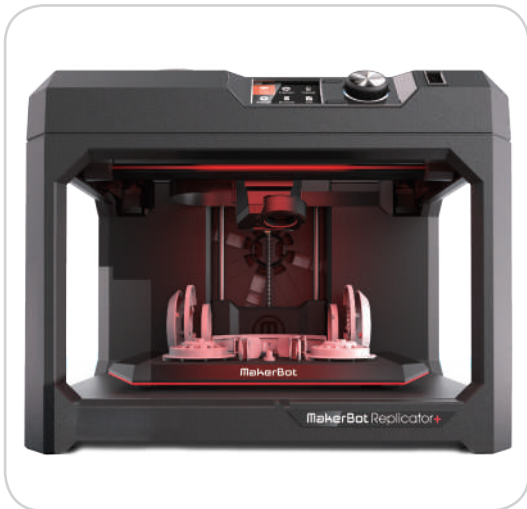
- Print Technology**
 - FDM (Fused Deposition Modeling)
- Build Volume**
 - 10,1 L x 12,6 W x 12,5 H cm [4 L x 5 W x 5 H in] 1,603cm³ [98in³]
- Min. | Max. Layer Resolution**
 - 100 microns | 400 microns
- Material Compatibility**
 - Small MakerBot PLA Material Spool 0,2Kg [0,5lb]
- Nozzle Diameter**• 0,4 mm [0,015 in]
- Ambient Operating Temperature**
 - 15–26° C[60–78° F]
- Storage Temperature**
 - 0–38° C [32–100° F]
- Product Dimensions & Weight**
 - 29,5 L x 34,9 W x 38,1 H cm [11,6 L x 13,8 W x 15,0 H in] 9,3kg [20,5lbs]
- Software Bundle**
 - MakerBot Print, MakerBot Mobile
- Power**
 - 100–240V, 50/60Hz, 0,75–0,45A

- Operating Systems & Supported File Types**
 - Mac Os X 10,9+ (.makerbot)(.stl)Windows 7, 10 (.makerbot)(.stl)(.ipt, .iam) (.sldprt)(.ldasm)(.ies, .igs)(.step, stp)(.catpart, .catproduct)(.obj)(.prt)(.par, .asm)(.prt)(.wrl)(.x_t, .x_b)

Replicator+

MakerBot Desktop 3D Printer

Unsurpassed performance with superior results and continuous reliability



- Print Technology**
 - FDM (Fused Deposition Modeling)
- Build Volume**
 - 29,5 L x 19,5 W x 17,5 H cm [11,6 L x 7,6 W x 6,5 H in] 9,492cm³ [573in³]
- Min. | Max. Layer Resolution**
 - 100 microns | 400 microns
- Material Compatibility**
 - Large MakerBot PLA Material SpoolLarge MakerBot Tough PLA Material Spool 0,9Kg [2,0lb]
- Nozzle Diameter**
 - 0,4 mm [0,015 in]
- Storage Temperature**
 - 0–38° C[32–100° F]
- Product Dimensions & Weight**
 - 52,8 L x 44,1W x 41,0 H cm [20,8 L x 17,4 W x 16,2 H in] 18,3kg [40,4lbs]
- Software Bundle**
 - MakerBot Print, MakerBot Mobile
- Power**
 - 100–240V, 50/60Hz, 0,75–0,45A
- Ambient Operating Temperature**
 - 15–26° C[60–78° F]

- Operating Systems & Supported File Types**
 - Mac Os X 10,9+ (.makerbot)(.stl)Windows 7, 10 (.makerbot)(.stl)(.ipt, .iam) (.sldprt)(.ldasm)(.ies, .igs)(.step, stp)(.catpart, .catproduct)(.obj)(.prt)(.par, .asm)(.prt)(.wrl)(.x_t, .x_b)

Replicator Z18

MakerBot Desktop 3D Printer

The best price-to-performance ratio in the extra-large, professional 3D printer category



Print Technology

- FDM (Fused Deposition Modeling)

Build Volume

- 30,5 L x 30,5 W x 45,7 H cm
[12,0 L x 12,0 W x 18,0 H in]
42,512cm³ [2,592in³]

Layer Resolution

- 100 microns

Material Diameter

- 1,75 mm [0,069 in]

Material Compatibility

- MakerBot PLA Material
L: 0,90 kg [2,0 lb]
XL: 2,26 kg [5,0 lb]*
XXL: 4,53 kg [10,0 lb]*
* MakerBot PLA Material case need

Build plate

- Injection molding PC-ABS

Print chamber

- Enclosed, heating build chamber

SIZE & WEIGHT

- 49,3 L x 56,5 W x 85,4 H cm
[19,4 L x 22,2 W x 33,6 H in]
41 kg [90 lbs]

Supported File Types

- STL | OBJ | THING | MAKERBOT

Connectivity

- USB, Ethernet, Wi-Fi

Power

- 100–240 VAC; 5,4–2,2 A; 50/60 HZ; 350 W

Operating Systems(OS)

- Windows (7+), MAC OS X(10.7+),
Linux(Ubuntu, Fedora)

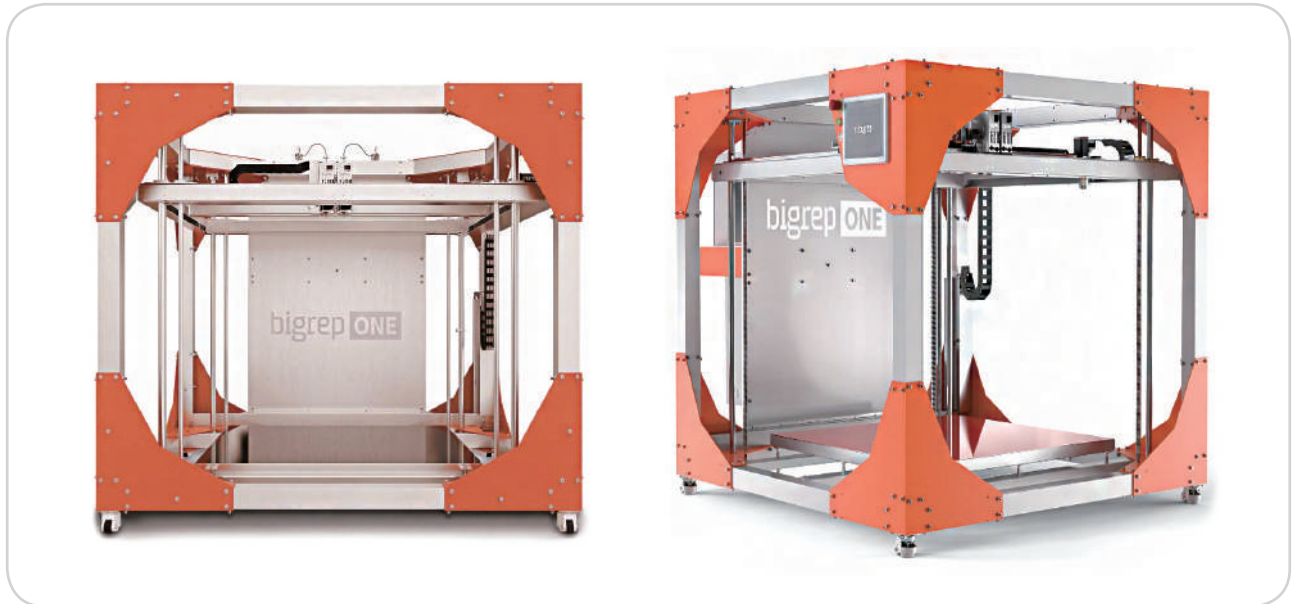
Camera Resolution

- 320 x 240

BigRep One

Supersized Industrial 3D Printer

Supersized 3D printer capable of printing 1,005 L x 1,005 W x 1,005 H mm) large industrial sizes



Equipped with various sizes of material

The dual nozzle of the independent modular is used

- The water-soluble material can be used and the nozzle can be easily detachable and replaced

The frame shape is open-type and the safety

- Integrated sensor attachment enables monitoring of output progress

Layer height resolution

- 400~900 microns / 150~400 microns

Extruder

- Two modular extrusion heads

Printing technology

- FFF : Fused-Filament-Fabrication(FDM*)

Support materials

- BigRep PVA, HIPS

Weight

- Approx. 460kg

Power

- 208V~240V, 16A, 50/60Hz

GUI

- Top Performance PC and onboard Remote application program for Linux, Mac OS X, Windows, iPhone OS, and Android

1m³ large build volume available

Easy and intuitive GUI

atic print bed leveling

- Printing beds maintain a constant temperature and have excellent adhesive strength

Build volume

- 1,005 L x 1,005 W x 1,005 H mm

Positional accuracy

- 100 microns

Bed leveling resolution

- <100 microns

Certified BigRep materials

- PLA, PETG, Pro HT, Pro Hs, PVA

Heating method

- Heated printing bed(60~80°C)

Size

- 1,850 L x 2,250 W x 1,725 H mm

Safety certifications

- CE approved

BigRep Pro

Supersized Multi-material Industrial 3D Printer



Industrial material compatibility

- The insulated filament cabinet

Shielded printing

- The enclosed frame

Speed & Precision

- MXT Technical precision extruder

Nozzle size

- 1mm / 0.6 ~ 2mm

Acceleration

- Up to 10 1/s²

Certified BigRep materials

- PLA, PETG, Pro HT, Pro Hs, PVA, Nylon, ASA, PP

Print bed temperature

- Max. 99°C

Size

- 1,950 L x 2,430 W x 1,790 H mm

Bosch Rexroth Technology

- CNC motion— control system

Build volume

- 1,005 L x 1,005 W x 1,005 H mm

Extruder

- 2 MXT Extruder

Layer height resolution

- 0.1 ~ 0.8mm

Printing technology

- Fused Filament Fabrication (FDM)

Support materials

- Soluble Plastics

Weight

- Approx. 1,550kg

Power

- 3 X AC 400V, 50/60Hz, 5100W

Safety certifications

- CE approved

BigRep Studio

Large Industrial 3D Printer



Build Volume

- 500 L x 1,000 W x 500 H mm

Printing Speed

- Max. 140 mm/s (layer height of as little as 0.1 mm.)

Extruder

- Standard ver. : Single extruder
- Advanced ver. : Dual extruder
(Equipped with 0.6mm nozzle)

Certified BigRep materials

- PLA, PETG, Pro HT, Pro Hs, PVA

Weight

- 약 250kg

Safety certifications

- CE approved

Layer height resolution

- 100 ~ 400 microns

Acceleration

- Up to 1,000 mm/s²

Printing technology

- FFF : Fused-Filament-Fabrication(FDM*)

Print bed temperature

- 60~80°C

Size

- 1,022 L x 1,660 W x 1,500 H mm

GUI

- Onboard multi touch panel

BigRep Studio G2

Enclosed Large Industrial 3D Printer



Engineering-grade materials.

- Ruby nozzles

Fully enclosed environment

- Auto-pause function

Independent temperature controls

- The heated filament chamber

Optimal printing temperatures

- Semi-automatic leveling

The massive build volume

- 500 L x 1,000 W x 500 H mm

Certified BigRep materials

- PLA, PETG, Pro HT, Pro Hs, PVA, Nylon, ASA, PP

Print bed temperature

- Max. 100°C

Size

- 1,715 L x 1,170 W x 1,765 H mm

Safety certifications

- CE approved

Build Volume

- 1,000 L x 500 W x 500 H mm

Layer height resolution

- 0,1 ~ 0,5mm

Extruder

- Dual extruder
Equipped with two 0,6 mm hot ends

Acceleration

- Up to 600mm/s²

Printing technology

- Fused Filament Fabrication (FFF)

Support materials

- Soluble Plastics

Weight

- Approx. 500kg

Power

- 208V~240V, 16A, 50/60 Hz

BigRep Edge

1.5m Large Industrial 3D Printer



- Large chambers, large buildforms
- Enormous Print Bed, Build Volume
 - 1,500 L x 800 W x 600 H mm
- Fast speed and Precision MXT extrusion
 - Second-generation extruder
- THE GRAPHICAL USER INTERFACE
- Build Volume
 - 1,500 L x 800 W x 600 H mm
- Layer height resolution
 - 0.1 ~ 0.6mm
- Extruder
 - 2 MXT Extruder
- Nozzle size
 - 0.6mm와 1mm 노즐
- Power
 - 240V~360V, 3 x 32A, 50/60 Hz

- Acceleration
 - Up to 10 1/s²
- Printing technology
 - Fused Filament Fabrication (FDM)
- Printable material
 - PLA, PETG, Pro HT, Pro Hs, PVA , Nylon, ASA, PP, PC, Ultem, PEEK
- Support materials
 - Soluble Plastics
- Print bed temperature
 - Max. 220°C
- Chamber temperature
 - Max. 200 °C
- Size
 - 3,100 L x 1,600 W x 2,220 H mm
- Safety certifications
 - CE/UL/FCC/Korean Certification

POCKET NC V2

5 Axis CNC Milling



SPINDLE Specification

- Spindle Speed: 2,000–10,000 rpm
- Power Output: 104 Watt
- Spindle Motor: BLDC 3 Phase with Hall Feedback
- Spindle Runout: ~ 0.0005 in
- Tool Change: 3mm Hex Key
- Tooling: ships with 1/8th inch collet, option to use 16 other sizes

Component

- 5 NEMA 17 Motors
- 3 linear lead screws with preloaded nuts
- 2 Rotary Worm Drives
- Linear Bearings, 9 & 42mm, 10% preload
- Integrated angular contact rotary bearings
- 6061 Aluminum Frame, ± 0.002 in squareness in all axes
- Machine Dimensions:
 - Fully extended: 444.5 mm wide x 317.5 mm tall x 279.4 mm deep
 - Fully compressed: 330.2 mm wide x 214.3 mm tall x 228.6 mm deep

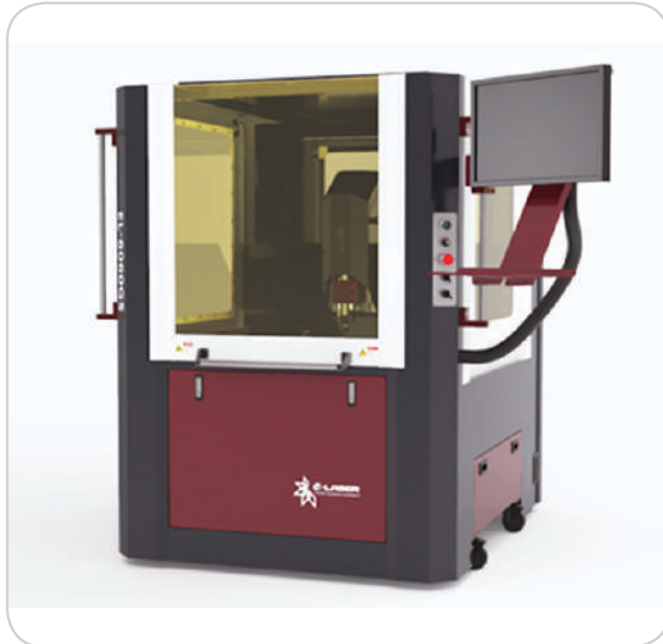
EST-1390LKM

Laser Cutting Machine



- The laser cutting machine capable of the metal/non-metal processing
- This equipment has a wide processing area (1300x900), and advanced features and convenience function, such as autofocus, convenient beam control, and laser output digital meter, where laser nozzles move automatically.
- Equipment capable of marking and cutting of the nonmetallic material, and marking and cutting of the metal material
- A smooth shift in work between metals and non-metals

EST-6060GS CNC Machine



- A small CNC machine with a processing area of 600 L x 600 W mm, which is made to be able to process in a small space such as a university, a laboratory, a laboratory, or a small workplace
- Excellent durability based on bed heat treatment and precision processing
- Metal materials such as aluminum are also capable of precision and continuous processing.
- Selectable spindles that are suitable for processing materials
- Enables efficient workspace utilization by applying the gantry structure

PrimeCut48 CNC Machine



- Large CNC machines with 1,220 L x 2,440 W mm processing area
- Excellent durability based on bed heat treatment and precision processing
- Metal materials such as aluminum can be processed in precision/continuous processing
- Selectable spindles that are suitable for processing materials
- Enables efficient workspace use by applying the gantry structure
- Maximize work stability and efficiency by choosing high-performance servo motors and mounting domestic control programs
- 3.6 to 4 ton equipment weight can be processed stably

EDUCATIONAL SMART TECHNOLOGY

Smart Factory / IoT / VR / AR / Smart Car / 3D Printer / Drone
Robot / AI / Automatic Control / Renewable Energy
Electricity / Electronic / Software
Measuring Instrument

PART 6

Drone

66	EST-5025	Drone Basic Trainer
70	EST-5021	Drone Control Trainer
72	EST-5027	Drone Application Trainer
74	EST-5023	Small Multicopter Development Trainer

EST-5025

Drone Basic Trainer



Drone Core Element Skill Learning

- Planar configuration to intuitively identify intensively constructed drone element technologies
- Adopting an open source-based microprocessor makes it easy for learners to set drones and practice flight.

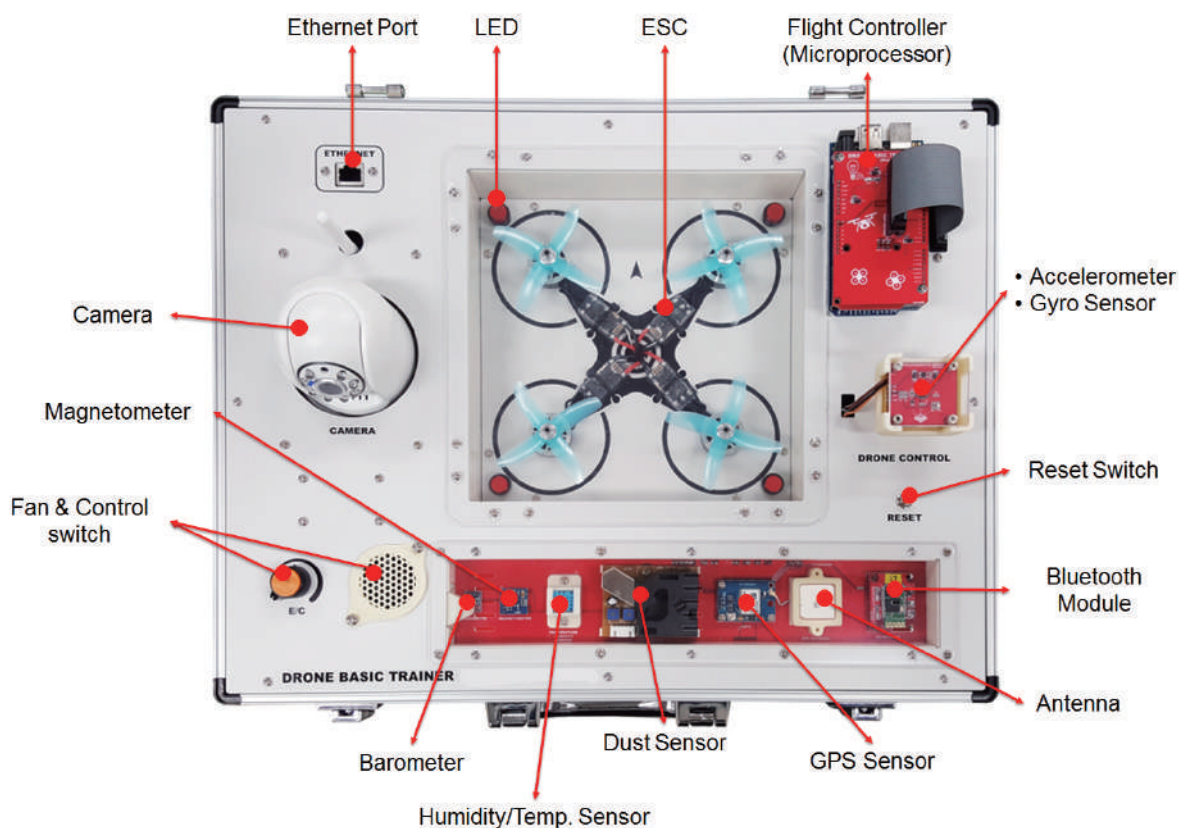
Drone Set through PC Software

- Through software, we check the values of various sensors and motors mounted on the drones and learn how to set the actual drones safely and repeatedly through simulation
- Set up a virtual flight environment and repetitively learn the settings required for the flight of the drones that fit the situation

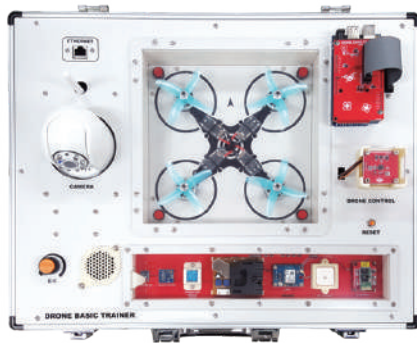
Android App

- Drone Control Learning via dedicated AndroidApp registered in Play Store
- By connecting App and the training equipment, it is possible to remotely monitor and control with Bluetooth communication
- Remote control and monitoring of the camera through Wi-Fi communication

Main Composition



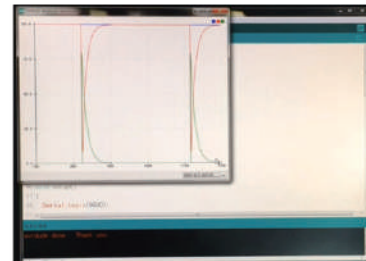
PC Software



Equipment operation

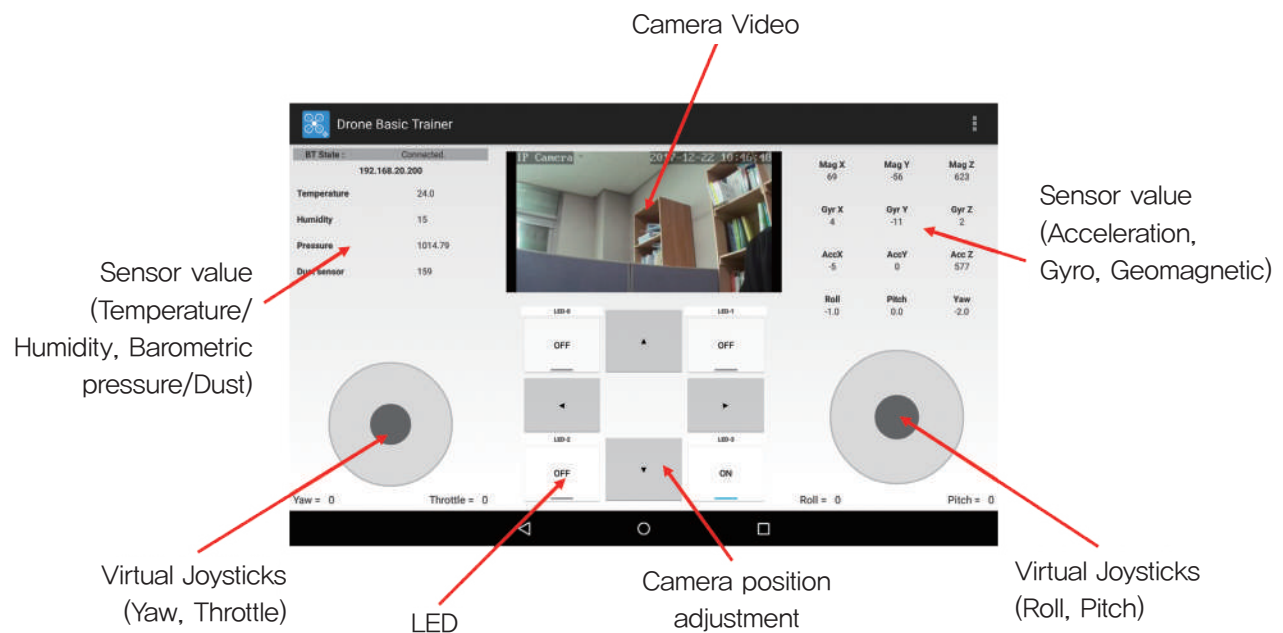


Data change monitoring of various sensors mounted on Drones



Motor rotation change monitoring through serial monitor

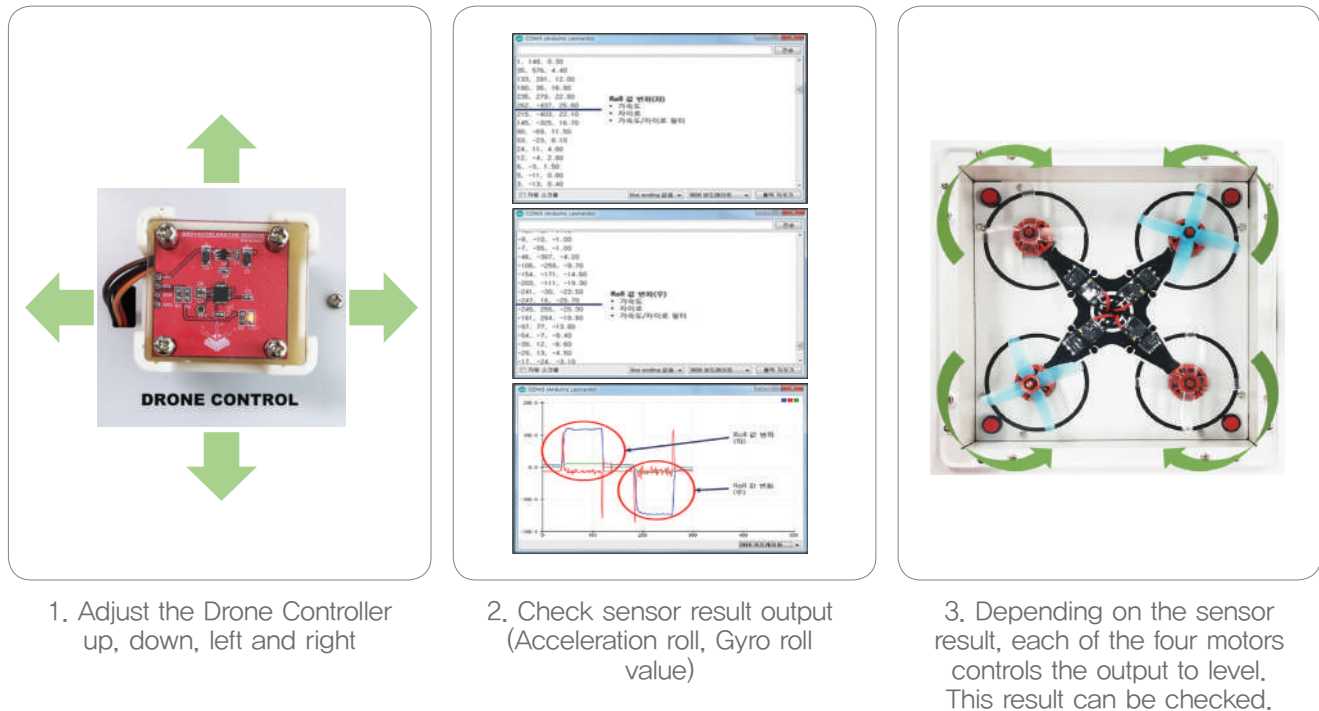
Android App



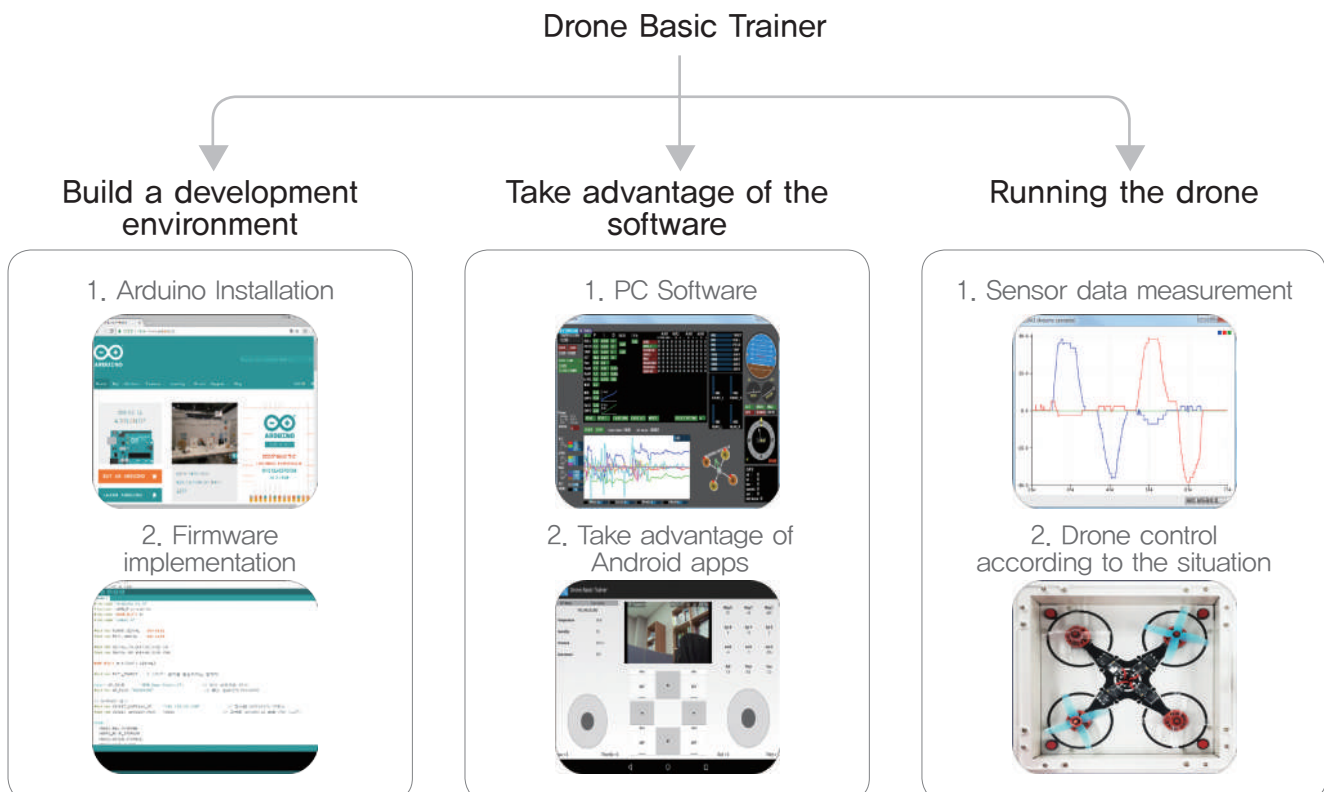
EST-5025

Drone Basic Trainer

Practice example (Controlling sensor value and Drone according to the movement of drone controller)



Introduction to the Learning Flowchart



Education Contents

- Drone definition and configuration
- Acceleration/gyro sensor monitoring
- Roll and Pitch values monitoring according to Acceleration/Gyro Sensor Values
- Geomagnetic sensor monitoring
- Temperature/humidity sensor and dust sensor monitoring
- Drone position monitoring using GPS
- Motor control
- Motor control in drone direction
- Motor control according to drone rotation and altitude
- Motor Control Using PID Control
- Drone control using PID control
- Drone control using barometer
- Application execution and setting using Bluetooth
- Drone remote monitoring and control (Bluetooth, Android App)
- Drone camera remote monitoring (Wi-Fi, Android App)

EST-5021

Drone Control Trainer



One-Stop from Assembly to Flight

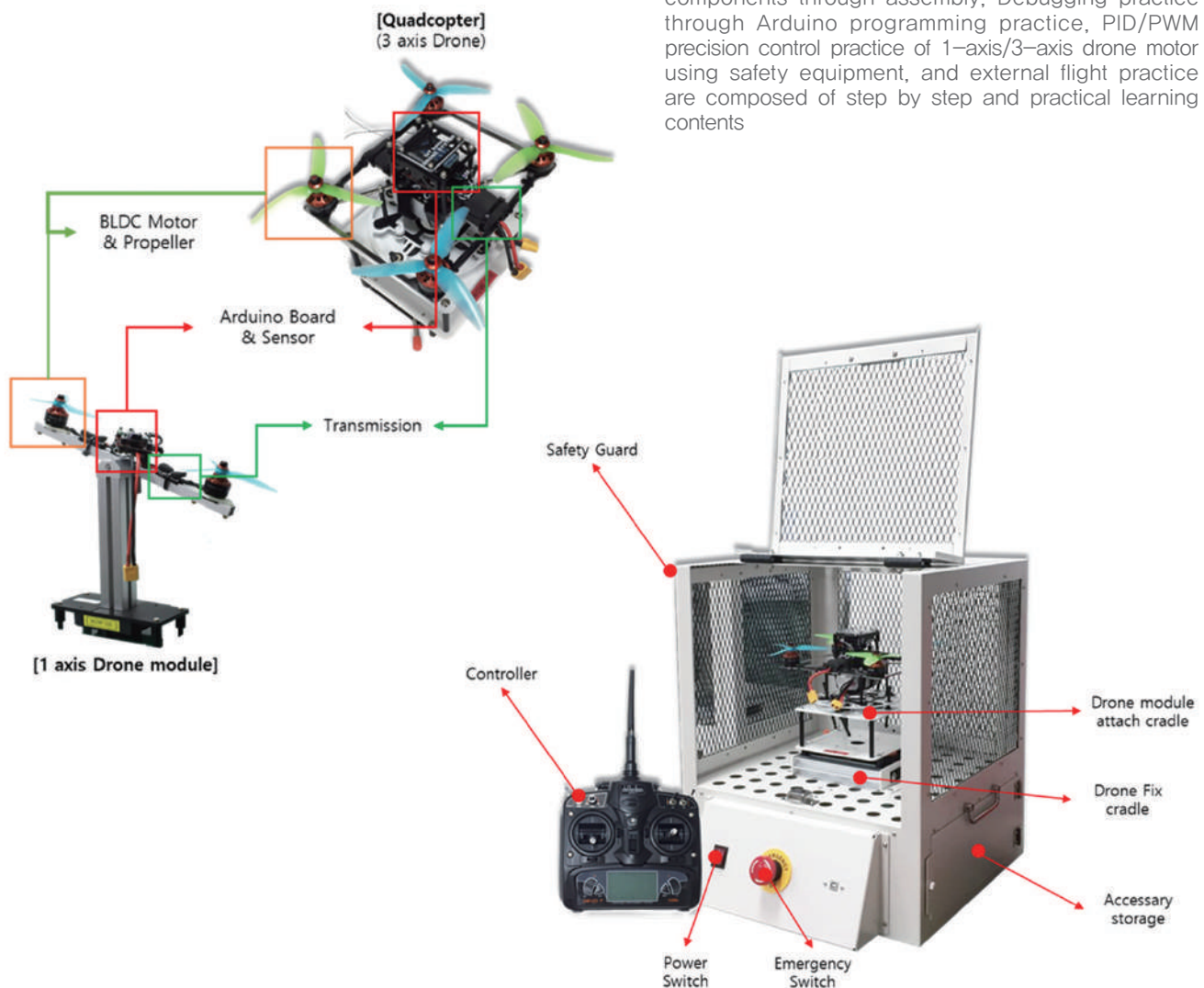
- Based on the assembly drawings provided, it is possible to practice race drones assembly. Through the above practice, it identifies the functions of drone components and cultivates maintenance capabilities
- Drone fitting ability cultivation such as various sensor value setting, and PWM precision control of BLDC motor for flight practice
- Use safety equipment with emergency stop switches for sufficient fitting and safe flight practice before an external flight

Provide a safe and ideal practice environment

- The risk of the drone damage and safety of learner are secured through the safety equipment, and the ideal practice environment of the flight practice and drone fitting is established through the optimal design of the structure fixing the safety equipment and drone

Step-by-Step Learning Contents

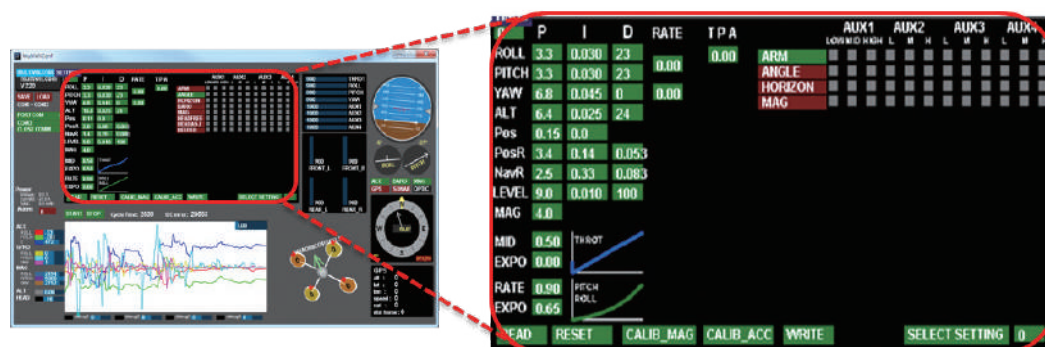
- Understanding the functions and principles of drone components through assembly, Debugging practice through Arduino programming practice, PID/PWM precision control practice of 1-axis/3-axis drone motor using safety equipment, and external flight practice are composed of step by step and practical learning contents



Main Composition



- Drone sensor value setting and upload using software



- Set PID value of BLDC Motor while adjusting drones using RC controller.
- When the setting is completed, press the 'Write' button to store the PID value in the drone

Education Contents

1 Dron Foundation

- Introduction to Drone Practice Equipment
- LED control
- Accelerated/Gyro Sensor Monitoring
- Accelerated/Gyro Sensor
- Filtering
- Monitoring using MultiWii
- Notes on drone use

2 1-axis drone control

- Motor PWM Control of a one-axis drone
- Rotation of a one-axis drone motor using PID control
- One-axis drone control using PID control
- Construction of Application-use environment
- Drone control using smartphone

3 Axis Drone Control

- Control of motor PWM of three-axis drones
- Control of the three-axis drone motor according to the direction of movement
- Control of the 3-axis drone motor according to rotation and altitude
- Rotation of a three-axis drone motor using PID control
- 3-axis drone control using PID control
- Binding of RC controller

EST-5027

Drone Application Trainer



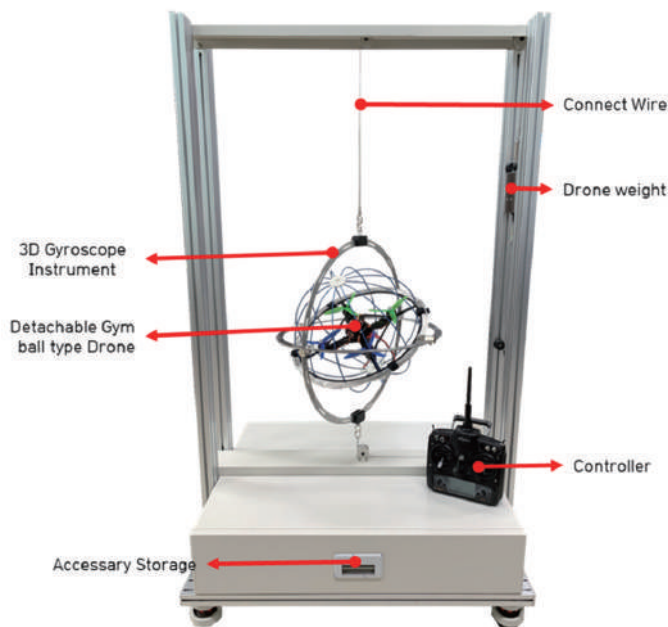
Safe and Ideal Practice Environment through Gym Ball-Type Drone

- 3D gyroscope instruments are provided to ensure safe and efficient drone flight practice inside the laboratory
- The quadcopter drone is mounted, so that the height, moving direction, and rotation control practice of the drone is possible according to the control speed of 4 propellers.
- Quadcopter drone provides PID precision control exercise contents using BLDC motor and ESC
- The gym ball-type drone is detachable and can be programmed and calibrated in safety in the instrument and flown outdoors
- A safe gym ball-type structure, which can be used in various ways such as drone soccer, drone racing, etc.

Step-by-Step Learning Contents

- PID control of the one-axis training module enables drone posture control and drone flight programming education through up and down the operation of both ARMs
- A quadcopter drone flight training using 1-axis training module flight and RC controller using BLUETOOTH communication
- A debugging practice through Arduino programming practice, PID precision control practice of 1-axis/3-axis drone motor using safety equipment, and practical learning contents from outside flight practice

Main Composition

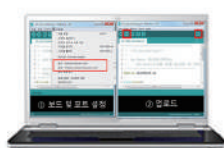


[Gym ball type Drone]



[3D Gyroscope Instrument]

1-Axis Horizontal Module Control (PID Control Use)



Program Upload
(USB Cable)

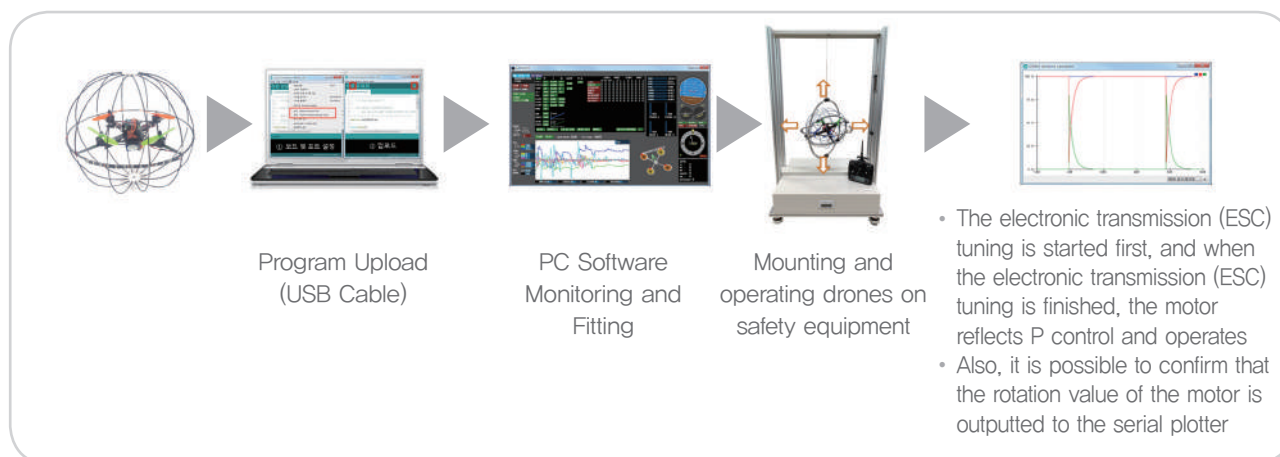


PC Software
Monitoring and Fitting



- Drone Control using Android App
- A level controls the output of the left/right motor differently to adjust the level to hold the level.

Quadcopter Control (PID Control Use)



Installation Case



Drone Basic

- Drone application training equipment
- Equipment introduction and Environment construction
- LED control
- Acceleration/gyro sensor monitoring
- Acceleration/gyro sensor filtering
- Monitoring using MultiWii
- Precautions when using drone
- PWM control of BLDC motor of drone
- PID control understanding of drone
- Monitoring of motor output correction value using PID control
- Drone motor control according to the direction of movement
- Drone motor control according to rotation and altitude
- Implementation of hovering function of drone
- Set for drone flight
- Basic motion control using RC controller
- Drone altitude and rotation control using RC controller
- Drone application control using RC controller

EST-5023

Small Multicopter Development Trainer



Based on NCS 'Small Multicopter Development'

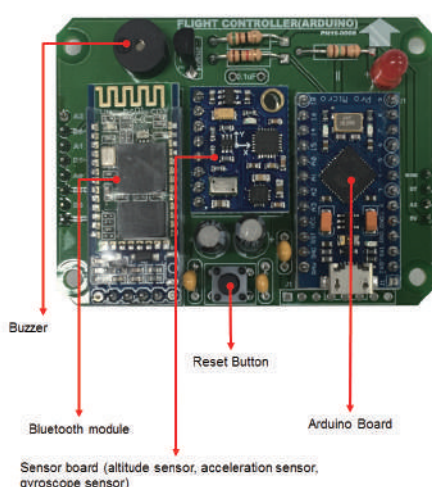
- Configure and design an optimized small multicopter system that meets the development requirements, based on an understanding of flight and control principles of small multicopter systems
- The quadcopter-based drone design enables basic assembly learning on the basic principles and structure of the drone, and analyzes gyro sensor data to learn to control the motor PID and flight method
- Design to enable easy experiment practice using open source-based microcontroller
- Contents are configured so that the trainee can assemble and complete the components of the drones such as the Flight Controller, motor, control device, sensor module, controller, charger, etc. of the drones

Practice professionalism and Safety secure

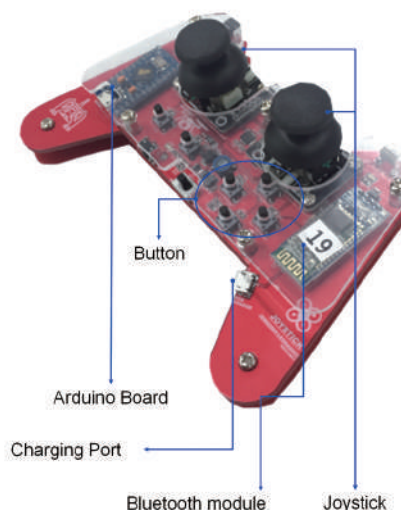
- Acceleration, gyro, and altitude sensors used in drones are provided with detachable structures to secure expertise
- FET-based motor drivers are provided to enable precise PID control
- Provides PC GUI capable of PID and the drone state control and sensor monitoring for precise drone fitting
- The drone and the controller can be directly piloted by an trainee using wireless communication
- The motor device is configured to mount a protective guard for safe flight

Main Composition

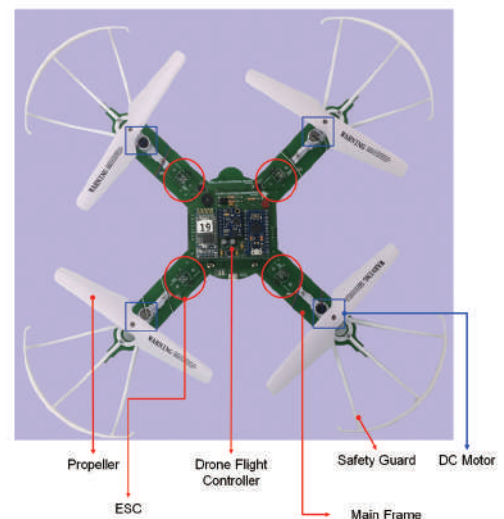
[Drone Flight Controller]



[Controller]



[Quadcopter Drone]



Education Contents

Concept setting of multicopter

- Flight of Multicopter
- Flight of multicopter according to the arranging method of wings and the structure of gas
- Flight of multicopter according to the power supply
- Flight of multicopter according to propeller and fixed Method
- Multicopter system hardware configuration
- Sensor configuration and operating principle of multicopter
- Safety requirements for multicopter flight
- Flight of multicopter using simulator program

Multicopter system design

- Multicopter Structural Design Following Requirements
- Power supply selection according to development requirements
- Selection of thrust systems according to development requirements
- Selecting a controller according to development requirements
- Implementation of electrical and electronic system parts
- Design of multicopter based on requirements
- Fabrication of the shape of airframe using 3D design tool

Multicopter Propulsion System Design

- Type of multicopter propulsion system
- Various power transmissions of multicopter systems
- Components and principles of multicopter propulsion system
- Performance prediction and selection of propulsion systems in accordance with requirement conditions
- Design of a combined structure of propulsion system and airframe
- Multicopter assembly

Design of Multicopter Flight System Control

- Multicopter flight control system configuration
- Basic element control and monitoring of multicopter
- Sensor composition and principles of multicopter
- Data communication(Data link) between the GCS (Ground Control System) and the FCC(Flight Control Computer)
- Various control techniques of multicopter
- Application control of multicopter

EDUCATIONAL SMART TECHNOLOGY

Smart Factory / IoT / VR / AR / Smart Car / 3D Printer / Drone
Robot / AI / Automatic Control / Renewable Energy
Electricity / Electronic / Software
Measuring Instrument

PART 7

Robot / AI

78	EST-2011	Artificial Intelligence(AI) Trainer
80	EST-2016	Big Data Trainer
82	EST-5019	Mobile Robot Trainer
84	EST-5017	Self Balancing Robot Trainer
85	EST-5016	Robot Manipulator Trainer
86	EST-5009	Humanoid Robot Trainer
88	EST-5000	Robot HRI Trainer
90	Krypton	Intelligent Disassembly and Assembly Robot
91	EC-66	Cooperative Robot System
92	UR 3e / UR 5e / UR 10e	Cooperative Robot System

EST-2011

Artificial Intelligence(AI) Trainer



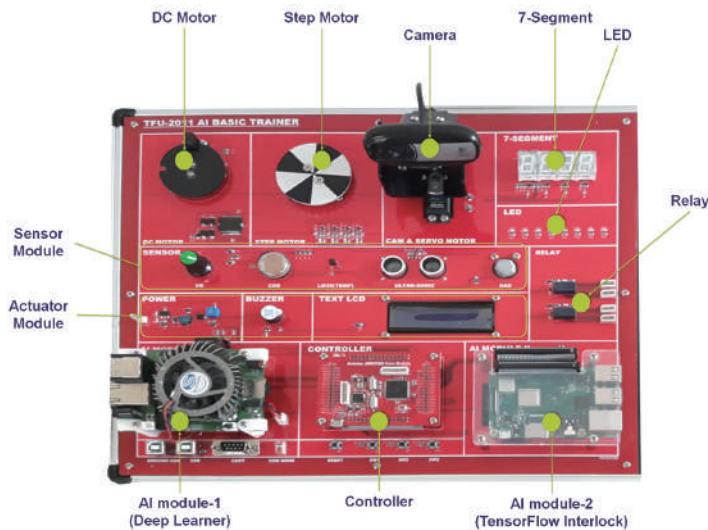
Effective AI Practice Curriculum

- A curriculum is designed to enable students to easily learn the concept of artificial intelligence, experience various types of artificial intelligence algorithms, and practice artificial intelligence using direct learning data

Artificial Intelligence(AI) Service Development

- By experiencing and practicing the concept of artificial intelligence used in everyday life, it is possible to develop and implement creative artificial intelligence service based on the understanding of the process and algorithm of artificial intelligence
- Learning various kinds of artificial intelligence algorithms repeatedly, learning the step-by-step and systematic artificial intelligence development processes such as learning data production, algorithm learning, and learning model generation.
- Basic training of artificial intelligence programs such as place holder, variable, linear regression model implementation through TensorFlow basic programming is possible
- MNIST, CNN, GAN, RNN, and other artificial intelligence algorithms can be practiced

Main Composition



PC

- 01 Making Learning Data
- 02 Making a Learning Model
- 03 Applying a 'Deep Learning' Learning Model

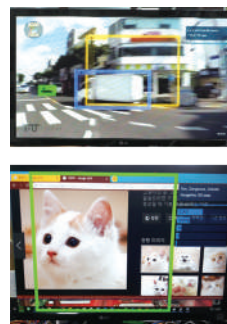


Artificial Intelligence Trainer

1. Applying learning model to Deep Learning module
2. Send input data (image, voice, text, etc.) to the determination and control unit

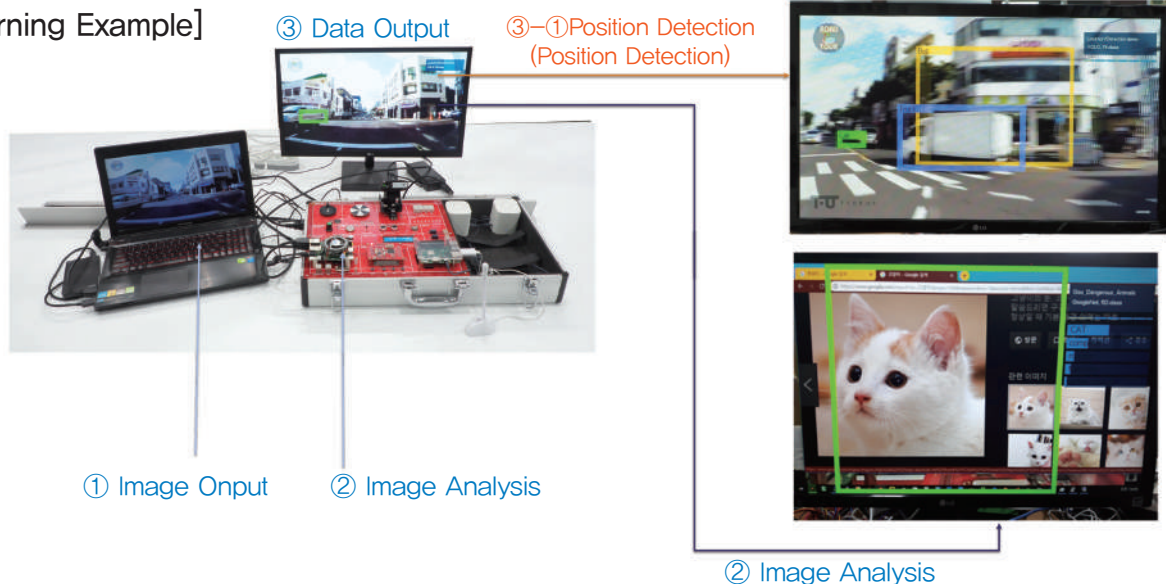


Judgment Result



- Operation of Control Elements in Control Modules such as Buzzer, Motor, etc.
- Comparison of results according to learning volume
- Comparison of results according to input data
- Improve completeness through multiple data updates

[AI Learning Example]



Education Contents

Artificial Intelligence Technology Overview

- Artificial Intelligence overview
- Artificial Intelligence algorithm types
- Application case of Artificial Intelligence

Experiencing Artificial Intelligence

- The structure of the training equipment
- Construction of a practice environment
- Classification algorithms experience
- Animal classification
 - Fruit/vegetable classification
 - Classification of flower types
 - Rock/paper/scissors classification
 - Defective/Good product classification
- Location Detection Algorithms Experience
 - Dog and cat detection
 - Human detection
 - CCTV surveillance system
 - Detection of the Autonomous Vehicle Front Object

Artificial Intelligence Learning

- Creating learning data
- Learning artificial intelligence using data
- Create a learning model
- Comparison of results according to learning volume

Artificial Intelligence Utilization

- Construction of a practical environment
- Device interworking using a classification algorithm
- Device interlocking using location detection algorithm

Artificial Intelligence Algorithm Implementation

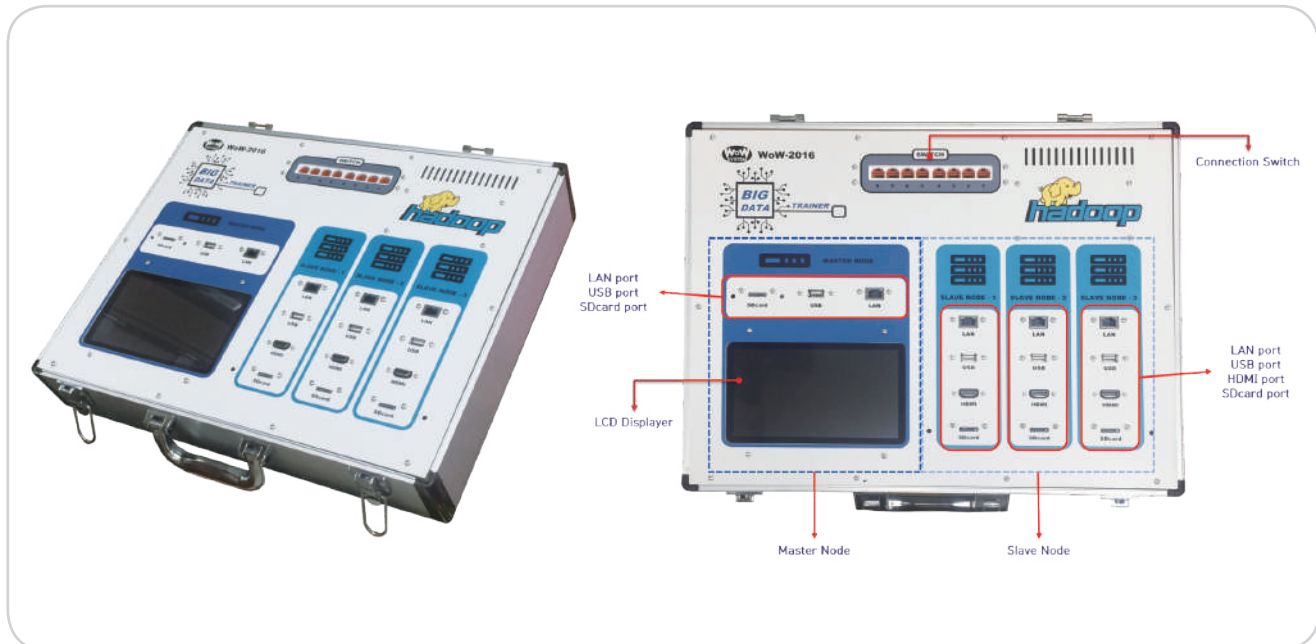
- Installing TensorFlow
- TensorFlow Basic Programming
- Tensor and Graph
 - Placeholder and variables
 - Implementation of the linear regression model
- Implementation of TensorFlow neural network
- TensorFlow learning model and tensor board utilization

AI Algorithm Implementation using TensorFlow

- CNN
- Autoencoder
- GAN
- RNN
- Inception
- DQN

EST-2016

Big Data Trainer



An analysis of the Big Data of the Core Technology of the Fourth Industrial Revolution

- Configure to practice of various data analysis tools from the basic concept of big data gradationally
- Provide a practical environment to build clusters and quickly analyze large data using the open platform Hadoop
- Provide a curriculum that allows you to practice the functions of the Hadoop Eco System (Hive, HBase, Zookeeper, etc.)

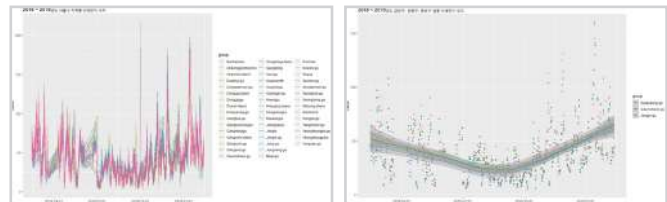
Big Data Practice based on Open Source

- Provide detailed guides for installing and testing essential programs necessary for big data analysis such as open source-based Hadoop and Python from the installation of the operating system (Linux)
- Configure Hadoop clusters that can collect data from the data source and store it stably in the Hadoop file system
- RDBMS interworking function practice that loads data into Hadoop or saves the processing result in RDBMS
- Loading data stored in Hadoop clusters using R and Hadoop to practice various visualization techniques of R

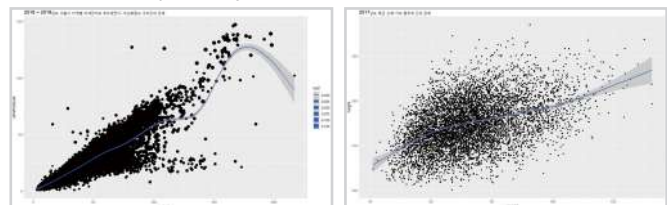
Practice Example

Analysis and Visualization of Structured Data

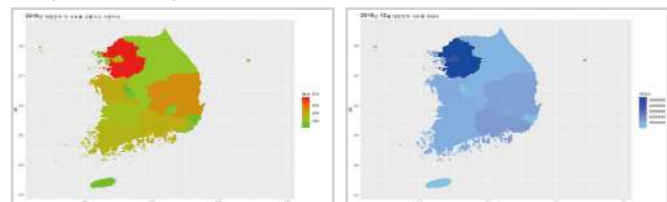
– Time Analysis and visualization



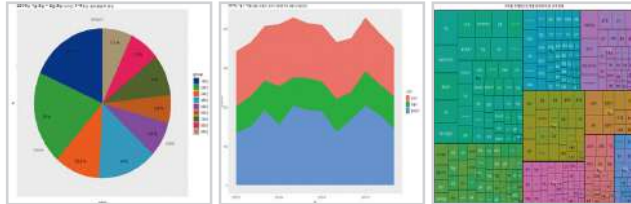
– Relationship Analysis and Visualization



– Space Analysis and Visualization



– Distribution Analysis and Visualization

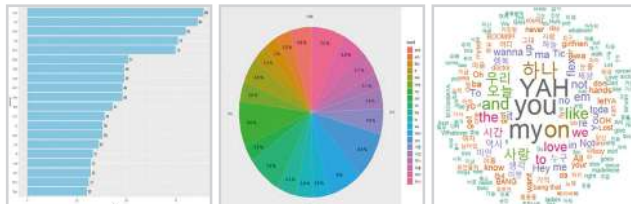


– Comparative Analysis and Visualization



Unstructured Data Analysis and Visualization

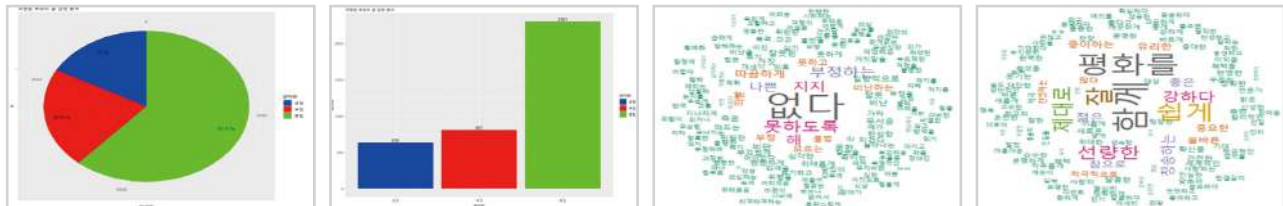
– Word Frequency Analysis and visualization



– Word Relation Analysis and visualization



– Word Sensibility Analysis and visualization



Education Content

Big Data Outline

- Big Data Concepts and Characteristics
- Big Data Application Cases

Building a Hadoop cluster

- Hadoop Overview and Features
- Hadoop System Structure
- Installing the operating system (OS)
- Save, inquire, and delete Hadoop cluster data

R for data analysis and visualization

- Installation and configuration of RStudio
- Rprogramming foundation
- Install and set up Rhadoop for Hadoop cluster interlocking

Structured Data Analysis and Visualization

- Time analysis and visualization using R
- Distribution analysis and visualization using R
- Relationship analysis and visualization using R
- Comparative analysis and visualization using R
- Spatial analysis and visualization using R

Unstructured Data Analysis and Visualization

- Understanding and installing test mining packages
- Analyzing and visualizing word frequency using R
- Word relation analysis and visualization using R
- A word emotion analysis and visualization using R

Supercomputer Practice

- Supercomputer overview
- Supercomputer practice environment configuration
- Comparison of the processing speed of supercomputers using distributed processing systems

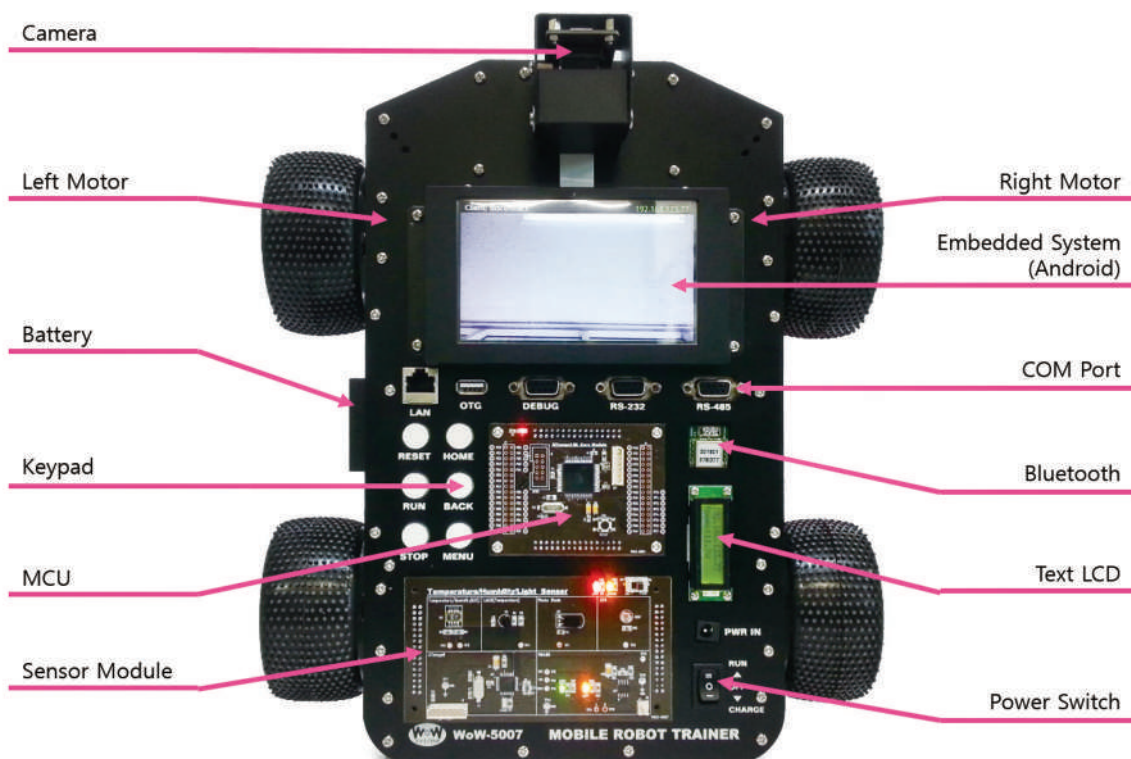
EST-5019

Mobile Robot Trainer



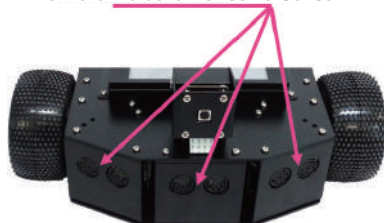
- Mobile Vision Robots that combine microprocessors and embedded
- Mobile robot driving practice using a microprocessor
- The autonomous driving practice of obstacle avoidance by installing front/back detection sensors and floor detection sensors
- Real-time camera image output by linking embedded board and camera
- Remote sensor monitoring and mobile robot control using Bluetooth communication
- Monitoring image data for Wi-Fi communication
- Provide basic/application examples for various exercises
- Monitoring and controlling using Android App
- A 4 Wheel robot that combines Microprocessor Core Board with Embedded Core Board
- Practice of various interlocking sensor board with detachable sensor board design
- Only the battery can be separated and charged when charging with detachable battery

Main Composition



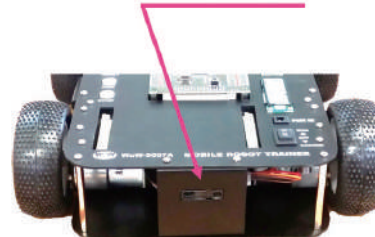
Mobile Robot Front

Forward Detection U-sonic Sensor



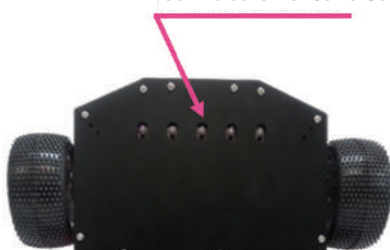
Mobile Robot Rear

Rear Detection U-sonic Sensor



Mobile Robot Bottom

Floor Detection U-sonic SensorD



Detachable Battery



Application Model :
EST-5007A

Exclude Embedded Systems, Micom control



Application Model :
EST-5010

Include Embedded Systems, Mecanum Wheel



Application Model :
EST-5011

Include Embedded Systems, Caterpillar Wheel



Application Model :
EST-5015

Include Embedded Systems, Omni Wheel



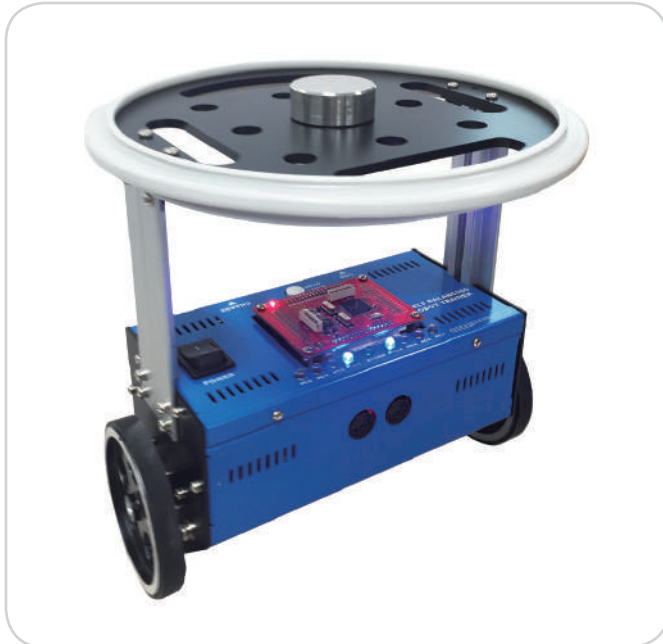
Education Contents

- Mobile robot Trainer
- Practice environment construction
- PIEZO Control
- Button control
- Text LCD control
- Battery monitoring
- MOTOR forward/backward control
- MOTOR direction change control

- Bottom IR Sensor monitoring
- Ultrasonic Sensor monitoring
- PSD Sensor monitoring
- AUTOMATIC DRIVING control
- Communication control
- Application application
- Protocol document

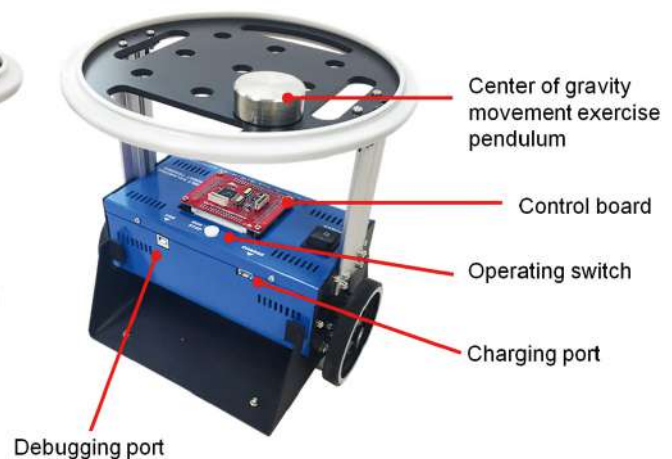
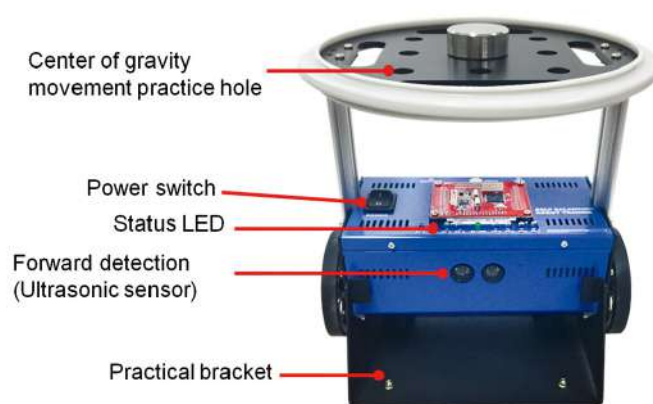
EST-5017

Self Balancing Robot Trainer



- Education on the structure and motion principles of Segway Robot or Balancing Robot
- Motor control practice of Balancing Robot using PID control
- Practice of balance control of the balancing robot using acceleration/gyro sensor
- Experiment on the characteristics of the balancing robot according to the change of the central axis
- Experiments on the characteristics of balancing robots according to the weight change
- Remote movement control of Balancing Robot using Bluetooth
- Provide individual practice textbooks according to MCU types (ATmega2560, ATmega128 selection)
- Provide basic/application examples program for various practice
- Practical brackets for safe practice

Main Composition

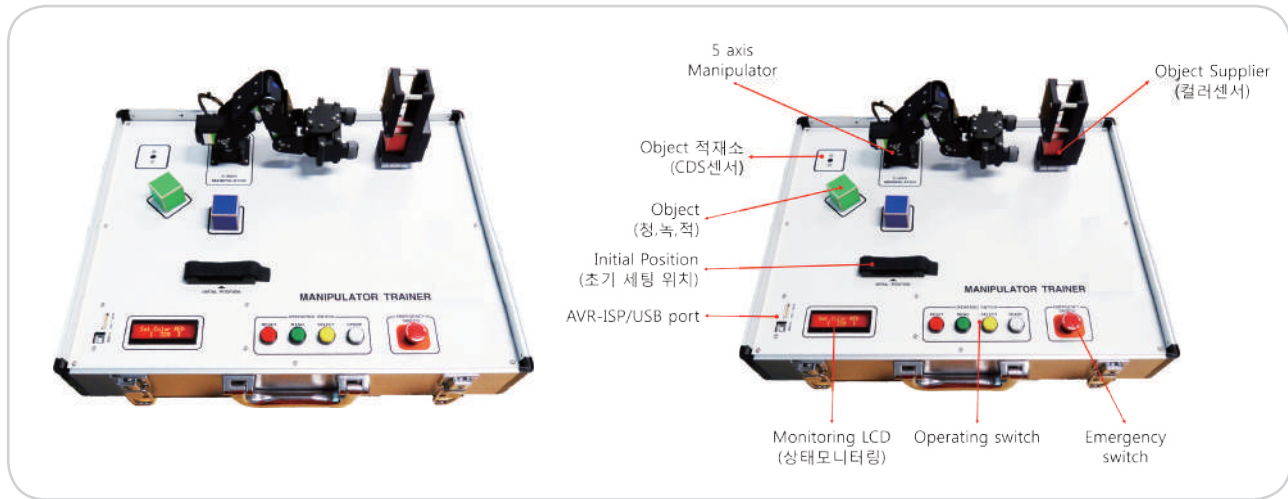


Education Contents

- Development environment construction
- PWM motor control of Balancing Robot
- Motor encoder control of Balancing Robot
- Ultrasonic sensor processing of Balancing Robot
- Acceleration sensor processing of Balancing robot
- Gyro sensor processing of Balancing Robot
- Sensor value filter processing of Balancing Robot
- Balance control (P control) of Balancing Robot
- Balance control (PI control) of Balancing Robot
- Balance control (PID control) of Balancing Robot
- Driving control (before/after) of the robot using the control of balance
- Driving control (left/right) of the robot using the control of balance
- Balancing robot control using Bluetooth communication

EST-5016

Robot Manipulator Trainer



- Provide a training module and curriculum to help you understand Forward Kinematics and Inverse Kinematics
- Understanding the structure and motion principles of manipulators using 2-axis disassembly and assembly module
- Practice from basic control to application, and interlocking control using a 5-axis manipulator (the practice of logistics automation 5-axis manipulator implementation)
- Provide individual practice textbooks based on MCU types (ATmega2560, ATmega128 choice)
- Providing individual practice textbook for two-axis disassembly and assembly modules and five-axis manipulators
- Interworking control exercises between the 2-axis/5-axis manipulator and simulation software
- Virtual manipulator design practice using simulation software
- Configure the five-axis manipulator, supply station, loading station, and other peripherals together
- Segmentation of practice by partial and interlocking operations for each part from supply station to loading station



[2-Axis Manipulator Disassembling and Assembly Practice]

Education Contents

2-Axis Manipulator Trainer

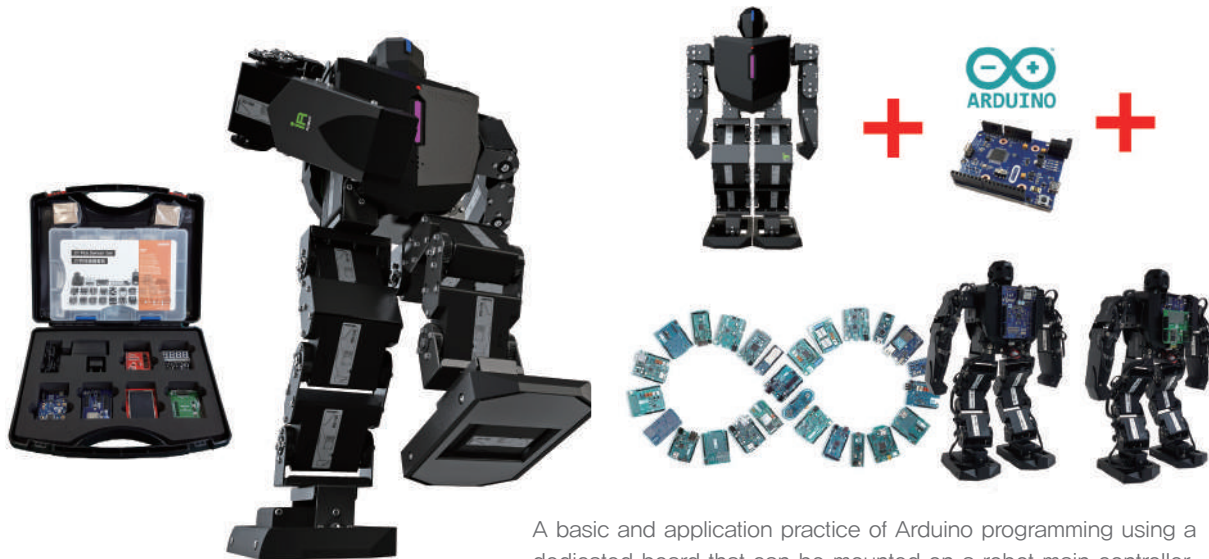
- Manipulator Overview
- 1-Axis Manipulator Production
- 1-Axis Manipulator Setup
- 1-Axis Manipulator Control
- 2-Axis Manipulator Production and Control
- Manipulator operation using Forward kinematics
- Manipulator operation using Inverse kinematics
- Creating and Following a 90° Track of 2-Axis Manipulator
- Creating and Following a 180° Track of 2-Axis Manipulator
- 2-Axis Manipulator Application Design – 1
- 2-Axis Manipulator Application Design – 2
- 3-Axis Manipulator Application Design – 1
- 3-Axis Manipulator Application Design – 2
- 4-Axis Manipulator Application Design – 1
- 4-Axis Manipulator Application Design – 2
- 2-Axis Robot Manipulator Disassembly

5-Axis Manipulator Trainer

- Understanding 5-Axis Manipulator Trainer – 1
- Understanding 5-Axis Manipulator Trainer – 2
- 5-Axis Manipulator Setup
- 5-Axis Manipulator trajectory motion using location coordinates – 1
- 5-Axis Manipulator trajectory motion using location coordinates – 2
- 5-Axis Manipulator trajectory motion using location coordinates – 3
- 5-Axis Manipulator trajectory motion using location coordinates – 4
- 5-Axis Manipulator trajectory motion using the angle between the axes – 1
- 5-Axis Manipulator trajectory motion using the angle between the axes – 2
- 5-Axis Manipulator trajectory motion using the angle between the axes – 3
- 5-Axis Manipulator trajectory motion using the angle between the axes – 4
- 5-Axis Manipulator Attitude Control – 1
- 5-Axis Manipulator Attitude Control – 2
- 5-Axis Manipulator Motion Control – 1
- 5-Axis Manipulator Motion Control – 2
- 5-Axis Manipulator Motion Control – 3
- 5-Axis Manipulator Motion Control – 4

EST-5009

Humanoid Robot Trainer



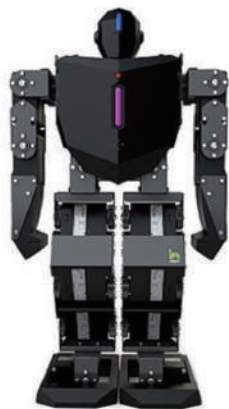
A basic and application practice of Arduino programming using a dedicated board that can be mounted on a robot main controller

- A biped walking humanoid robot compatible with Arduino
- Basic 16 degrees of freedom, 24 degrees of freedom extensible
- A biped walking humanoid robot compatible with Arduino
- Basic 16 degrees of freedom, 24 degrees of freedom extensible
- Provide Total Manager Software(motion editing and sensor setting)
- Remote control of smartphone use
- More than 100 basic motion libraries and user library area
- 6-axis acceleration/gyro sensor and Bluetooth 4.0 module equipped as standard
- Designed simply to dock on the main controller by providing the IRduino board, which is an Arduino board.
- IRduino boards are independently available (equal to Arduino Leonardo)
- Provide Arduino API
- Practice Arduino basic practice and humanoid robot interlocking using IRduino and sensor shields
- ICT convergence Robot implementation using Arduino Compatibility Sensor, Actuator, and Communication Module

Main Composition



[IRduino Shield Kit]



[Robot]



[Robot Stand]



[Carrying Bag]

Education Contents

IR Robot

LED control firmware development

- LED module control
- LED module and robot control
- LED module and robot control application

RELAY Control Firmware Development

- RELAY module control
- RELAY module and robot Control
- RELAY module and robot control application

Developing Temperature Sensor (LM35) Control Firmware

- LM35 module control
- LM35 module and robot Control
- LM35 module and robot control application

PUSH Button Control Firmware Development

- PUSH button module control
- PUSH button module and robot control
- PUSH button module and robot control application

Touch LCD Shield Control Firmware Development

- Touch LCD shield control
- Touch LCD shield and robot control
- Touch LCD shield and robot control application

FND Shield Control Firmware Development

- FND Shield Control
- FND shield and robot control
- FND shield and robot control application

Wi-Fi shield Control Firmware Development

- LED control using Wi-Fi shield
- RELAY control using Wi-Fi shield

BLUETOOTH Shield Control Firmware Development

- LED control using Bluetooth shield
- RELAY control using Bluetooth shield

Wi-Fi Robot Control Firmware Development

- The status of the robot using the Wi-Fi shield
- Robot operation control using Wi-Fi shield

BLUETOOTH Shield Control Firmware Development

- Robot control using Bluetooth shield
- Robot control application using Bluetooth shield

EST-5000

Robot HRI Trainer



Mobile Vision Self-driving Smart Car

- Self-driving line tracking using IR sensors
- Self-driving by detecting distance from the vehicle ahead and automatically adjusting speed using ultrasonic sensors
- Signal light recognition, Automatic stop and Driving using camera image.
- Surrounding obstacles recognition and Automatic avoidance driving using LiDAR sensor

Smart Cars Implementation with Converged Systems

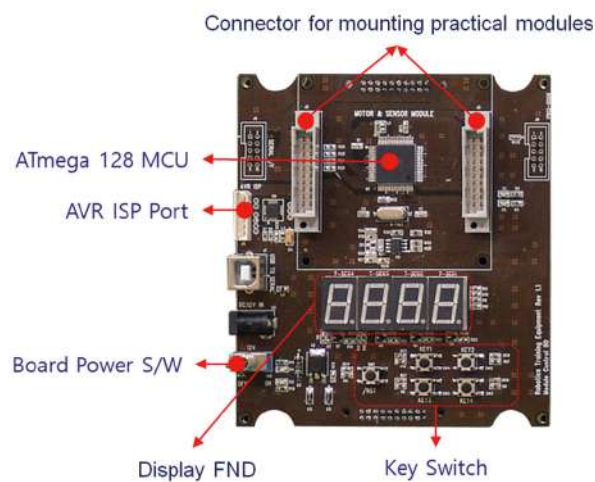
- Embedded system and Arduino system measure and collect sensor values attached to each location through serial communication to transmit control commands for Self-driving.
 - Signal light recognition drive / Obstacle avoidance self-driving using camera image
 - Maintain vehicle distance through forward detection / Line Tracing
 - Light, Buzzer, LCD, Motor (Direction) control

Android App

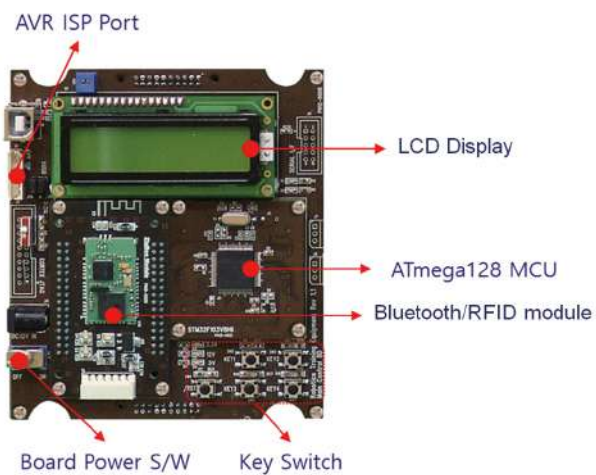
- Bluetooth communications with Arduino to request and control sensor values and to transfer control command
- Receive images through WIFI communication with embedded
- Remote monitoring and control of mobile vision robots

Main Composition





[Main Control Board]



[Module Control Board]

Education Contents

- Robot Introduction
- Intelligent Robot HIR Practical Equipment Configuration
- AVR ATmega128 Structure and Function
- Implementation of the Practice Environment (Compiler installation)
- LED Control
- FND Control
- Key Switch Control
- DIP Switch Control
- DOT-Matrix Control
- DC Motor Control
- SETP Motor Control
- Gas sensor Control
- Ultrasonic / IR Sensor Control
- Sensor Control using A/D Converter
- Color Sensor Control
- Touch Sensor and Bumper Switch Control
- GRIP Module Control
- Protocol
- UART Communications Loop Back Control
- Main Module Program
- PC GUI Program
- Android Application

Krypton

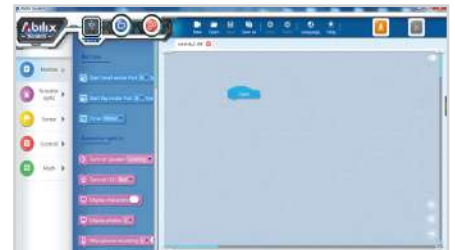
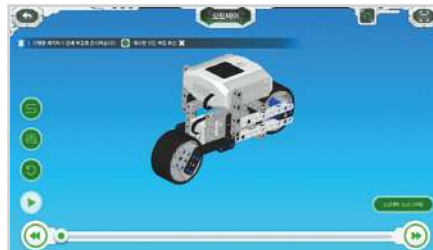
Intelligent Disassembly and Assembly Robot



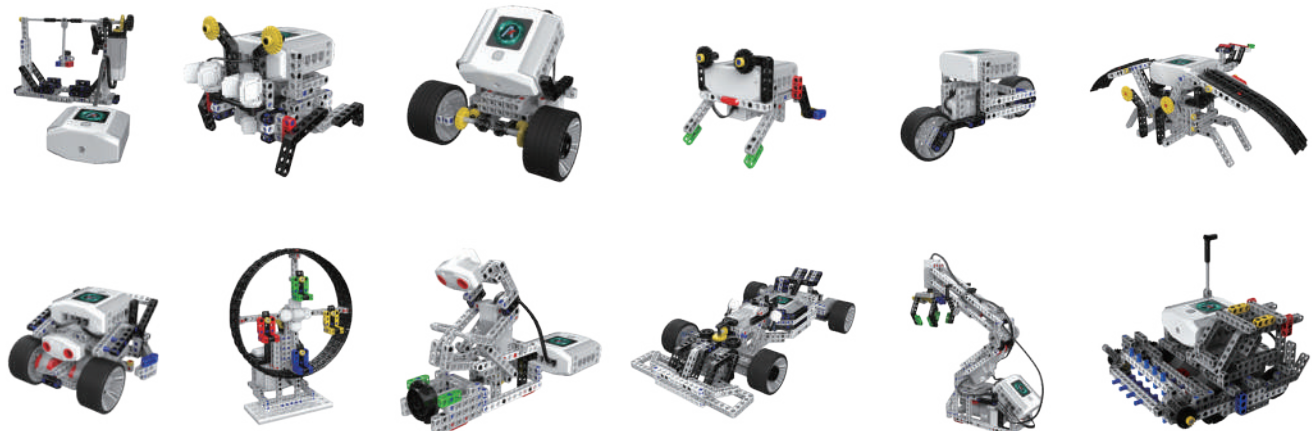
- Create and learn not only how to create robot models, but also how to bring the robot to life by directly coding so that it can sense, react, and move—its surroundings using sensors. Include Points, Lines, and Face Components
- Download (coding) programs using hotspots and USB
- PC and mobile interworking
- Use dedicated programs (available in Scratch, Chart, and C languages)
- Special Brick that can be infinitely expanded with X, Y, Z-axis infinite expansion six-angle Brick
- Creative various coding available
- Provide 3D 360-degree rotation drawings when mobile connects
- Other projects other than robots can be created
- When building a robot, it can adjust the change of speed and the direction of the rotation axis by utilizing gears and can provide training on the principle of gears.

Main Composition

— Software



Application Model



EC-66

Cooperative Robot System



Various robot kinematics / dynamics algorithm

- Flexible and complex position posture and shape control can be implemented, and the same flexibility as human arms can be provided
- The -7-axis kinematic algorithm formulates a rational optimization function/weight function based on the optimal Jacobian Matrix/Norm of speed and acceleration. This implements a comprehensive solution of higher-order requirements such as efficiency, energy, safety, compliance and obstacle avoidance.

Zero space/location posture configuration double-mode inverse solution algorithm

- Zero space displays special coordinate space that only robots can work on
- Location posture configuration double-mode inverse solution algorithm is the basis, and Location posture configuration double-mode inverse solution algorithm meets the requirements of hybrid pose and configuration at the same time
- Through an algorithm, it can perfectly simulate the movement of the human arm and perform much more accurately and efficiently than the human arm

Option



Gripper



EST-UR3251
Conveyor Belt Set

Safety / Efficiency Dual Mode

- Cooperative robot EC66 applies two modes of safety and efficiency to meet market needs on the premise of safety and pursuit of intelligence.
- In safety mode, the main physical quantities such as power, speed, acceleration, momentum and energy of the entire machine are prioritized in safety to control the hazard of collisions
- Efficiency mode maximizes the advantages of large scale torque and high-speed ERG series joint modules that can provide a speed of 2.8 m/s or more of the maximum tool line close to the efficiency of existing industrial robots

APP Education System

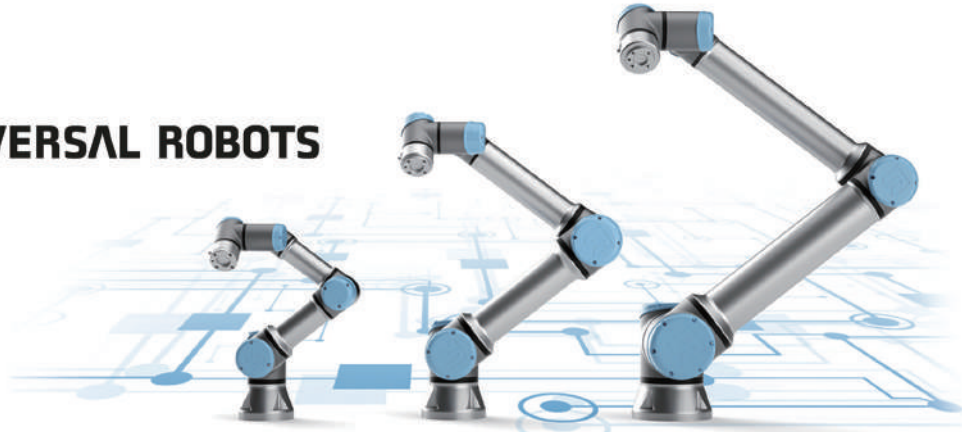
- EC66's Education APP is runnable on ANDROID and IOS platforms and provides remote control online video support and other assistive features.

UNIVERSAL ROBOTS UR 3e / UR 5e / UR 10e

Cooperative Robot System



UNIVERSAL ROBOTS



The Benefits of UNIVERSAL ROBOTS

Easy programming

- The user who has no programming experience using patented technology can quickly set up and operate robots through intuitive 3D visualization
- Robot arms can be operated by moving to desired points or by touching arrows on easy-to-use touchscreen tablets

Fast setup

- UNIVERSAL ROBOTS innovatively changes the cobot(Cooperative Robot) setup method to shorten the typical robot placement work, which took weeks, to a few hours
- The average time of setup which customers report is about half a day long and can be set up quickly.
- It usually takes less than an hour for uneducated workers to unpack and install the robot and then program the first simple task
- Cobot(Cooperative Robot) can reuse programs for repeating tasks

Flexible arrangement

- UNIVERSAL ROBOTS is a space-saving lightweight robot that can be easily relocated to a number of tasks without changing production layout
- It is available to automate almost all manual operations quickly, including small batch job or fast transitions

Collaboration and safety

- 80% of UNIVERSAL ROBOTS used all over the world work right next to the human operator without a safety protection device.
- This robot replaces human operators, which can reduce repetitive strain disorders and injury from accidents in dangerous, monotonous tasks.

Option



Gripper



Force/Torque
Senso



Vacuum Gripper

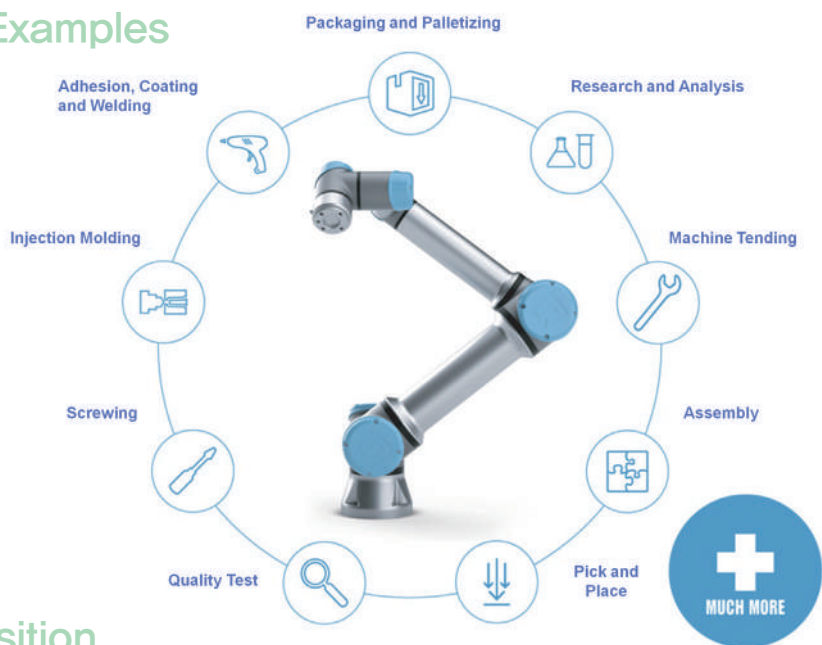


GECKO Gripper



EST-UR3251
Conveyor Belt Set

Application Examples



Main Composition



UR 3e

			
Radius 500mm / 19.7ins	Payload 3kg / 6.6lb	Installation Area 128mm / 5.03ins	Weight 11kg / 24.3lbs

- The smallest model of the UNIVERSAL ROBOTS family, it is suitable when light assembly and highly precise work are needed
- All joints rotate 360 degrees, of which end joints can rotate infinitely
- The most flexible and versatile cooperative robot system available today



UR 5e

			
Radius 850mm / 33.5ins	Payload 5kg / 11lbs	Installation Area 149mm / 5.9ins	Weight 18.4kg / 40.6lbs

- The ideal model for automating light processing operations such as pick and place and testing
- A medium-sized robotic arm that is easy to program and quick to install



UR 10e

			
Radius 1300mm / 51.2in	Payload 10kg / 22lb	Installation Area 190mm / 7.5ins	Weight 28.9kg / 63.7lb

- It has the largest model and the largest power among UNIVERSAL ROBOTS family.
- Cooperative robot arms can automate relatively heavy process operations with a maximum weight of 10 kg
- Suitable for packaging, loading, assembly, pick-and place operations with a relatively long distance between each work station

EDUCATIONAL SMART TECHNOLOGY

Smart Factory / IoT / VR / AR / Smart Car / 3D Printer / Drone
Robot / AI / Automatic Control / Renewable Energy
Electricity / Electronic / Software
Measuring Instrument

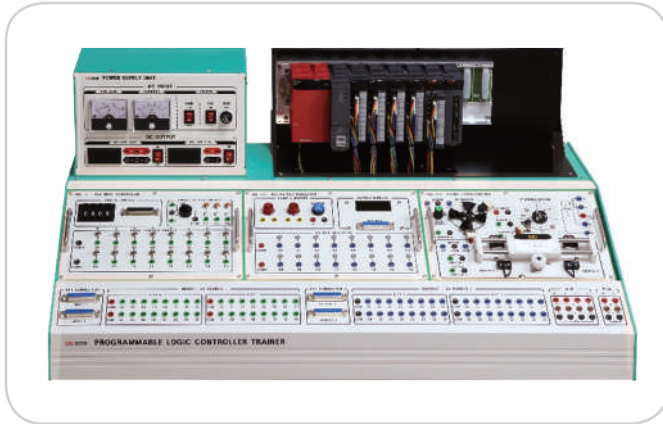
PART 8

Automatic control

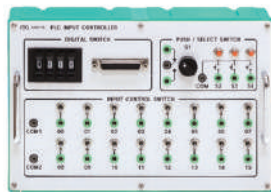
96	EST-3210M	PLC Trainer
96	EST-3246	PLC Trainer
97	EST-3210LX	PLC Trainer
97	EST-3228	PLC Trainer
98	EST-6007	PLC Trainer
98	EST-1901	PLC Trainer
99	EST-2001	PLC Application Training(Elevator)
99	EST-2002	PLC Application Training (Parking Tower)
99	EST-2003	PLC Application Training(Conveyor)
99	EST-2004	PLC Application Training (Electric Pneumatic)
99	EST-3164	PLC Application Training (Escalator trainer)
99	EST-3130	Mechatronics Trainer
100	EST-3450	Process Control System Trainer
100	EST-3454	Process Control System Trainer
101	EST-3400NS	Mini MPS Trainer
101	EST-3100	Automated Manufacturing Trainer
102	EST-2213	6-Axis Robot Trainer
102	EST-3758	3-Axis Motion Control Trainer
103	EST-3750	1AXIS AC Servo Motor Trainer
103	EST-3752	PLC & Motion Trainer
104	EST-4000P	Pneumatic Trainer
104	EST-4100H	Hydraulic Trainer
105	EST-3830	Safety Trainer
105	EST-3310	PC based Sensor Trainer
106	EST-3300	PC based Sensor Trainer
106	EST-3420	Sequence Trainer
107	EST-3622	Sequence Trainer
107	EST-3609	Sequence Trainer

EST-3210M

PLC Trainer



- Multi PLC Trainer (Mitsubishi)
- MITSUBISHI PLC module mounted
- The PLC module replaceable according to various types of PLCs
- Peripheral devices are in the form of module, which makes it possible to carry classes for different levels and the forward · reverse and straight movement control practices available using DC motors, DC geared motors and stepping motors.
- Basic I/O control practices using modules and various PLC applications practices
- Connector with 64 I/O points (Input: 32 points and Output: 32 points) mounted
- Various application modules replaceable while practicing



3210-01
PLC Input Controller



3210-02
PLC Output Controller



3210-03
Count & Position

EST-3246

PLC Trainer

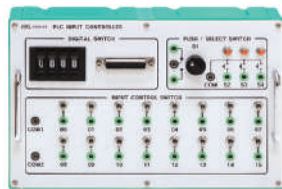


- The FX3u model, an integral PLC of Mitsubishi, applied
- A bag-type structure for easy moving and storing
- Digital I/O practices with switches and lamps utilized available
- Application practices with stepping motors utilized and data control practices with the FND and the digital switch utilized available
- Pneumatic control practices available using 2 pneumatic cylinders
- Number of control I/O point per an I/O link unit 64 points (Input : 32 points and Output: 32 points)
- Expandable for analog practices (Option)
- CC-Link card can be mounted for communication practices (Option)

EST-3210 LX PLC Trainer



- PLC Trainer with LS Industrial System XGT CPU mounted
- The PLC module replaceable according to various types of PLCs
- Peripheral devices are in the form of module, which makes it possible to carry classes for different levels and the forward · reverse and straight
- movement control practices available using DC motors, DC geared motors and stepping motors.
- Basic I/O control practices using modules and various PLC applications practices
- The practice of the speed of motor, forward · reverse rotation, position control with the operation of the actuator(DC/Stepping motor)
- Various application modules replaceable while practicing



3210-01
PLC Input Controller

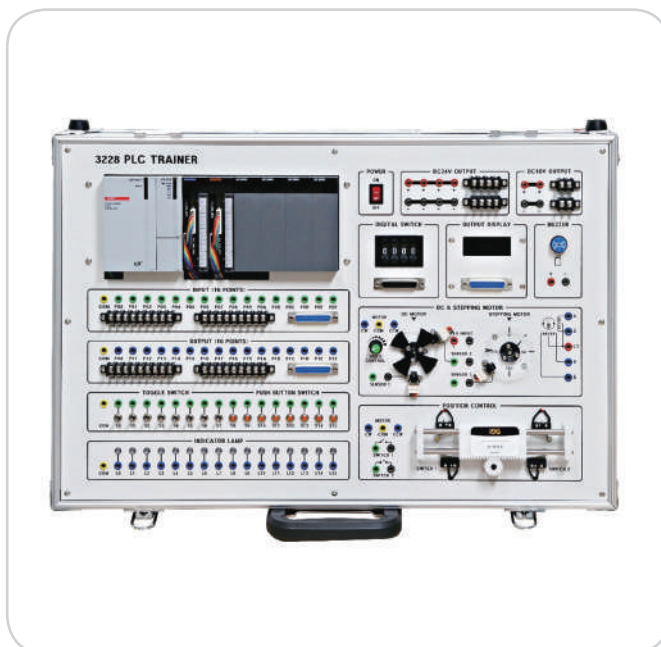


3210-02
PLC Output Controller



3210-03
Count & Position

EST-3228 PLC Trainer



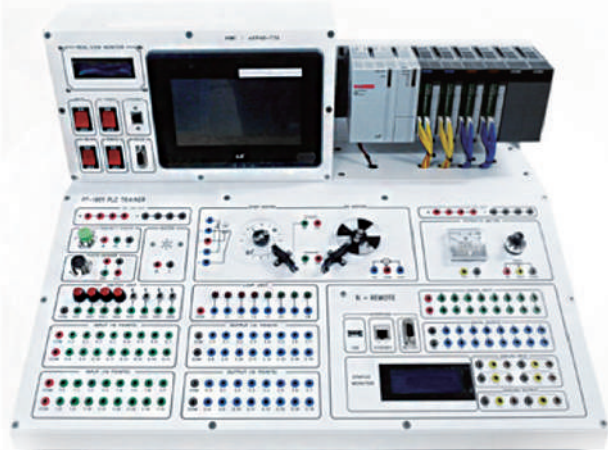
- PLC Trainer with a LS Industrial Systems XGT CPU mounted
- PLC module replaceable in accordance to various types of PLCs
- Peripheral devices are in the form of module, which makes it possible to carry classes for different levels and the forward · reverse and straight movement control practices available using DC motors, DC geared motors and stepping motors.
- Basic I/O controls using modules
- The I/O device is in the form of module necessary for the practice of PLC input and output programming, which makes a variety of programming practices available at basic and operation courses.
- The actuator (DC/Stepping Motors) operation makes it interesting for students to practice controlling motor speeds, forward reverse rotations and positioning.

EST-6007 PLC Trainer



- General practice from simple to high difficulty function using MITSUBISHI MELSEC-Q
- Various data control practice with 16 input points and 16 output points
- Implementation of I/O basic function using signal switch and indicator lamp
- Application motion practice by linking DC motor, stepping motor & position motor and sensors
- Monitoring and real-time control using a 7-inch touch screen
- A drawing practice using HMI similar to industrial environment in various ways
- Implementation motions by linking PLC and HMI in various ways

EST-1901 PLC Trainer



- Manufacture to improve job ability such as NCS-based automatic control system operation and various machinery production facility management
- Practice of technology such as system design, sensor, PLC control, and various motor controls included in automatic control field technology
- Real-time monitoring is provided to control and monitor the state of the process with computers, smartphones, and touch panels
- Communication practice and input/output practice using communication in REMOTE I/O
- REMOTE I/O practice using ISO 15735 International Standard Profibus or Ethernet IP
- PLC models: LS Industrial Systems, Mitsubishi, Siemens

EST- 2001~4, EST-3164

PLC Application Training



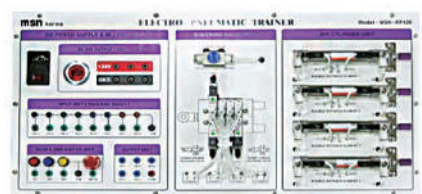
Elevator
EST-2001



Parking Tower
EST-2002



Conveyor
EST-2003



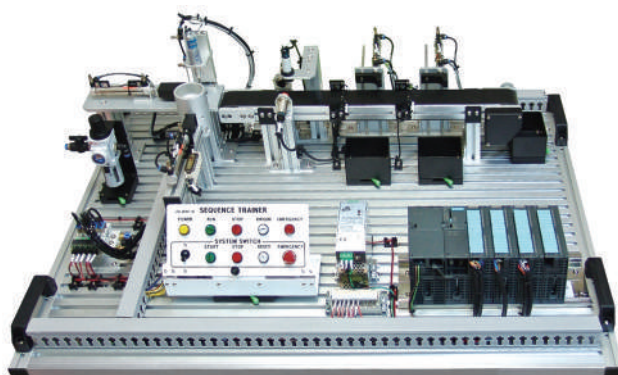
Electric Pneumatic
EST-2004



Escalator trainer
EST-3164

EST-3130

Mechatronics Trainer



- Project practice equipment using a Siemens S7-300 PLC and a variety of in-process devices
- Conveyor belts, sensors, cylinders and others are provided in the form of module in order for students to complete the assignment through directly working on assembly/wiring/piping/programming
- Designs and productions can be done through various processes
- Pneumatic module is consisted of SMC valves.

EST-3450

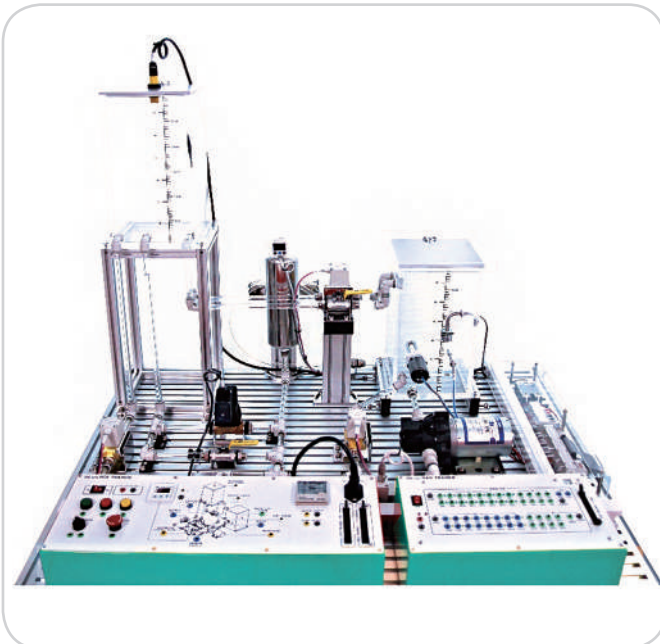
Process Control System Trainer



- PID control practice device with Mitsubishi's PLC
- Pressure/Flow rate/Temp/Level control practices available
- Various controllers attachable including those of Siemens, OMRON, LS Industrial Systems and others
- Visualization practices available with the HMI system applied

EST-3454

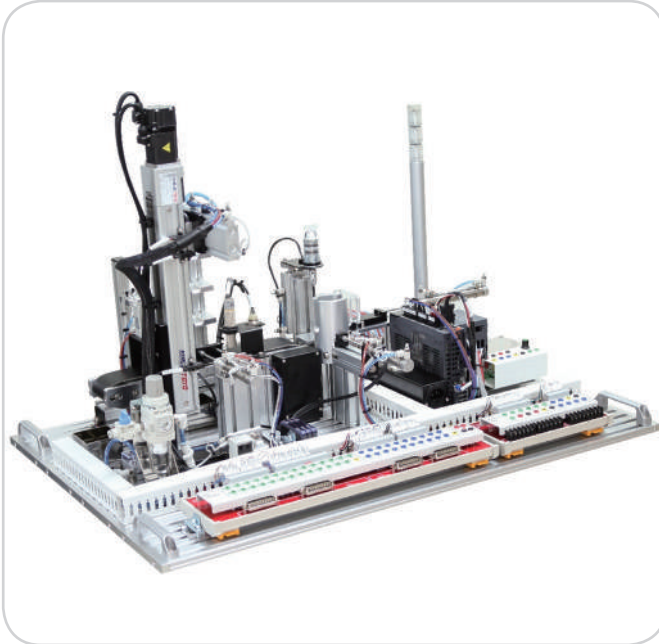
Process Control System Trainer



- PID control practice device with PLCs or PCs utilized
- Pressure/Flow rate/Temp/Level control practices available
- Various controllers attachable including those of Siemens, OMRON, LS Industrial Systems and others
- Visualization practices available with the HMI system applied

EST-3400NS

Mini MPS Trainer



- Practice equipment for national qualification practical examinations of production automation engineers and industrial engineers
- Various in-process practices available including supply / inspection / transportation / classification / storage and so on
- AC servo drive control practices available (Single axis)
- Practicing interoperable controls with various PLCs available

EST-3100

Automated Manufacturing Trainer



- National certification practical test device for certified production automation technician
- Consist of component feeder, drill processing system, belt conveyor transfer equipment, sensor sensing device, extraction device for defective product, loading case for imported goods, loading case ofr defective product and etc.
- Air unit, solenoid valve and control cylinder are equipped so that it operates without any additional device once air is provided, and possible for self driving and linkage with other equipments
- Comprehension and controlling practice on production automation process such as supply, manufacture, sort and storage processing
- Practice for basic control of automation system using various kinds of PLC
- Interlocking operation with counter/ timer function and motor control

EST-2213

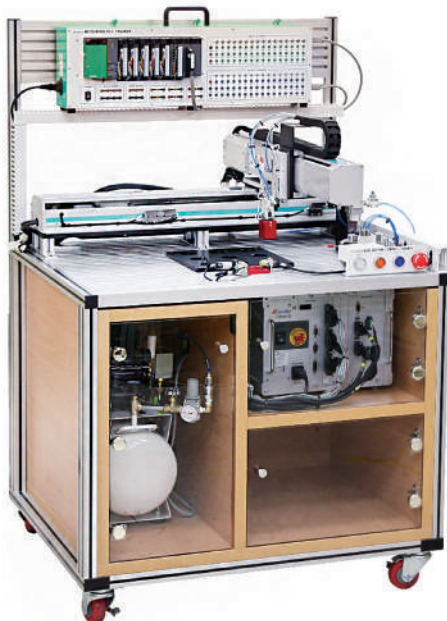
6-Axis Robot Trainer



- In-process control practice with the 6-axis articulated robot utilized
- Fuel cell automatic assembly process using an auto tool change
- The IRB120, a 6-axis articulated robot of ABB's applied
- Applicable to a variety of robot types
- Equipment Dimension: 1200 * 1200 * 1800mm
- PC-based robot controls through the robot controller
- Remote control practices available

EST-3758

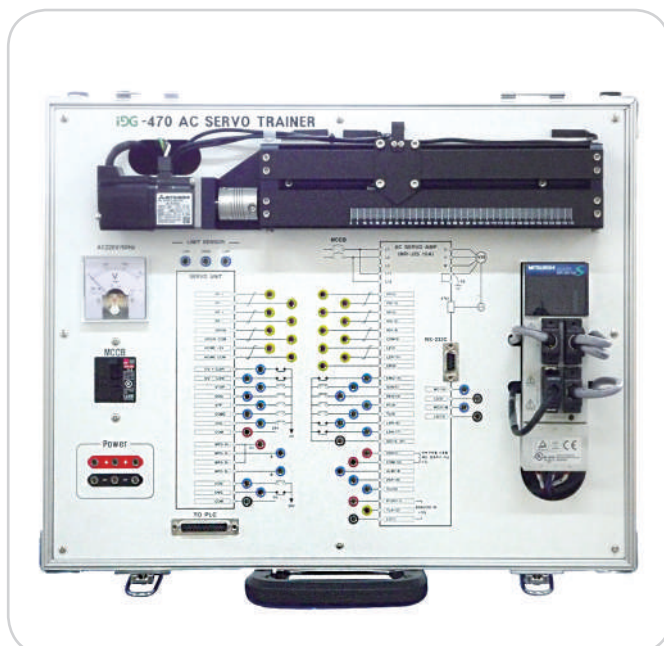
3-Axis Motion Control Trainer



- Motion control practice device for PLC and PC-based control
- Mitsubishi PLC and AC Servo Drive control practice
- Control practice through PC-based motion controller of Robostar
- High precision control practice within 0.02mm

EST-3750

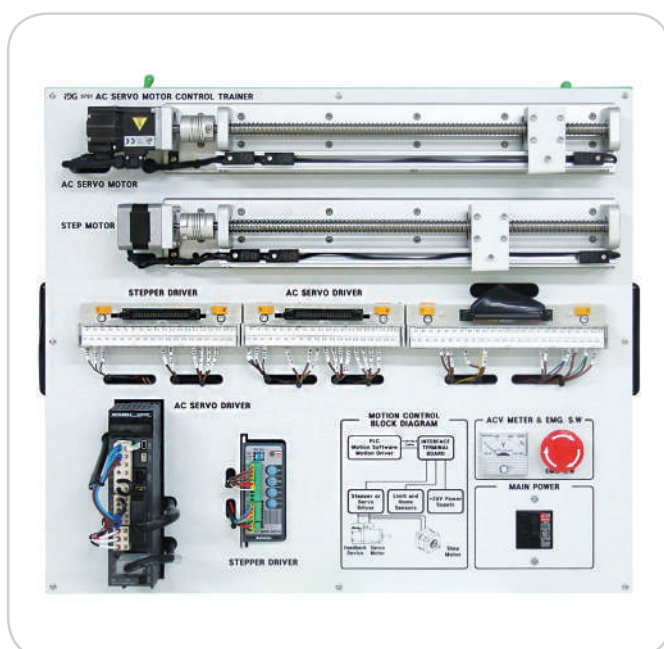
1AXIS AC Servo Motor Trainer



- Practice for 1 Axis Control Utilizing AC Servo Motor
- Applying of AC Servo Drive of Mitsubishi
- Bag Type Structure for Easy Moving & Storage
- Utilizing as Peripherals of Various Control Devices

EST-3752

PLC & Motion Trainer



- Control Practice for 1 Axis Utilizing AC Servo Motor & Stepping Motor
- Applying of AC Servo Drive from Mitsubishi
- Applying of Stepping Motor Drive from Autonics
- Utilizing as Peripherals of Various Control Devices

EST-4000P Pneumatic Trainer



- Suitable for education to improve an automation job ability based on real industry fields and Certification Training Device relating to pneumatic
- Safer and faster composition of pneumatic circuits (Vertical and horizontal installation is possible) on a profile working board is available through a hand-lever fixing device with one-touch cam type
- Composed with various electrical and electronic control units, all sorts of sensors and pneumatic components
- Composed with a pneumatic automation system by basic and application steps
- Provide pneumatic simulation software for education purpose
- Possible to customize extra pneumatic valve such as Combination Valve
- Configure SMC products in consideration of durability and compatibility

EST-4100H Hydraulic Trainer



- Continually providing various valves to an application set in order to experience a basic practice on hydraulics and electro-hydraulic and an additional practice on a high-level application hydraulic system applied to automation fields
- Suitable for education to improve an automation job ability based on on-site and training device for Certification Test
- Composed with various electrical and electronic control units, all sorts of sensors and hydraulic components
- Composed with a hydraulic automation system by each procedure, Basis, Application, Proportion, Servo Control
- Providing a hydraulic simulation system for education
- Faster and safer than aluminum profile Working Board and possible to organize hydraulic circuit by using one-touch hand lever method
- Possible to customize additional hydraulic valve such as Combination Valve

EST-3830 Safety Trainer



- Comprised of practice using safety sensor & PLC
- Push Terminal Interface that Actual Wiring Practice is Available
- Various Safety Practice
- Practice of Process Safety Control
- Education System Using Program, Support of Ethernet & EtherCAT Communication which are High Speed
- Open Safety Network Systems

EST-3310 PC based Sensor



- Experiment practice on 16 kinds of sensor characteristics and principles in electrical and electronic, automation, robot, and basic fields
- Independent Local Mode operation on PC (USB2.0 & RS-232 Interface)
- Output values of various sensors are monitored on LCD Display and PC
- The sensor module comprises on-Board Type configuration so that the efficiency of equipment and smooth follow-up management are achieved
- 16 kinds sensor monitoring is possible by using the operation program in PC
- ation to enable sensor-linked control and manual control experiment practice on PC-based

EST-3300

PC based Sensor Trainer



- Sensor training equipment utilizing the PC based data acquisition unit
- Experiment and test the equipments of electricity, electronic, automation, new renewable energy, and integral sensor in basic science
- The value of sensor data measured independently in Manual Mode can be output with Graphic LCD of DAQ Controller
- Provides PC-based sensor data control application using LabVIEW
- Peripheral devices practice utilizing a sensor by providing various application modules according to the operating conditions of the sensor

EST-3420

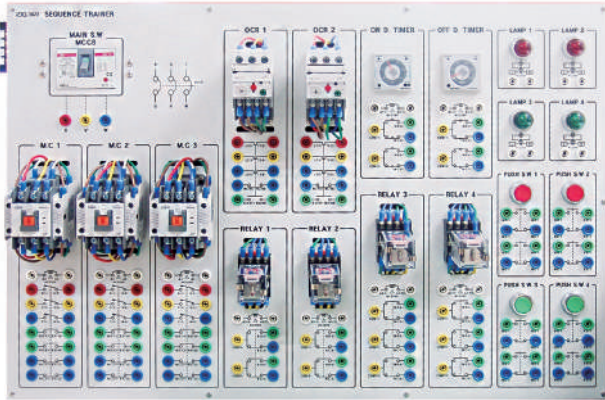
Sequence Trainer



- MCCB × 1EA, NFB × 1EA
- Power Lamp × 1EA
- Magnetic Contactor(MC) × 3EA
- Thermal Overload Relay(TOR) × 2EA
- EOCR × 1EA
- Timer × 2EA, Flicker Timer × 1EA, Counter × 1EA
- Relay (8Pin × 2EA, 11Pin × 2EA)
- Terminal Block 6Pin × 1EA
- Push S.W × 4EA, SEL S.W × 1EA, EMG × 1EA
- Lamp × 5EA (Red, Green), Buzzer × 1EA
- Reactor × 1EA
- AC motor(40W) 3-phase 6-wire system × 1EA
- Size: 915(W) × 620(D) × 280(H)mm
- 4 Ø Safety socket applied

EST-3622

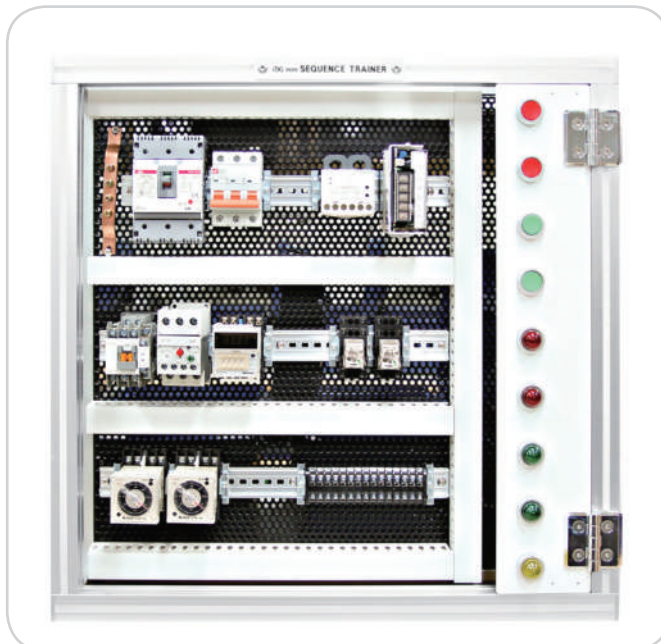
Sequence Trainer



- Sequence training equipment using various electrical sequence devices such as relay, EOCR, MC, etc.
- Panel-type, which allows to identify the internal structure of the sequence device
- AC 220V 3-phase control training equipment
- The double protection cap terminal is used in consideration of users' safety.

EST-3609

Sequence Trainer



- Sequence Practice Device for Site Adaptation
- Channel & Various Electric Sequence Devices are Placed at Punching Plate and Students Directly Conduct Wiring Work to configure Circuits
- Applicable for Various Electric Sequence Devices
- Available for Practice on Various Integrated PLC Mounting
- Applying of ON/OFF Switch & Lamp Panel

EDUCATIONAL SMART TECHNOLOGY

Smart Factory / IoT / VR / AR / Smart Car / 3D Printer / Drone
Robot / AI / Automatic Control / Renewable Energy
Electricity / Electronic / Software
Measuring Instrument

PART 9

Renewable Energy

- | | | |
|-----|----------|-------------------------------|
| 110 | EST-3047 | New Renewable Energy Trainer |
| 112 | EST-3004 | New Renewable Energy Trainer |
| 114 | EST-3023 | Wind Power Generation |
| 115 | EST-3045 | Hydrogen Fuel Cell Trainer |
| 116 | EST-3027 | Smart Grid Traine |
| 117 | EST-3029 | Smart Power Management System |

EST-3047

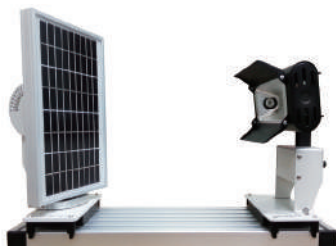
New Renewable Energy Trainer



- The development principle of new renewable energy, the energy conversion process, and the use process of charging electrical energy are directly wired and practiced
- All stages from energy generation to processing are conveniently integrated
- With AC and DC voltage/current meter built-in, energy conversion stepwise values can be identified without a separate instrument
- New renewable energy generation module (solar light, wind power) for energy generation
- Best point possession for the measurement of value in the transformation process
- A driving load configuration (AC/DC) to directly test the generated energy
- In the event of a short circuit to the battery, a protective circuit is built-in and the rapid charging function for charging the battery
- Available to check voltage/current values and V-I, P-V characteristic curves in PC GUI using USB
- Boost principle practice using a boost converter

The solar power generation module and wind power generation module selectable

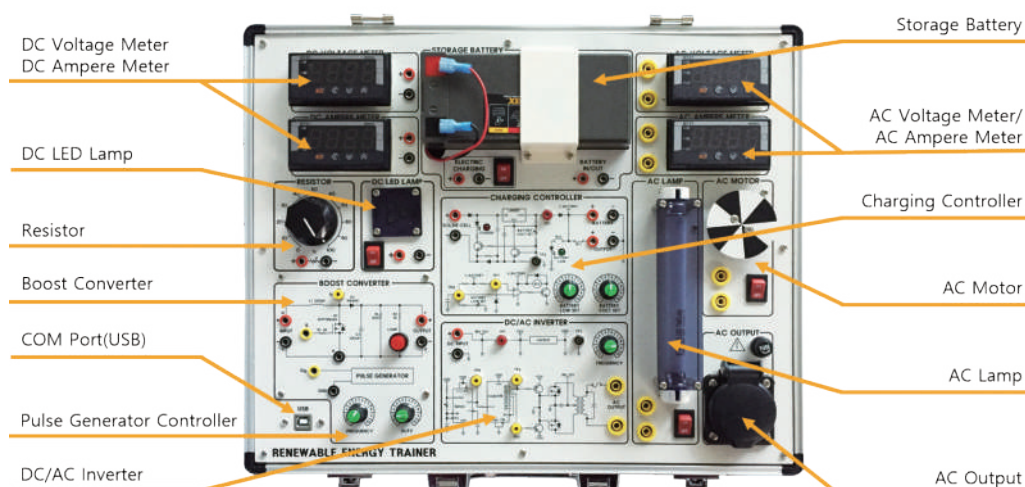
Solar power generation module



Wind power generation module



Main Composition





Education Contents

- Energy classification
- Solar power generation utilization technology
- Solar power generation equipment description
- The brightness (light intensity) measurement of the light
- Efficiency measurement of a solar panel
- The experiment of solar module characteristics according to distance
- Solar module characteristic experiment according to the amount of light
- Solar module characteristics experiment according to temperature change
- Electrical characteristics of a solar module according to incidence angle
- Serial-parallel connection characteristic experiment
- Photovoltaic power generation according to the shadow area
- Exposure defects protection characteristics experiments and Hot spot
- Charging controller experiment
- Battery characteristic experiment
- Boost characteristic experiment
- DC-AC inverter experiment
- DC-AC inverter load experiment
- Wind power generation utilization technology
- Wind power generator overview
- Type of wind power generation method
- Components of wind power generator
- Generator principle
- Wind Power Generator load experiment
- Charging controller experiment
- Battery characteristics experiment
- Boost characteristics experiment
- DC/AC inverter experiment
- DC/AC inverter load experiment

EST-3004

New Renewable Energy Trainer



- New renewable energy principles and components education
- Practice by directly wiring the generation principle of new renewable energy, energy conversion process, and the use process of charged electrical energy
- Practice of solar and wind power energy generation
- Independent and grid-connected new renewable energy power generation system practice
- Understanding the principles and structure of independent and grid-connected inverters, and the concept of grid
- Comparison practice of photovoltaic power generation amount by serial-parallel connection
- The practice of the principle of charging controller using test point of charging controller
- Using the power quality analyzer → Analysis of the power quality produced by the inverter
- Including an Analog Integrating Electricity Meter
- Monitoring system enables real-time monitoring without PC
- an electronic instrument and an electronic loading module to measure energy generation performance without separate measuring equipment

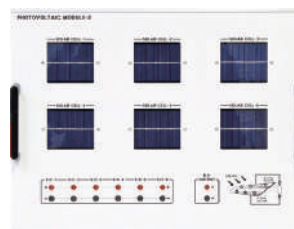
주요구성



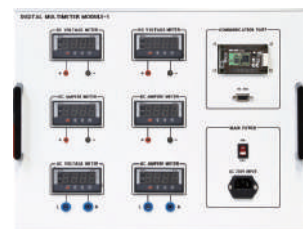
MONITORING SYSTEM



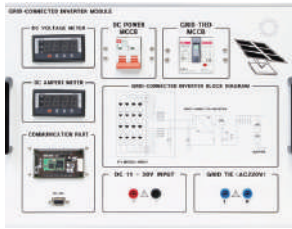
PV CELL - 1



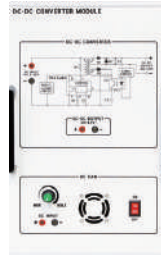
PV CELL - 2



GRID-CONNECTED
INVERTER



DIGITAL MULTIMETER



DC-DC
CONVERTER



AC LOAD



DC
ELECTRONIC
LOADER



DC LOAD



CHARGE
CONTROLLER



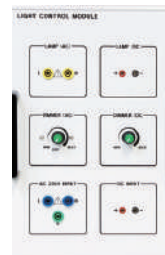
WATTHOUR
METER



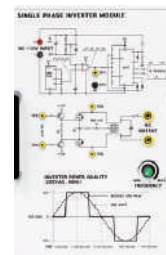
WATTHOUR
METER



POWER
SUPPLY



LIGHT
CONTROL



SINGLE PHASE
INVERTER



LOADER (LED/
RESISTOR)



WIND GENERATOR

Education Contents

- Photoelectric effect simulation
- Ohm's Law and Voltmeter/current meter experiment
- Efficiency measurement of the photovoltaic panel
- Experiment on the solar module characteristics according to the amount of light
- Solar module characteristics experiment according to temperature change
- Photovoltaic power generation according to the shadow area
- Exposure defects protection characteristics experiments and Hot spot
- Electrical characteristics of a solar module according to incidence angle
- Serial/parallel connection characteristic experiment
- Bypass diode experiment
- Charge controller experiment
- Battery characteristics experiment
- DC-AC inverter experiment
- DC-AC inverter load experiment
- System-linked inverter experiment (no load)
- System-linked inverter experiment (load)

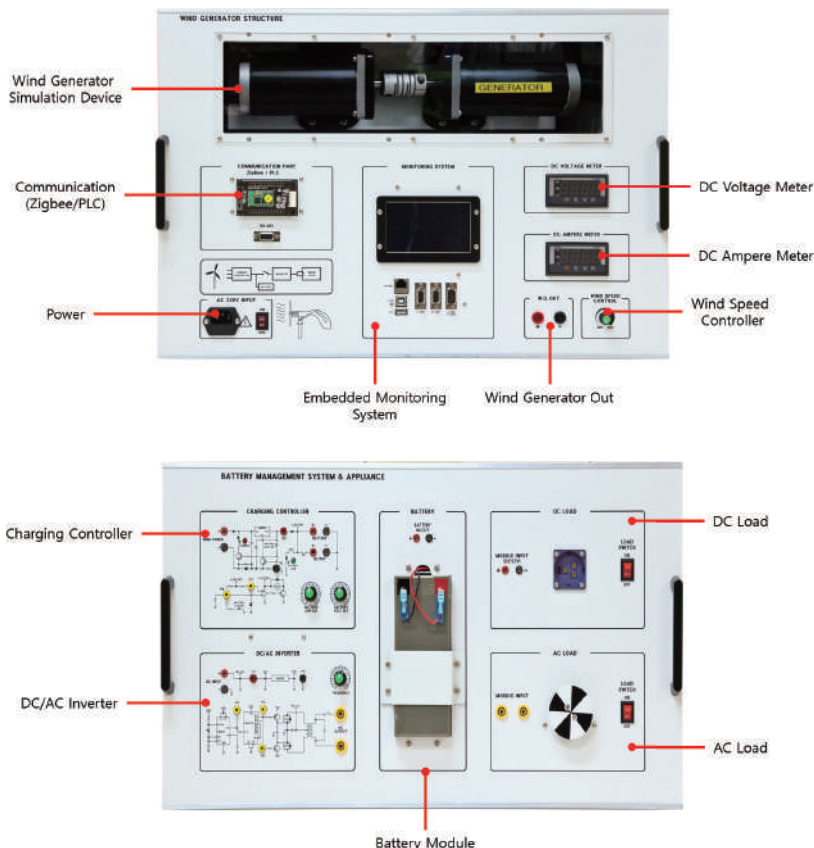
EST-3023

Wind Power Generation



- Wind power principles and characteristics practice using wind energy
- Independent-type wind power generation experiment practice
- Equipment control and real-time monitoring practice with Embedded Monitoring System
- Understanding the driving principle and the electric production process of the wind power generator
- Wind power sensors are attached to the front of the rotor, so RPM, wind volume measurement and analysis simulation
- Various practical exercises, from the mechanical structure of the wind power generator to the principle of power generation,
- With domestic regional wind speed data, so power generation simulation is possible according to regional wind speed
- Configure inside the inverter and charging controller, battery equipment
- It consists of two-stage tower racks that can be detachable

Main Composition



Education Contents

- Wind generator overview
- Wind power generation method type
- Components of wind power generator
- Generator principle
- Characteristics of wind power generation according to wind speed
- Load test of wind generator
- Charge controller experiment
- Battery characteristics experiment
- DC-AC inverter experiment
- DC-AC inverter load experiment

EST-3045

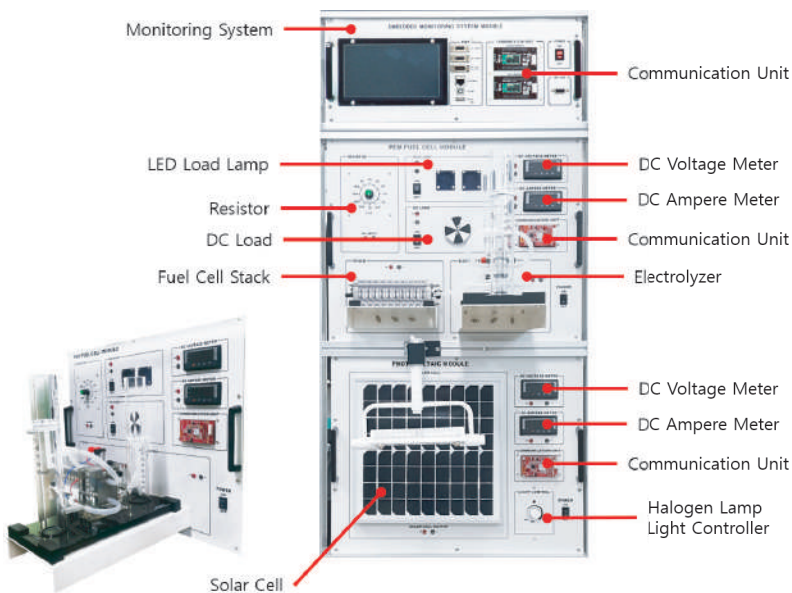
Hydrogen Fuel Cell Trainer



- Configure basic scientific principles and learning about fuel cell energy
- Understanding of basic electricity through the process of converting hydrogen generated by electrolysis of water into electricity
- Support a solid polymer fuel cell stack that can generate a total of 2W
- Designed to experiment with fuel cell disassembly/assembly and series/parallel wiring
- Voltage and current can be measured for each PEM Fuel Cell and power production can be practiced using PEM Fuel Cell.
- Virtual solar is connected to the dimmer, so solar experiment according to the brightness of the light is possible
- Configure to allow various solar experiment according to incident angle by displaying angle on virtual solar structure

- Experiments on solar cell and fuel cell characteristics
- Drawing solar cell I-V and P-V characteristic curve by Adjust Resistor
- The Embedded Monitoring System is applied to enable equipment control and real-time monitoring practices through the 7" Touch TFT LCD.
- Data collection using Zigbee communication
- It is composed of a two-stage tower rack, can be detachable to the module, and can be easily moved by configuring the wheel

Main Composition



Education Contents

- Cell
- Fuel cell
- Introduction to fuel cell experiment equipment
- Installation of monitoring program
- Electrolysis of fuel cell
- Electrolysis experiment using 15W electrolysis device
- The power generation amount experiment of the fuel battery
- Experiment of power generation efficiency of fuel cell
- DC LOAD(LED) utilization using fuel cell
- DC LOAD(MOTOR) utilization using fuel cell

EST-3027

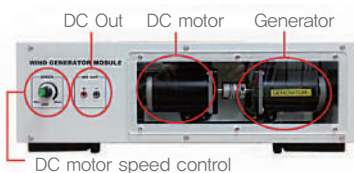
Smart Grid Traine



Photovoltaic generation module and wind power generation module connection practice available

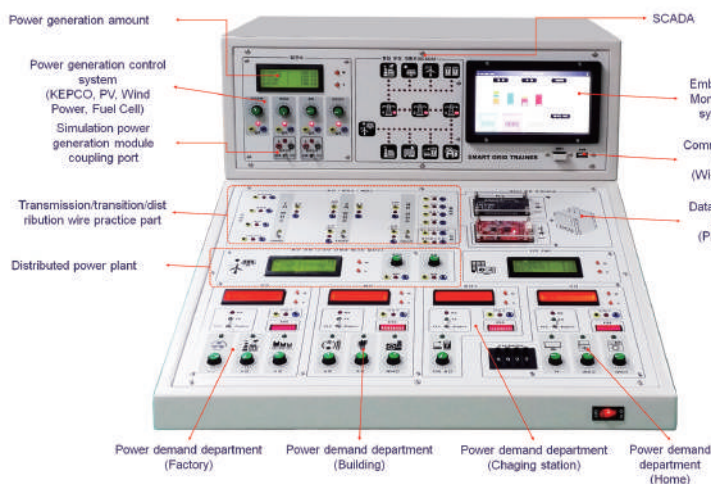


[Photovoltaic generation module] [Wind power generation module]



DC motor speed control

Main Composition

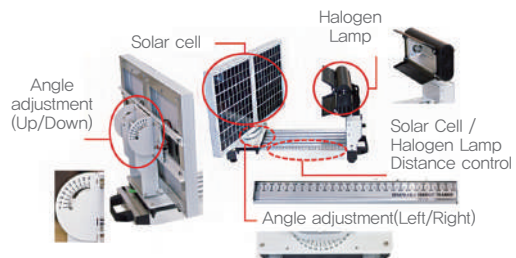


Understanding Smart Grid Power System

- Education on smart grid concepts, components, and major technologies
- The virtual generating part (Photovoltaic/Windpower/Hydrogen fuel cell), Transmission/Transformer part, Power transaction part, Reserve power part, Local energy management part(EMS), Electric power demand part are identically comprised of the electric power system diagram of the actual industrial site
- Integrated Operational System(SCADA) configuration to understand the interworking state of each component

Various practice contents and power system data monitorin

- Configure to enable interworking of distributed power generation using actual simulation power generation modules(Photovoltaic/Windpower)
- Design to be able to intuitively practice by directly connecting for the interlocking operation of each component
- Configure to practice the core elements of the smart grid such as real-time power management, monitoring and recovery of blackout section, integrated remote monitoring and control, distributed power, power consumption monitoring and control
- Including power generation and demand data storage and analysis functions
- Data monitoring and control practice of 1st, 2nd, and distribution substations through PC Software



Education Contents

- Efficiency measurement practice of the solar panel
- Photovoltaic generation practice according to solar radiation amount
- Wind power generation practice according to wind speed
- Solar power/wind power generation interlocking practice
- Power plant operation practice
- Transmission/Transformation and distribution practice
- Power demand practice of power consumer
- Preventive maintenance practice
- Demand management practice
- Power outage management practice
- Distributed power management practice
- Power quality control practice
- Smart meter reading practice
- ESS Practice
- Facility operation automation practice
- Data storage function

EST-3029

Smart Power Management System



- Energy flow education from energy power generation to power transmission/distribution, home/building/facility consumption power control
- Experiments by connecting new renewable energy generation module (photovoltaic, wind power)
- Solar power serial/parallel connection power generation practice
- Real-time monitoring of energy generation data
- Check voltage/current values and V-I, P-V characteristic curves in PC software
- Power consumption control of Home/Factory/Building Device
- Monitoring using PC software and Android App.
- Voltage/current meter and watt-meter built-in to check the value of each energy conversion step without a separate instrument

Main Composition



PHOTOVOLTAIC MODULE - 1



PHOTOVOLTAIC MODULE - 2



WIND GENERATOR MODULE



KOREA POWER EXCHANGE MODULE



DISTRIBUTED GENERATION MODULE



ENERGY STORAGE SYSTEM MODULE



SEM SERVER & SMART HOME MODULE



SMART IBS MODULE



SMART F/A MODULE

Education Contents

- Principle of solar photovoltaic system.(Photoelectric effect simulation)
- Ohm's law and voltmeter & amperemeter experiment
- Measurement bright of light(Illumination)
- Solar photovoltaic generation according to solar radiation amount
- Solar photovoltaic generation according to shadow
- Solar photovoltaic generation according to series/parallel connection of solar cells
- Solar photovoltaic generation according to wind speed
- Understanding Zigbee(Zigbee HAN network)
- Real time power management of electrical grid
- Real time monitoring a blackout section in electrical grid
- Controlling sectional electrical grid for restoring blackout section
- Restoring a power blackout by distributed power
- Real time monitoring a graph of consumption power
- Operation of a power plant according to consumption power
- Real time monitoring a graph of generation
- Real time monitoring a graph of reserve margin
- Real time remote monitoring and control for power feeding part(PC&APP)
- Demand according to power feeding order at peak power
- Saving energy using ESS
- Real time power consumption management of power demanding part
- Real time remote monitoring and control of power demanding part(APP)

PART 10

Electric / Electronic / Communication

120	EST-1028	Basic Electrical & Electronic Circuit trainer
121	EST-1013	Logic Circuit Trainer
122	EST-1008	Analog & Digital Circuit Traine
123	EST-1032	Servo Motor Trainer
124	EST-4042	Sensor Trainer
126	EST-1004	Basic Electricity & Electronic Trainer
128	EST-1012	Semiconductor Electronic Circuit Trainer
130	EST-E100	Electrical Equipment Trainer
131	EST-3026	Electric Power Electronic Trainer
132	EST-3052	Electric Power Electronic Trainer
134	EST-2017	PC-based Control Trainer
135	EST-4000	Multi RFID Trainer
136	EST-4037	RFID Logistics Automation Trainer equipment
137	EST-4019	Home Network Trainer
138	EST-4027	Wired and Wireless Communication Interface Trainer
140	EST-1017	Firmware Development Trainer
141	EST-1000	Multi Microprocessor Trainer
142	EST-3032	LED Basic Trainer
143	EST-3021	LED Application Trainer
144	EST-2009	Android Platform Trainer
145	EST-4013	Android Application Trainer
146	EST-2012	Raspberry Pi Trainer
149	EST-6820	Emergency Equipment Trainer
149	EST-6600	Emergency Equipment Trainer (P-Type Receiver)

150	EST-6700	Emergency Equipment Trainer (R-Type Multifunction Device)
150	EST-E4000	Electrical Equipment / Information and Communication Equipment
151	EST-E6200	Extension Construction Trainer / Information and Communication equipment
151	EST-6041	Assembling and Disassembling of Motor Trainer
152	EST-6010	Motor Generator Trainer
152	EST-6011	DC(shunt/series wound)Motor / DC(compound) Generator
153	EST-6030	Electric Machine Structure Trainer
153	EST-3711	Motor Control Trainer
154	EST-3710	Inverter & 3 Phase Motor
154	EST-6035	Noise/Vibration Measuring Trainer
155	EST-6401	PC based Digital Power Protection Mointoring (GIPAM) Trainer
155	EST-P1	Nuclear Power Simulator
156	EST-0901	Smart Power Distribution Trainer
156	EST-0905~7	Distribution Panel Trainer
157	EST-EEP1~4	Power Grid Diagram and Panel
158	EST-IPSS	Power IT Streamline Water Distribution Simulator

EST-1028

Basic Electrical & Electronic Circuit trainer



Analog & digital electronic circuit practice

- Various analog and digital electronic circuit practice with breadboard capable of attaching/detaching and addition practice module, and all kinds of the switches and variable resistance
- DC +5V, $\pm 15V$ fixed voltage and DC variable power supply, AC variable power supply

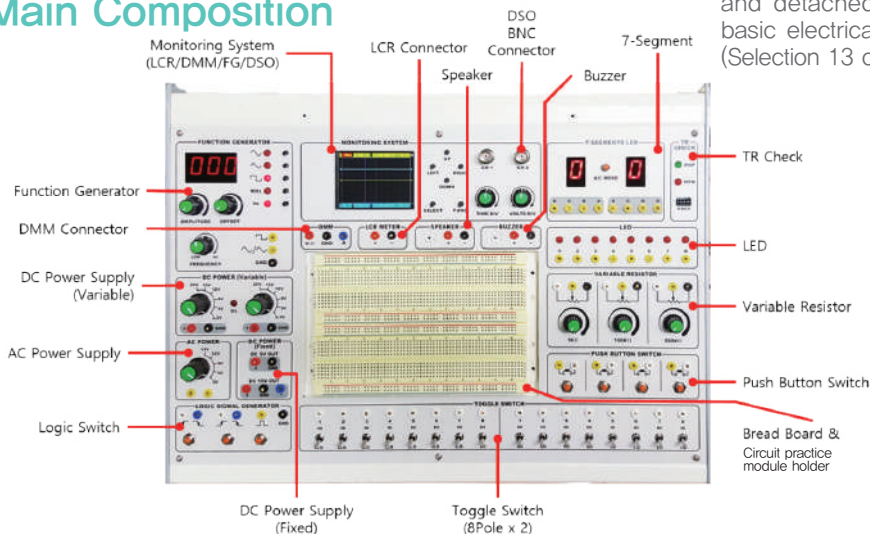
All-in-One integrated instrument embedded

- Oscilloscope, Multimeter, LCR meter, Function Generator, Power Supply is built in to easily check waveform measurement and various state values without a separate measuring device
- Oscilloscope waveform measurement using PC software

Expansion practice module configuratio

- The expansion training module that can be attached and detached from the breadboard is composed of basic electrical and electronic circuit practice modules (Selection 13 out of 24 types).

Main Composition

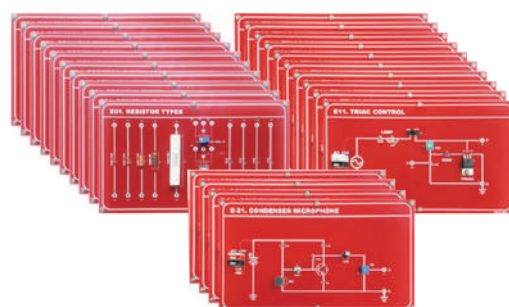


Education Contents

- Basic of Resistance
- Utilization of Resistance
- Basic of capacitor
- Utilization of capacitor
- Basic of Inductor
- Utilization of Inductor
- Characteristic of Diode
- Amplification circuit in transistor
- Switching circuit of transistor
- SCR
- TRIAC
- MOSFET
- IGBT

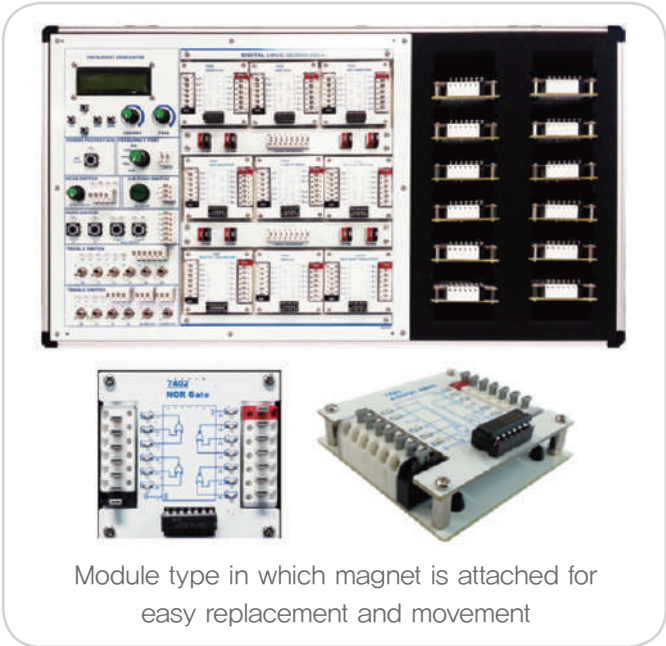
[Practical module configuration(Optional)]

- | | |
|-------------------------------------|-----------------------------|
| • RESISTOR TYPES | • VOLTAGE REGULATOR |
| • SERIAL/PARALLEL RESISTOR CIRCUIT | • TRANSISTOR TYPE |
| • CAPACITOR TYPES | • SWITCH TYPE |
| • SERIAL/PARALLEL CAPACITOR CIRCUIT | • SWITCH APPLICATION |
| • INDUCTOR TYPES | • RELAY TYPE |
| • SERIAL/PARALLEL INDUCTOR CIRCUIT | • CONDENSER MICROPHONE |
| • DIODE TYPES | • LED & 7-SEGMENT |
| • TRANSISTOR AMPLIFIER | • CRYSTAL OSCILLATOR |
| • SWITCHING TRANSISTOR | • SOLID STATE RELAY CONTROL |
| • SCR CONTROL | |
| • TRIAC CONTROL | |
| • MOSFET CONTROL | |
| • IGBT CONTROL | |
| • UJT CONTROL | |
| • ZENER DIODE | |



EST-1013

Logic Circuit Trainer



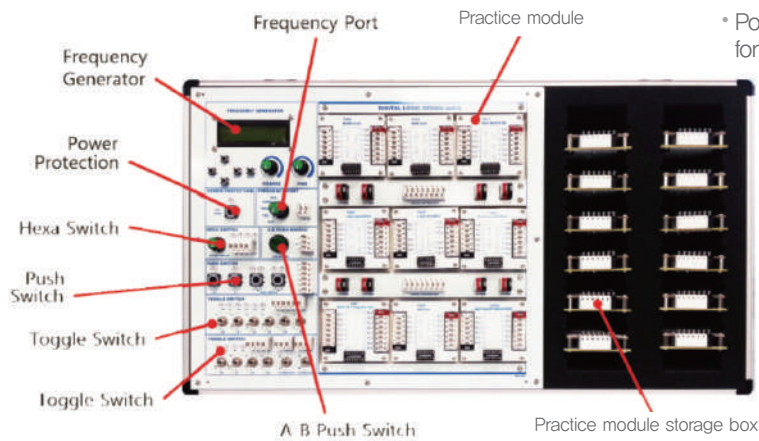
The scalability of circuit practice through various practice modules

- Supply 16 practice modules(15types 16pcs) to enable various logical circuit practice
- The main body and the practice module are separately composed, and the practice module is designed as a magnet-attached module, so that the practice module can be easily and quickly added and exchanged.
- Understanding the practice module easily and quickly by printing the circuit diagram on the practice module surface
- LED is mounted on the input/output of the practice module to easily check the operation of the logic circuit
- When the IC of practice module is out of order, it is available to easily and quickly replaced
- It is composed of the structure connecting the practice module through the actual wiring, so that user can actively practice
- Push button switch and Toggle switch mounted to practice

Instrumentation built-in configuration

- Effective practice with the built-in Frequency Generator and Frequency Counter for logic circuit practice
- Power supplier and Power protection circuits embedded for logic circuit practice

Main Composition



MODULE의 LOGIC FUNCTION	Module Qt' y
2-INPUT AND GATE(7408)	1
2-INPUT OR GATE(7432)	1
2-INPUT NAND GATE(7400)	1
2-INPUT NOR GATE(7402)	1
HEX. INVERTER(7404)	1
3-INPUT NAND GATE(7410)	1
EXCLUSIVE OR GATE(7486)	1

MODULE의 LOGIC FUNCTION	Module Qt' y
J-K FLIP FLOP(7476)	2
D-FLIP FLOP(7474)	1
S-R LATCH(74279)	1
ENCODER(74138)	1
DECODER(74148)	1
8-BIT SHIFT REGISTER(74164)	1
BCD to 7-SEGMENT DECODER(7447)	1
7-SEGMENT MODULE	1

Education Content

- AND GATE
- OR GATE
- NOT GATE
- NAND GATE
- NOR GATE
- Exclusive OR Gate (XOR) GATE
- Adder
- Subtractor
- Encoder & Decoder
- Multiplexer & Demultiplexer
- RS Latch & RS Flip – Flop
- D Latch & D Flip – Flop
- JK Flip – Flop
- T Flip – Flop
- SHIFT REGISTER
- Asynchronous counter
- Synchronous counter
- FND Decoder

EST-1008

Analog & Digital Circuit Trainer



Analog & digital electronic circuit practice

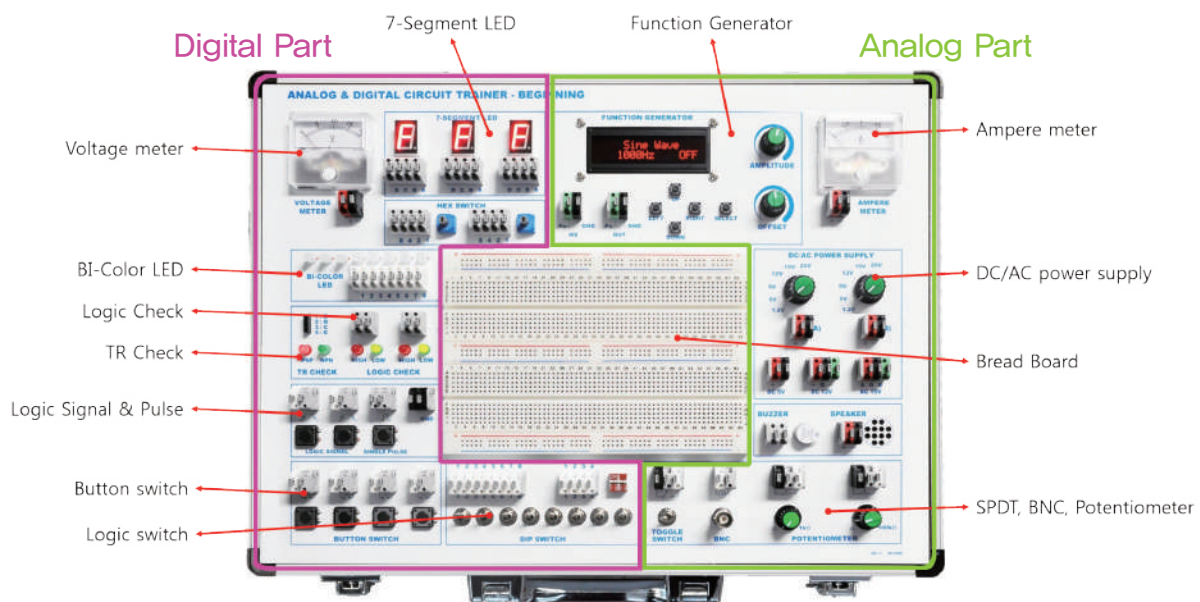
- Variety of analog and digital electronic circuit practice by installing detachable breadboards, various switches and variable resistance
- Power Supply using 220V power is installed, and supply DC +5V, $\pm 12V$ fixed voltage, DC variable power supply and AC variable power supply required for practical training.

Installation of measuring instruments and switches for practice convenience

- The waveform of Function Generator generates sine wave, triangle wave, square wave, sawtooth wave, and reverse sawtooth wave, and ECG and Random Noise output function
- Function Generator checks the frequency and output waveform set in Text LCD
- Logic Signal & Single Pulse generation pulse, subpulse, and trigger pulses can be output through each functional position
- It consists of four or more different input switches: Hex SW, Toggle SW, Dip SW, and Button SW

Main Composition

[Analog Part and Digital Part]



Education Contents

Direct current circuit

- Ohm's Law
- Series connection and a parallel connection circuit of resistance
- Kirchhoff's Law

AC circuit

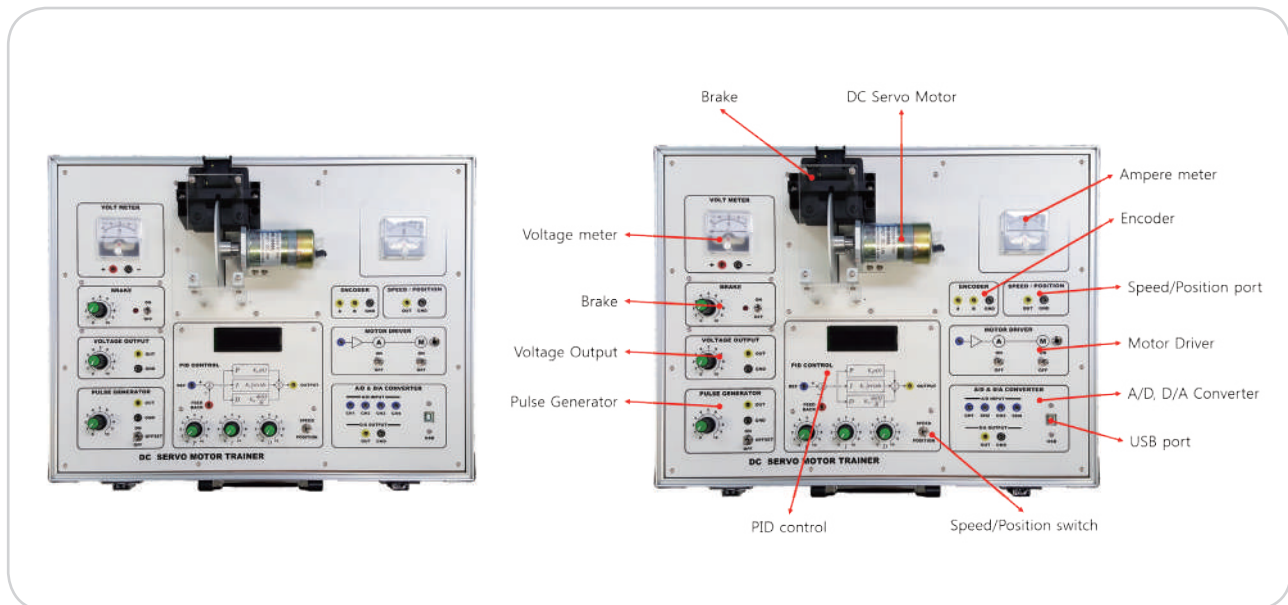
- RC&RL Circuit
- LC resonance circuit
- Filter Circuit

Semiconductor

- Diode characteristics
- Characteristics of Zener diode

EST-1032

Servo Motor Trainer



- A device that tests the basic characteristics of a motor
- A device that can acquire the operating principle of an application module using a motor
- Voltage/current measurement by motor rotation by mounting a voltage/current meter
- The application of the high tensile strength case according to the distortion prevention design of servo motor
- Provides a servo motor with a Feeding nut of high strength metal material
- Provides a servo motor with high life time potentiometer
- High power, high speed, and high durability implementation as a small linear servo with coreless motors (Premium Series).
- Provide a servo motor that can be installed flexibly and easily for application with Rotatable Hinge
- 32Bit microcontroller, AC/DC converter with resolution of 4096 and high linearity potentiometer built-in implementation of 4 times higher precision than existing competitive products
- Output rotation speed and angle data to the LCD using a DC servo motor with an encoder embedded
- Checking real-time waveform and graph of motor rotating using PC software
- Users can control P, I, D values on both the equipment and PC software

Education Contents

- Introduction of DC servo motor practice equipment
- DC servo motor control
- Name and function of each part
- PC GUI method of use
- Experiment of Open Loop control characteristics of servo motor
- Experiment of Open Loop control characteristics of servo motor using break
- Experiment of Close Loop control characteristics of servo motor
- Experiment of PID control characteristics of servo motor
- Experiment of PID control characteristics of servo motor using break
- Location control characteristics of servo motor

EST-4042

Sensor Trainer



Sensor, minimum unit of the Internet of Things(IoT)

- Learning the characteristics and operating principles of 20 kinds of sensors
- Each sensor is manufactured with modular, and provides sensor-specific circuit diagrams and communication protocols for easy addition and replacement as required.
- Total 8 kinds of sensor modules are installed in the main equipment to practice

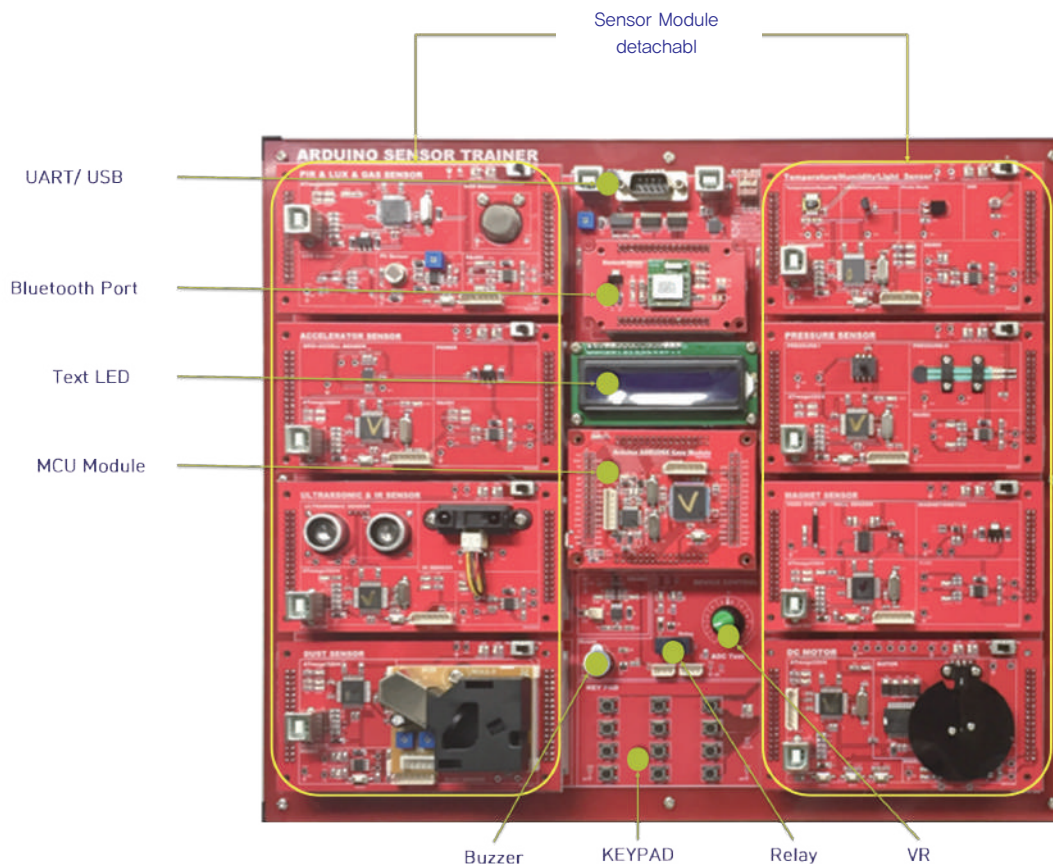
Firmware development practice

- The output value of the sensor can be confirmed through the serial monitor through the construction of the Arduino development environment, and the control practice of the actuator is possible.
- Provides examples of firmware development library for each sensor to enable beginners to easily access

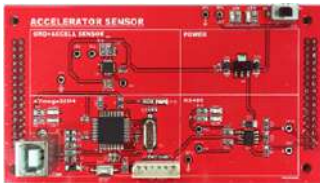
PC software and monitoring

- Data analysis by monitoring sensor values using PC software
- Remote monitoring of sensor values through Android App

Main Composition



Practice Module



ACCELERATION SENSOR



MAGNET SENSOR



PROXIMITY SENSOR



DUST SENSOR



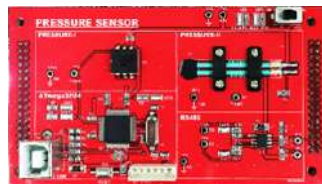
TEMP / HYMI / LIGHT SENSOR



DC MOTOR



ULTRASONIC / IR SENSOR



PRESSURE SENSOR



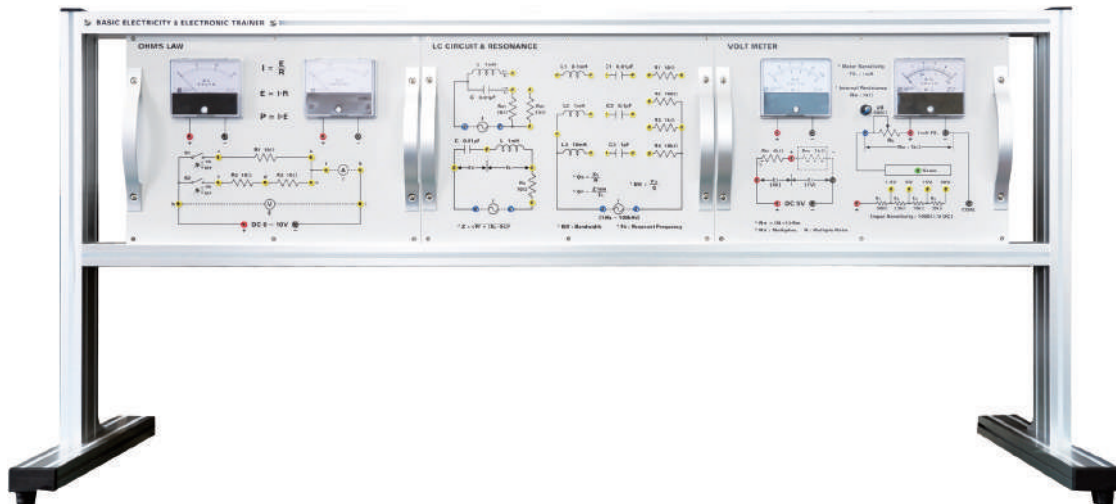
PIR / LUX / GAS SENSOR

Education Contents

- LED DEVICE CONTROL
- RELAY DEVICE CONTROL
- BUZZER DEVICE CONTROL
- VR DEVICE CONTROL
- PROXIMITY SENSOR (BR18)
- PROXIMITY SENSOR (PR18)
- PROXIMITY SENSOR (CR18)
- COLOR DETECTOR
- DUST SENSOR
- TEMPERATURE SENSOR (SHT11)
- HUMIDITY LIGHT SENSOR (SHT11)
- TEMPERATURE SENSOR (LM35)
- LIGHT SENSOR (PHOTO DIODE)
- LIGHT SENSOR (CDS)
- ULTRASONIC SENSOR
- PSD SENSOR
- PIR SENSOR
- LIGHT SENSOR (LUX)
- GAS SENSOR
- ACCELERATION SENSOR
- PRESSURE
- REED SWITCH SENSOR
- HALL SENSOR
- MAGNETIC ANGLE
- ENCODER SENSOR
- PHOTO INTERRUPT SENSOR
- IR SENSOR
- PHOTO TR SENSOR
- 13.56MHz RFID

EST-1004

Basic Electricity & Electronic Trainer

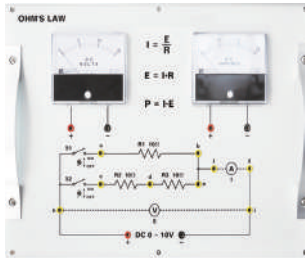


- Provide 14 experimental modules, including basic electrical and electronic experiment practice
- Principles of voltage/current/resistance, circuits, measurement error occurrence practice
- Basic principles and characteristics practice of Inductor and capacitor
- The practice of the basic theory of electrical and electronic such as Ohm's Law and Kirchhoff's Law
- Three-phase power conversion principles and half-wave/propagation rectifier circuit practice
- Electromagnetic force generation principle practice
- User directly wires and practices

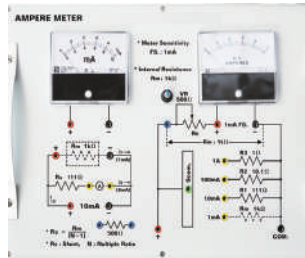
Education Contents

- Ohm's Law
- Resistance's Serial & Parallel
- Voltmeter & Voltage Measurement
- Amperemeter & Current Measurement
- Ohmmeter & Resistance Measurement
- Transformer & Transform
- Inductance's Serial, Parallel Circuit
- Ohmmeter & Capacitance's Serial, Parallel Circuit
- Capacitance & RC Circuit
- LC Circuit & Resonance
- Kirchhoff's Law
- Bridge Circuit
- 3-Phase Transformer & Δ & Y Connection
- Relay & Instruction
- 1-Phase Half-Wave & Full Wave Rectification
- Induced Electromotive Force & Electromotive Force
- Occurrence in Magnetic Field

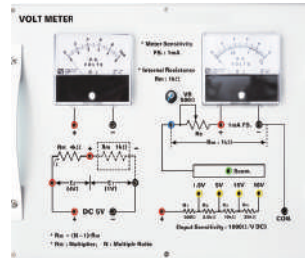
Main Composition



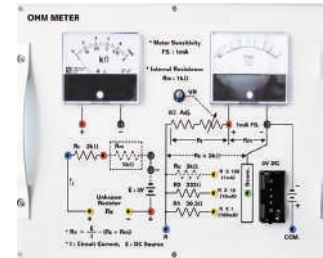
[OHM' s LAW]



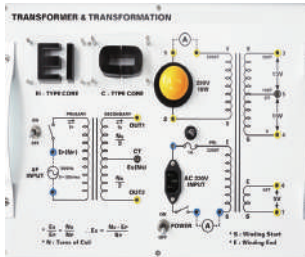
[AMPERE METER]



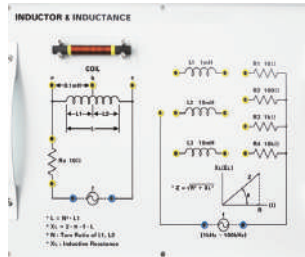
[VOLT METER]



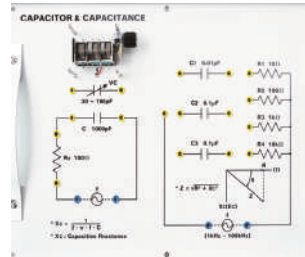
[OHM METER]



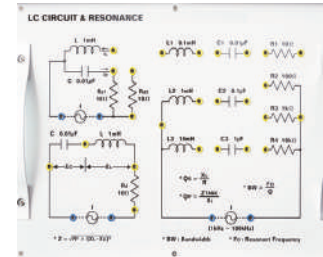
[TRANSFORMER & TRANSFORMATION]



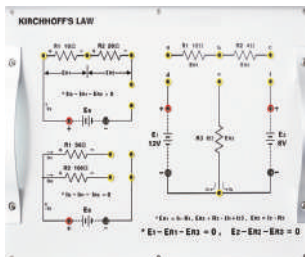
[INDUCTOR & INDUCTANCE]



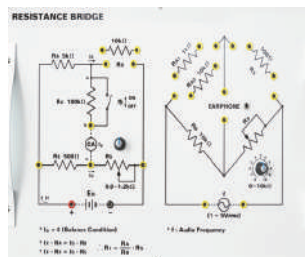
[CAPACITOR & CAPACITANCE]



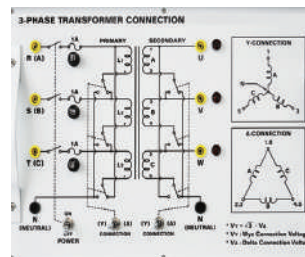
[LC CIRCUIT & RESONANCE]



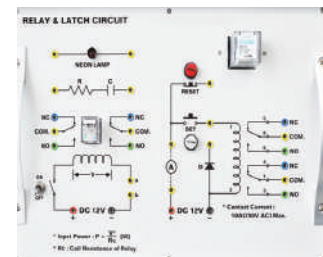
[KIRCHHOFF' s LAW]



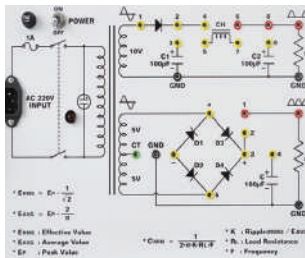
[RESISTANCE BRIDGE]



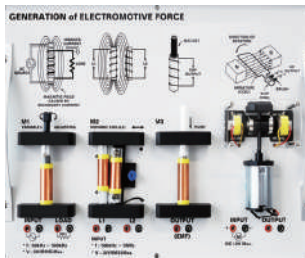
[3-PHASE TRANSFORMER CONNECTION]



[RELAY & LATCH CIRCUIT]



[HALF & FULL WAVE RECTIFIER]



[GENERATION OF ELECTROMOTIVE FORCE]

EST-1012

Semiconductor Electronic Circuit Trainer



- Provide 24 experimental modules, including semiconductor basic and applied experimental practice
- Practices based on the characteristics of the diode
- Transistor Characteristic Practice
- DC/Differential/Operational amplifier and Inversion/Non-inversion amplifier practice
- Application practice such as constant voltage/TANK circuit
- Various oscillator practice
- The variable resistance module enables the change of the practice contents according to the resistance value

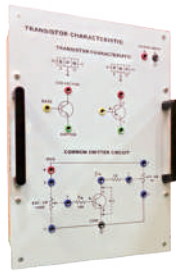
Education Contents

- Semiconductor diode characteristics practice
- Practice of semiconductor diode and zener diode
- Transistor characteristics practice
- Emitter ground transistor characteristics practice
- FET characteristics practice
- MOSFET characteristics practice
- SCR characteristics practice
- UJT characteristics practice
- Optical transistor characteristics practice
- Light Emitting Diode(LED) characteristics practice
- Emitter ground amplifier characteristics practice
- DC amplifier circuit practice
- Power amplifier circuit practice
- Differential amplifier circuit practice
- Operational amplifier basic circuit practice
- Inversion and non-inversion amplifier circuit practice
- Active filter circuit practice
- Unbalanced voltage supply circuit practice
- Constant voltage circuit practice
- Tank circuit practice
- LC oscillator circuit practice
- Crystal oscillator circuit practice
- Wien bridge oscillator circuit practice
- Square wave oscillator circuit practice
- RAMP generator circuit practice
- Amplitude modulation circuit practice

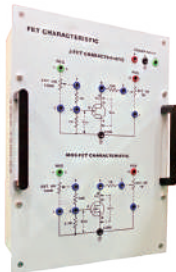
Main Composition



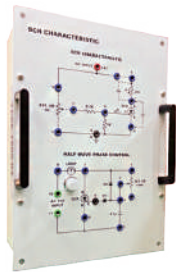
DIODE/ZENER CHARACTERISTIC



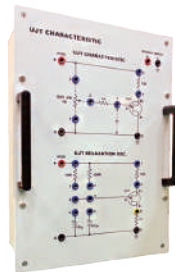
TRANSISTOR CHARACTERISTIC



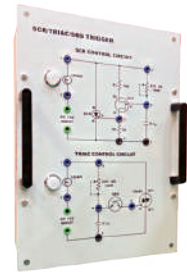
FET CHARACTERISTIC



SCR CHARACTERISTIC



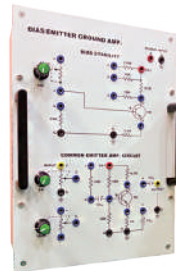
UJT CHARACTERISTIC



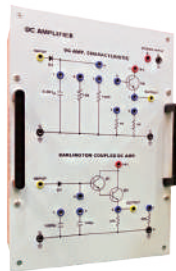
SCR/TRIAC/SBS TRIGGER



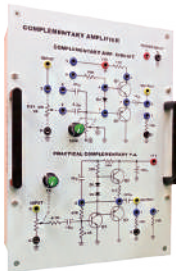
LED/PHOTO DEVICE



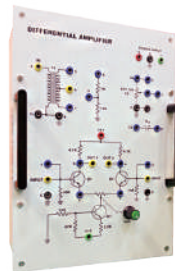
BIAS/EMITTER GROUND AMP.



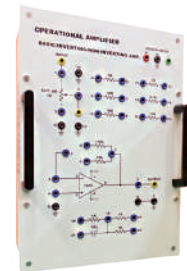
DC AMPLIFIER



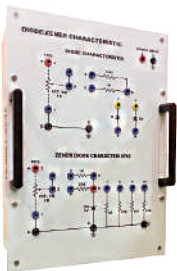
COMPLEMENT AMPLIFIER



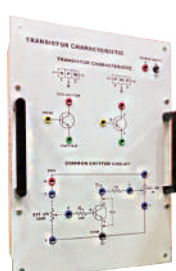
DIFFERENTIAL AMPLIFIER



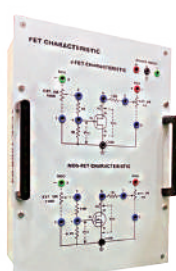
OPERATIONAL AMPLIFIER



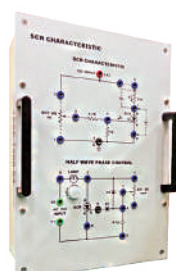
ACTIVE FILTER CIRCUIT



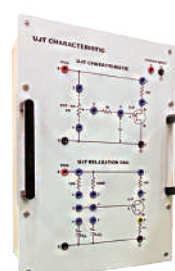
UNREGULATED POWER SUPPLY



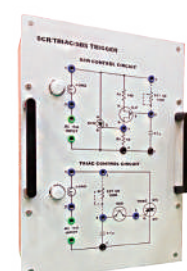
DC VOLTAGE REGULATOR



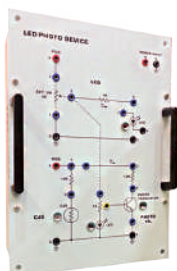
VARIABLE VOLTAGE REGULATOR



TANK CIRCUIT/ RESONANCE



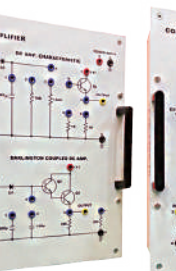
OSCILLATOR



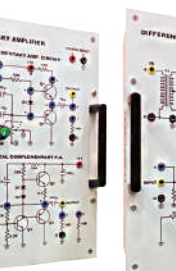
CRYSTAL OSCILLATOR



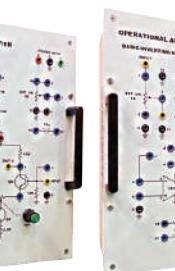
WEIN BRIDGE OSCILLATOR



MULTI VIBRATOR/ SCHMITT TRIGGER



TIMER IC APPLICATION



RAMP GENERATOR



MODULATION/ DEMODULATION



VARIABLE RESISTOR

EST-E100

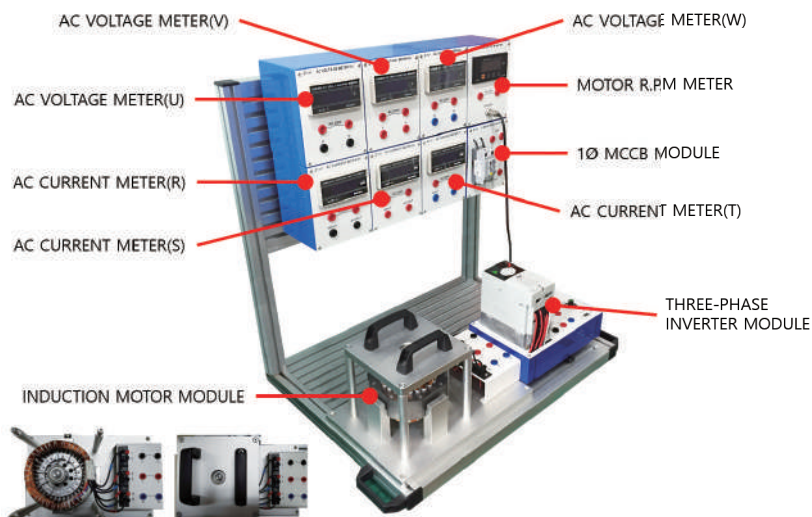
Electrical Equipment Trainer



- NCS electric equipment production training education
- Practice of the principle and components of the motor
- Practice from basic to application of the winding method of induction machine
- Direct delta and Y-link practice
- Easily understand the shape of windings, observing the shape of the rotor, and the structure of the motor through disassembly and assembly of the motor(Induction machine)
- Understanding the overall sequence method of the measuring instrument with direct connection of voltage/current/motor speed/frequency meter
- Check voltage/current/resistance/motor speed/frequency measurements values on single-phase and three phases

- The structure which can easily understand the characteristics from the base of the motor to the application by controlling the speed of the motor
- Understanding the operation principle of the motor with the simulation software of the electric machine

Main Composition



Education Contents

- Insulation paper production
- Single-phase four-pole induction motor production
- Single-phase six-pole induction motor production
- Single-phase two-pole induction motor production
- Single-phase two-pole shaded pole induction motor production
- Single-phase four-pole 110/220[V] induction motor production
- 3-phase two-pole induction motor production
- 3-Phase two-pole molding inner sphere induction motor production
- 3-phase four-pole induction motor production
- 3-phase eight-pole induction motor production
- 3-phase 2/4-pole 110/220[V] induction motor production
- 3-phase two-pole double connection induction motor production
- 3-phase 4-pole double connection induction motor production

EST-3026

Electric Power Electronic Trainer



From basic to application

- Principles of basic electric power electronics and basic circuit education
- The overall practice of power electronics from diode rectifiers to AC power control, boost/coercion circuit, and inverters

Digital oscilloscope mounted

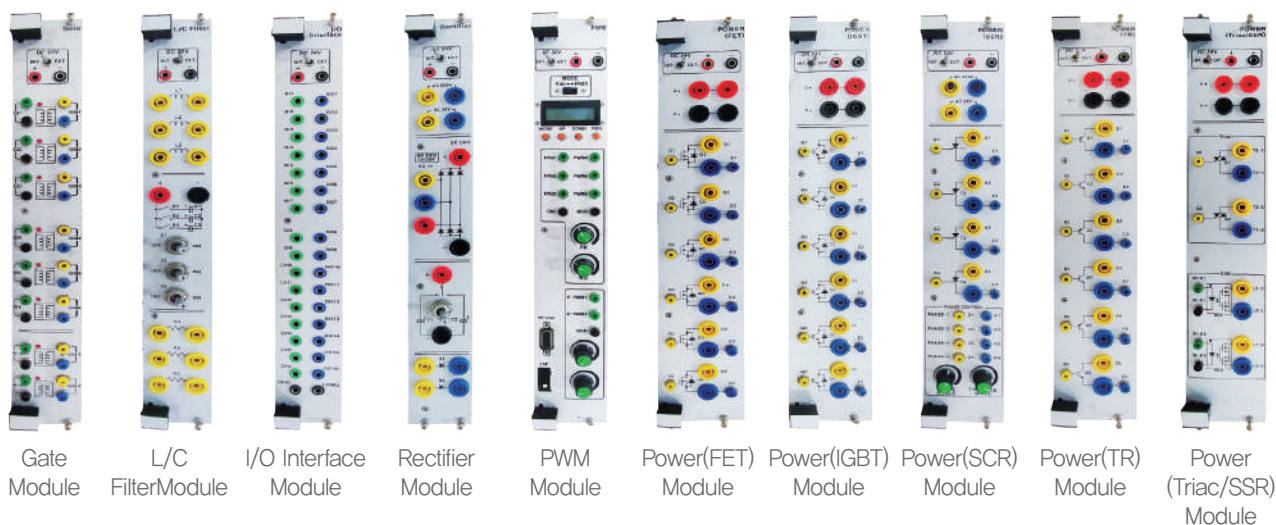
- Measurement of waveforms of practice circuit on PC

Provides an intensive practice environment that can be detachable

- Gate modules accept six independent PWM signals and use them as inputs for inverter control driver modules
- Depending on your application, you can change and practice six power modules (TRIAC/SSR, FET, IGBT, TR, SCR).
- Configure each slot to be detachable from the base rack

Main Composition

Power electronic modules can be detachable, so they can be replaced to practice.



Education Contents

- Single-phase half-wave diode rectifier
- Single-phase full-wave diode rectifier
- Three-phase half-wave diode rectifier
- Three-phase full-wave diode rectifier
- Constant voltage power circuit
- Single-phase half-wave phase control rectifier
- Single-phase full-wave phase control rectifier
- Three-phase half-wave phase control rectifier
- Single-phase AC Power Control by SCR
- Single-phase AC power control by SCR and diode
- Buck chopper circuit (IGBT)
- Buck chopper circuit (FET)
- Boost chopper circuit (IGBT)
- Boost chopper circuit (FET)
- Buck & Boost chopper circuit
- Single-phase square wave voltage type inverter
- Three-phase voltage type inverter

EST-3052

Electric Power Electronic Trainer



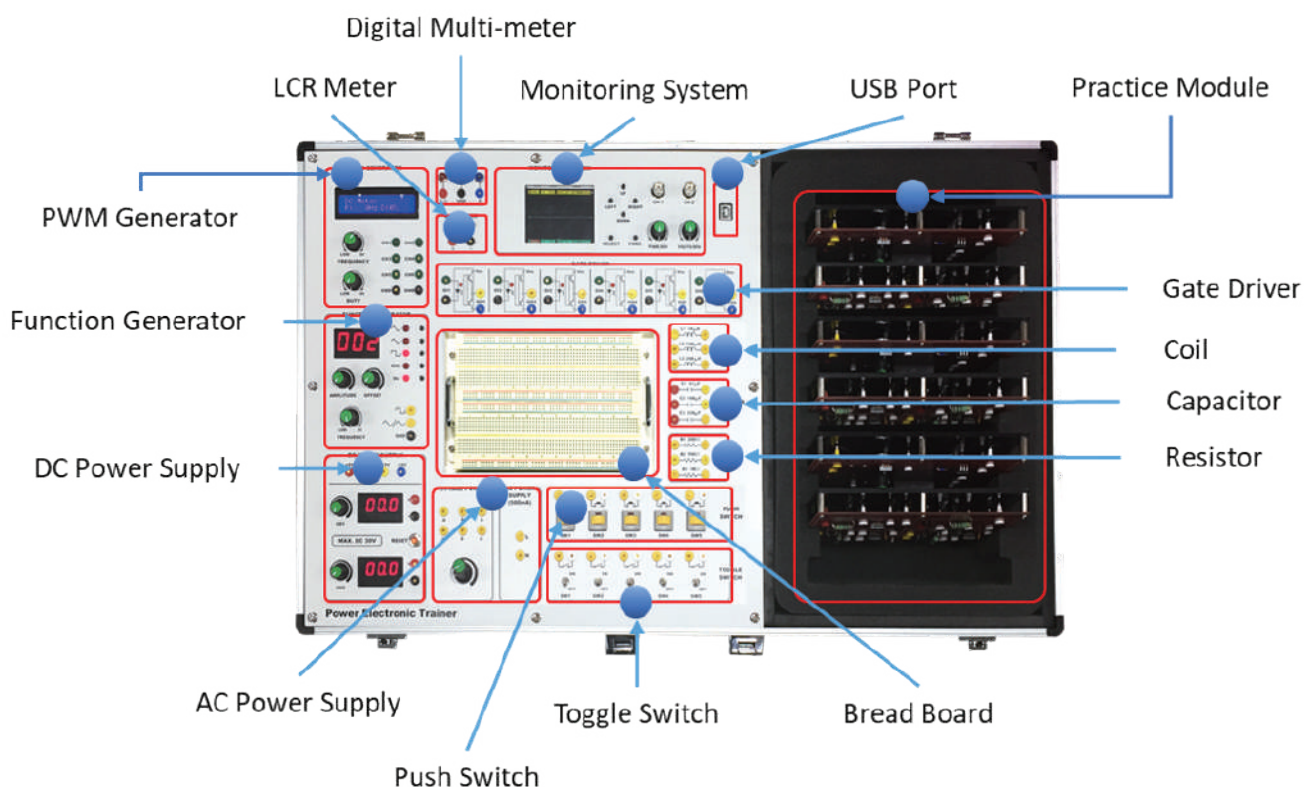
One-stop power electronic practice

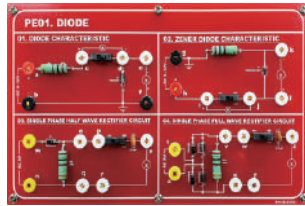
- Basic circuit practice and application circuit practice in the field of electric power electronic
- LC Meter, Digital Multi Meter, Digital Oscilloscope, Function Generator, etc. are all built in and can be practiced independently without additional equipment,
- Real circuit configuration practice through breadboard
- Expanding practice by additionally constructing DIODE, SCR, TRIAC&SSR, TR, FET, IGBT, BUCK/BOOST practice module

Power separation type system configuration

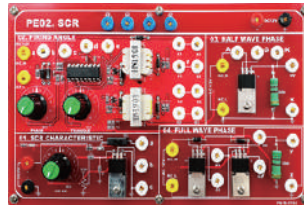
- DC Power supply is composed of 0 ~ 30V variable type 2 channels from which power is separated, and it is possible to experiment with characteristics of various IC devices.
- AC(single/three-phase)power supply is provided, Y-wiring and Δ -wiring practice using AC 3 phase, and unbalanced-wiring practice by varying the single-phase amplitude
- The gate control practice of power device using 6Ch PWM signal
- The gate driver receives 6 independent PWM signals and controls TR, FET, IGBT, etc. to control DC, 3-phase, BLDC motor, etc.

Main Composition

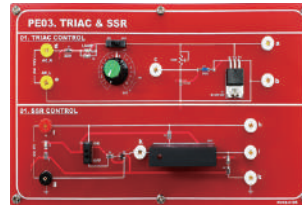




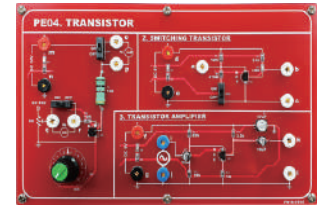
DIODE Module



SCR Module



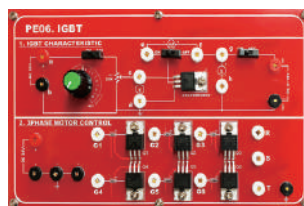
TIAC & SSR Module



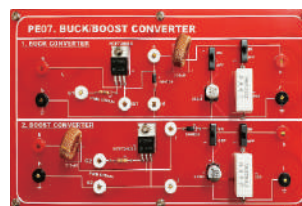
TIAC & SSR Module



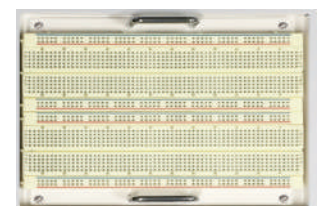
FET Module



IGBT Module



BUCK/BOOST



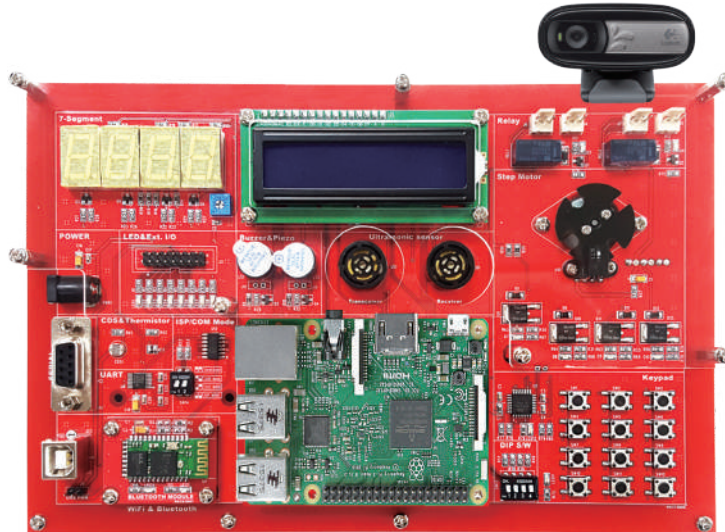
BREAD BOARD

Education Contents

- Diode characteristic experiment
- Zener diode characteristic experiment
- Single-phase half-wave/full-wave rectification experiment
- 3-phase half-wave/full-wave rectification experiment
- Rectifier filter circuit experiment
- Constant voltage circuit experiment
- SCR characteristic experiment
- Single-phase half wave/full-wave phase experiment
- 3-phase half-wave/full-wave phase experiment
- TRIAC characteristics experiment
- TRIAC AC phase control experiment
- SSR circuit design experiment
- Transistor characteristic experiment
- Transistor bias amplification experiment
- Transistor switching circuit experiment
- DC motor control circuit experiment using transistor
- Buck/Boost converter experiment using transistor
- FET characteristic experiment
- FET switching circuit experiment
- Experiment of 3-phase motor control circuit using FET
- IGBT characteristic experiment
- IGBT switching circuit experiment
- Experiment of BLDC motor control circuit using IGBT

EST-2017

PC-based Control Trainer



※ Product type may change depending on the task of practice

PC-based (Visual C++) controller step-by-step control practice

- Stepwise production practice of PC GUI using Visual C++
 - Character string output
 - Mouse
 - Graphic
 - Timer, Bitmap, Domain
 - Control, Supposition Dialog Box, Child Window
 - Events, etc
- Communication(USB serial, WIFI) program enables monitoring and control practice of external devices
 - Ultrasonic, CDS, VR, Temp., Gas sensor value monitoring
 - LED, Buzzer, Relay, Motor, FND, Text LCD
- Remote monitoring of external camera images using WIFI communication in PC GUI

Education Contents

- Equipment introduction and Environment construction
- Basic practice of PC GUI production
- Wire communication programming practice
- Wireless communication programming practice
- Ultrasonic sensor monitoring GUI production practice (wire/wireless)
- Temperature sensor monitoring GUI production practice (wire/wireless)
- Illuminance sensor GUI production practice (wire/wireless)
- LED control GUI production practice (wire/wireless)
- Buzzer control GUI production practice (wire/wireless)
- Relay control GUI production practice (wire/wireless)
- FND control GUI production practice (wire/wireless)
- Text LCD control GUI production practice (wire/wireless)
- Motor control GUI production practice (wire/wireless)
- GUI production practice of camera image monitoring using wireless communication
- Integrated monitoring and control GUI production practice

EST-4000

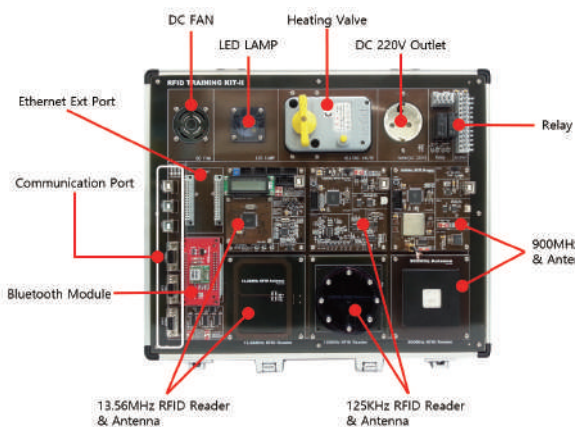
Multi RFID Trainer



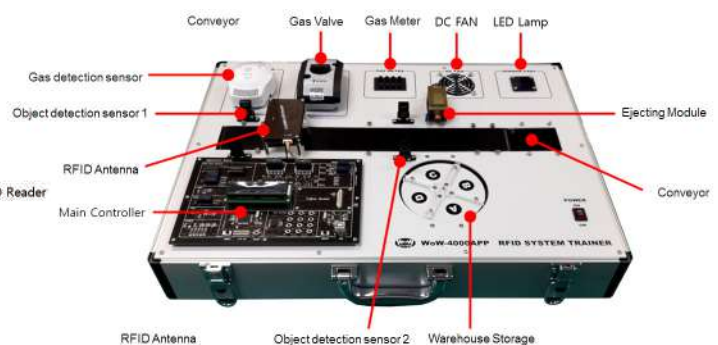
Sensor, minimum units of the Internet of Things(IoT)

- RFID education by frequency
- RFID configurations at 125KHz, 13.56MHz and 900MHz
- Practice of the characteristics and motion principles of individual RFID module
- DC FAN, LED Lamp, Heating Valve, Outlet, Relay control practices using RFID
- Application cases of RFID(Automatic calculation, Attendance management, Material management, etc.) implementation practice
- RFID Tag data monitoring and device control using dedicated App.
- RFID application logistics automation practice(Model : WOW-4000APP)

Main Composition



[EST-4000]



[EST-4000APP]

Education Contents

- Relay control practice
- AC Voltage control using TRIAC
- Valve Open/Close control
- FAN control
- LED Lamp control
- TEXT LCD control
- UART communication Loopback practice
- Principles of TAG recognition system
- Device control using 13.56 RFID
- 13.56MHz RFID program
- 13.56MHz RFID Reader
- 13.56MHz product calculation program
- 13.56MHz Attendance management program
- 13.56MHz Material management program
- 125kHz RFID product calculation program
- 900MHz RFID product calculation program
- Remote monitoring and control practice using Android App.

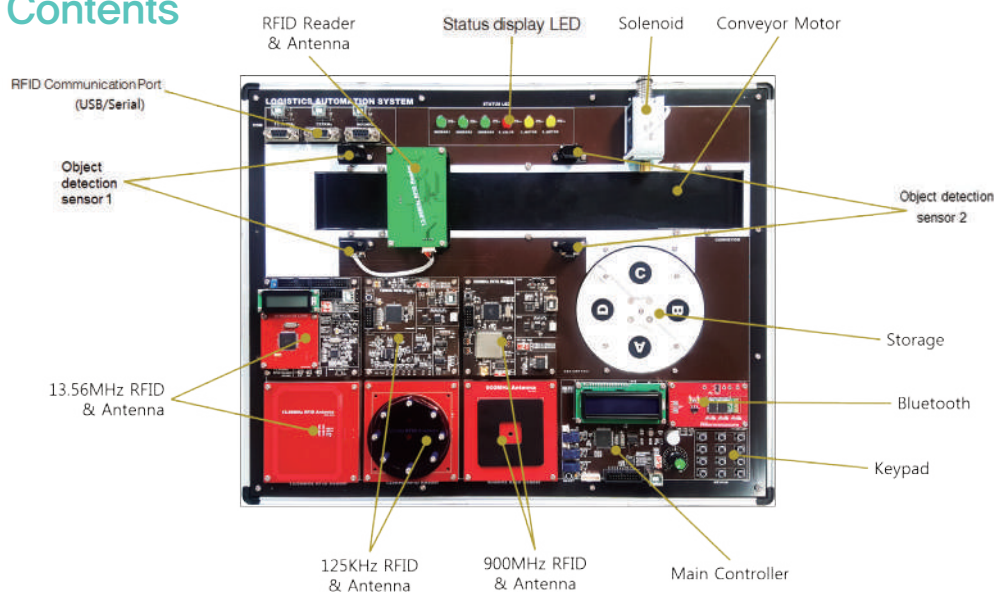
EST-4037

RFID Logistics Automation Trainer equipment



- Education on the implementation of logistics automation system using RFID
- Configure 125KHz, 13.56MHz, 900MHz RFID on one equipment
- Monitoring and controlling programs for components of logistics automation systems
- Practice of logistics automation system implementation program using 13.56MHz
- Practice of implementing application program using 125KH
- Practice of implementing application program using 13.56MH
- Practice of implementing application program using 900MHz

Education Contents



Education Contents

- RFID introduction
- LOGISTICS AUTOMATON SYSTEM equipment
- introductionConstruction of practice environment
- RELAY control practice
- SOLENOID control practice
- PROXIMITY SENSOR practice
- CONVEYOR MOTOR control practice
- STORAGE MOTOR control practice
- TEXT LCD control practice
- CDS SENSOR monitoring practice
- RFID Reader practice
- Logistics automation control practice
- RFID Application program 1
- RFID Application program 2

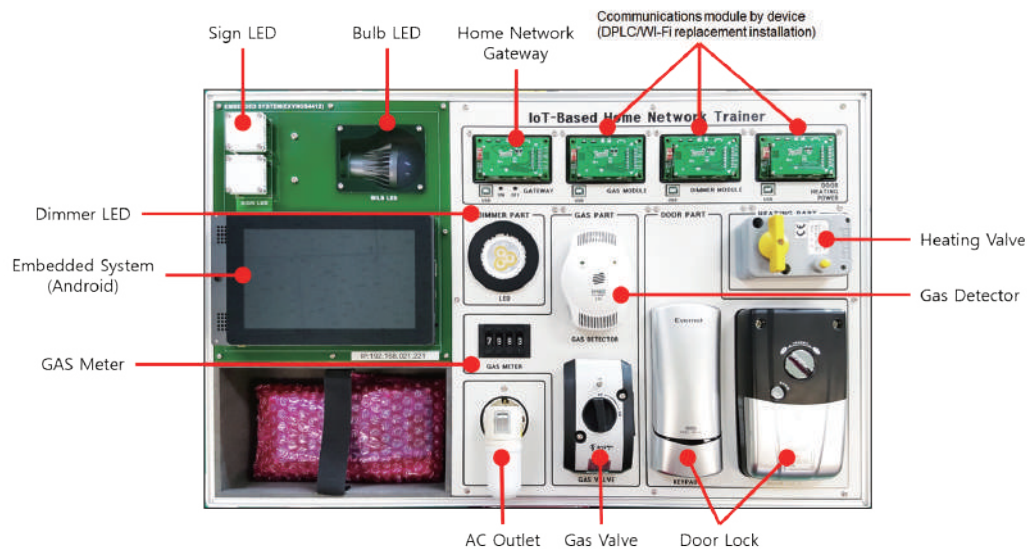
EST-4019

Home Network Trainer



- Home network principles and element technology education
- State monitoring and control education of lighting, door, heating, gas, and power parts used in home
- The practice of producing the individual control firmware of home devices using Arduino
- Home device monitoring and control practice using Power Line Communication (DPLC) and wireless communication (Wi-Fi)
- Practice of Android App. production by communication module
- Provides basic/application example programs for various practice
- The embedded system is composed in one equipment and can be educated without a separate smart device
- The communications selection(Power Line Communications(DPLC), Wireless Telecommunication(Wi-Fi)) according to the user needs as the structure capable of communications module attaching/detaching

Main Composition



Education Contents

- LoT and Smart home Embedded and Home
- Networks Starting Arduino LED control practice GAS
- Signal detection practice GAS device control
- Practice Electronic device control practice Firmware
- Initialization and Communication settings Starting
- Android LED control practice (DGAS signal detection)
- Practice (DPLC communication) GAS device control
- Practice (DPLC communication) Electronic device control
- Practice (DPGAS detection practice (WIFI communication))
- GAS device control practice (WIFI communication)
- Electronic device control practice (WIFI communication)

EST-4027

Wired and Wireless Communication Interface Trainer



Wired and Wireless interface practice

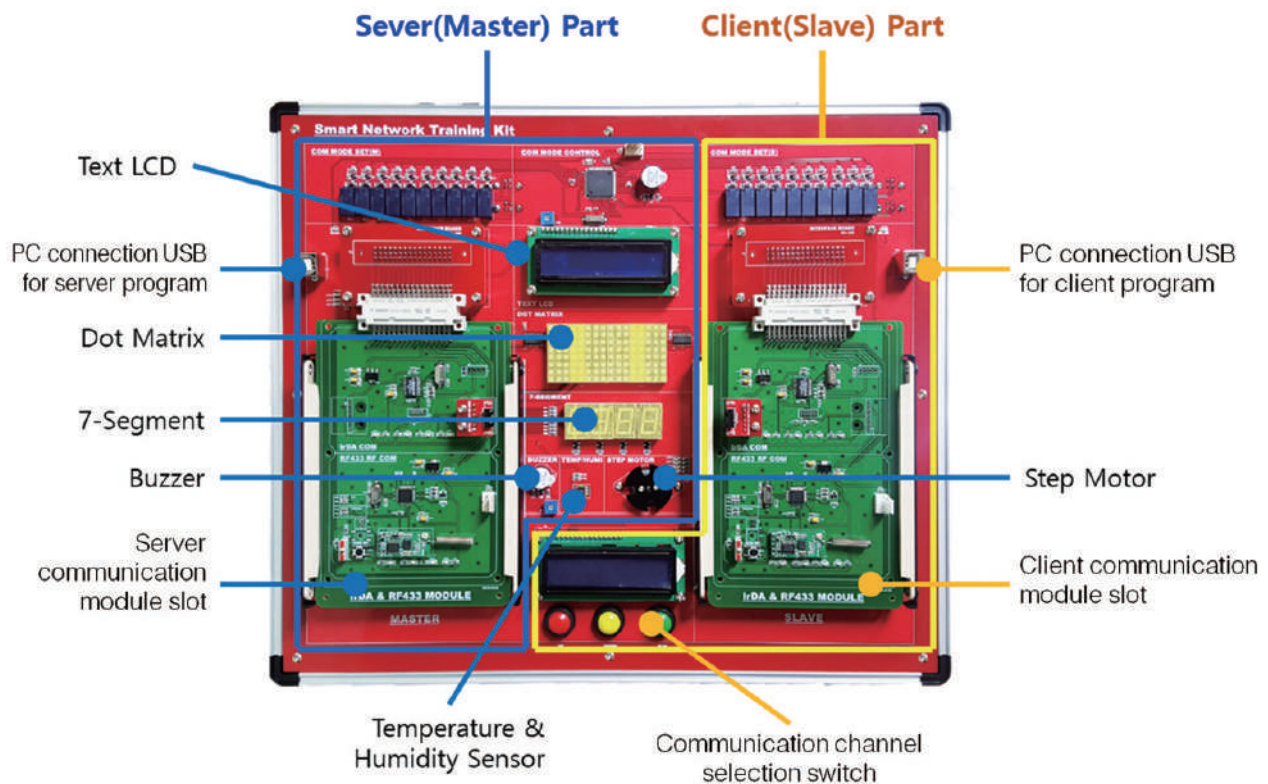
- * A total of 13 communication modules are installed in the master module of the server role and various controllers are included to enable various practice
- * A total of 13 communication modules are installed in the slave module of client role

Server and Client programming practice

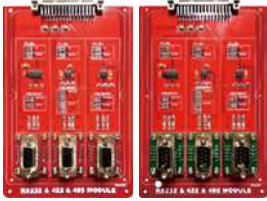
- * MS Visual Studio: Programming practice of 13 kinds of communication modules that set and provide C++ Program as basic practice environment is possible
- * An example program source is provided to enable the learner to practice easily and quickly
- * A communication program practice using PC software to intuitively and easily check the results of the training.



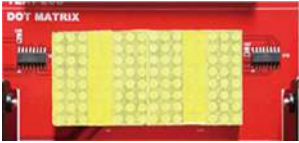
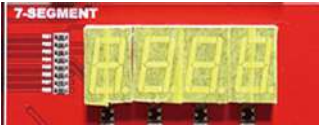
Main Composition



[Communication Module]

RS-232, 422, 485	WIFI, LAN	USB, CAN	LpRa
			
bluetooth	RF433, IrDA	NFC	Zigbee
			

[Control Device]

STEP MOTOR	TEXT LCD	DOT MA TRIX
		
7-SEGMENT	BUZZER	TEMPO / HUMI SENSOR
		

Education Contents

- RS-232C Interface Program Practice
 - RS-422 Interface Program Practice
 - USB Interface Program Practice
 - CAN Interface Program Practice
 - Ethernet(TCP/IP) Interface Program Practice
- LoRa Interface Program Practice
 - IrDA Interface Program Practice
 - NFC Interface Program Practice
 - Bluetooth Interface Program Practice
 - RF-433 Interface Program Practice

EST-1017

Firmware Development Trainer

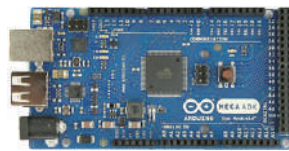


Textbook composition based on NCS learning module

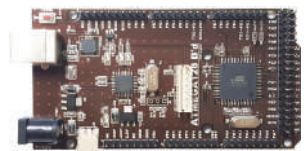
- The 'Firmware Development' learning module consists of 'Firmware Design' → 'Firmware Implementation' → 'Firmware Verification' flow, and can learn the practical firmware development capability through repetitive practice.

Arduino repeated practice and Extensibility

- Repeated Learning of Arduino using various modules such as 7 kinds of sensors including CDS, Ultrasonic, VR, PIR, Axis, NFC, Temp/Humidity, and 4 kinds of display of LED, FND, Text LCD, Dot Matrix, and Motor, Input module, etc
- This equipment is MCU detachable structure and is easy to expand because it is possible to practice two kinds of microcontrollers, ATmega2560 (Arduino) and ATmega128 (AVR).

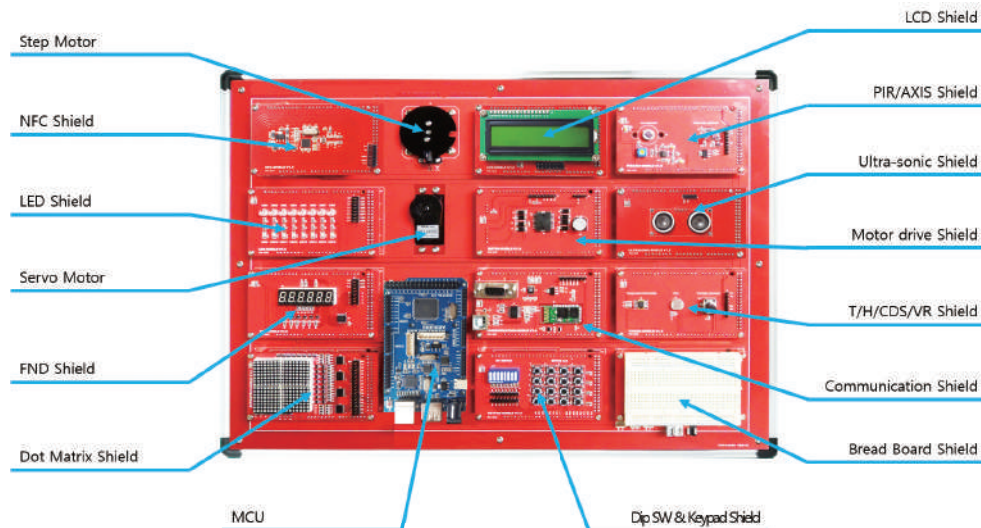


ATmega2560(ARDUINO)



ATmega128(AVR)

Main Composition



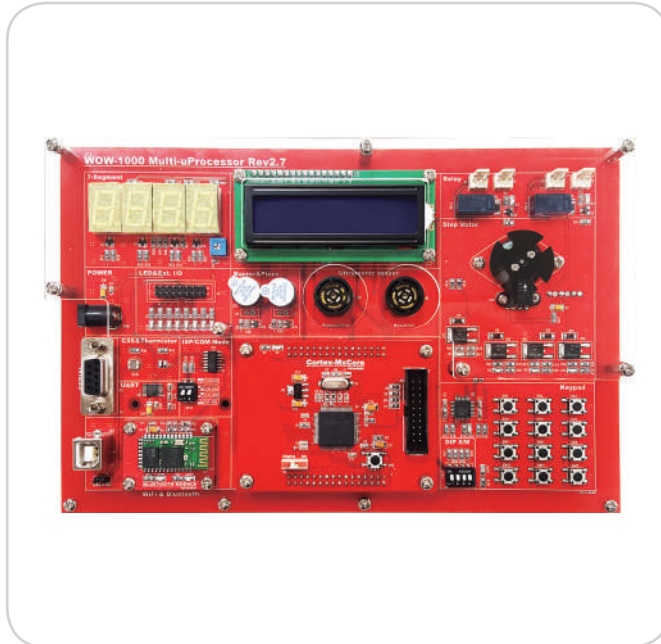
5

Education Contents

- Starting AVR/ARDUINO
- Development of LED control firmware
- Development of FND control firmware
- Development of COMMUNICATION control firmware
- Development of TEXT LCD control firmware
- Development of KEYPAD control firmware
- Development of STEP MOTOR control firmware
- Development of STEP MOTOR control firmware interworking with KEYPAD
- Development of CDS SENSOR monitoring firmware
- Development of Temperature/Humidity sensor monitoring firmware
- Development of firmware using Bluetooth communication

EST-1000

Multi Microprocessor Trainer



Various microcontroller learning

* This equipment is MCU detachable structure and it is possible to practice 3 kinds of microcontrollers (Arduino (ATmega2560), AVR (ATmega128), ARM (Cortex-M3)).

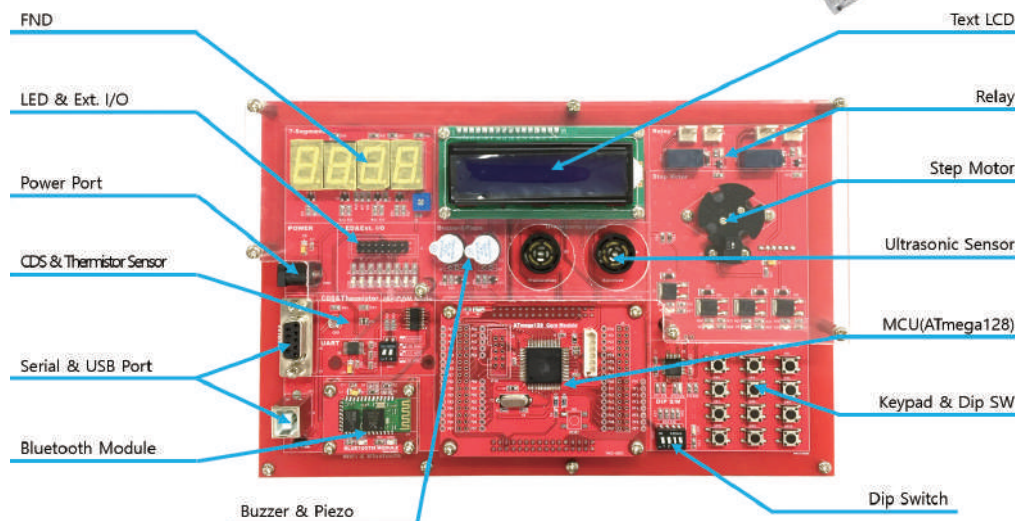
Arduino repeated practice and Extensibility

* Repeated Learning of Arduino using various modules such as 7 kinds of sensors including CDS, Ultrasonic, VR, PIR, Axis, NFC, Temp/Humidity, and 4 kinds of display of LED, FND, Text LCD, Dot Matrix, and Motor, Input module, etc

* This equipment is MCU detachable structure and is easy to expand because it is possible to practice two kinds of microcontrollers, ATmega2560 (Arduino) and ATmega128 (AVR).



Main Composition



Education Contents

- MCU structure and function
- GPIO (Universal I/O Port)
- LED control using GPIO port output control
- FND control using GPIO port output control
- TEXT LCD control using GPIO port output control
- Relay control using GPIO port output control
- DIP Switch control using GPIO port input control
- External interrupt related register
- External interrupt descent edge detection
- Timer and Counter
- Ultrasonic sensor data processing using timer/counter
- PIEZO control using PWM
- A/D converter related register
- CDS sensor control using A/D converter
- Universal Sync/Asynchronous serial communication – USART
- Step motor control
- Monitoring and control using Application

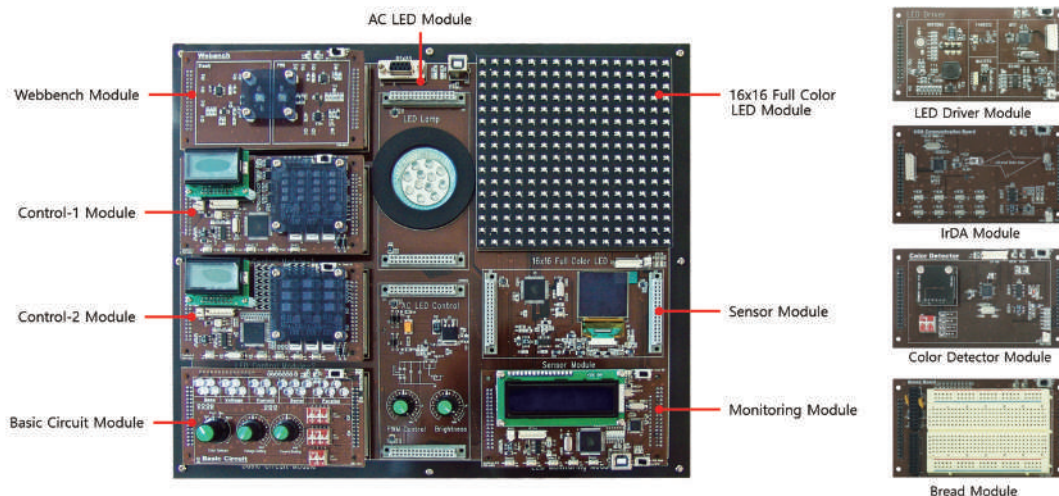
EST-3032

LED Basic Trainer



- Training on circuit and control methods by LED type
- The configuration is designed to compare and analyze the characteristics of various LED-related devices and applied parts
- Connect with PC to LED and data acquisition or change
- LED control with serial, parallel, constant current, constant voltage
- It is composed of various application hardware such as device LED, FND, Dot Matrix, OLED, LED LAMP, and practice operation principles, power efficiency of LED lighting, and LED lighting control (including filters and sensors)
- Sensor interlocking LED control experiment practice
- Hardware and program practice to IrDA Remote control transmission and reception
- LED brightness control practice using various types of LED driver IC
- Remote control using RS485 communication between main module and LED control module
- Breadboard user circuit design practice

Main Composition



Education Contents

- LED overview
- The description of LED experiment equipment
- LED basic driving experiment
- LED control experiment using constant voltage method
- LED control experiment using constant current method
- LED series experiment
- LED parallel experiment
- LED driver operation using Webench
- The structure and function of ATmega128
- LED control using AC
- 16X16 Full Color LED control
- FAN5622 LED driver control
- MAX1570 LED driver control
- LED lighting control using program
- Full Color LED brightness control
- Full Color LED Color control
- Full Color LED Frequency control
- Sensor Module control
- Color Detector control
- IrDA control
- 7-Segment control
- DOT MATRIX control

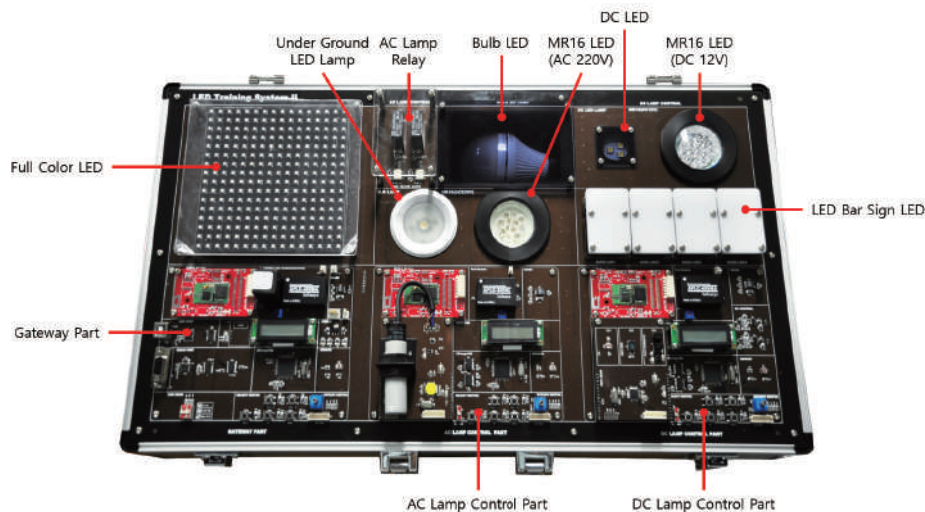
EST-3021

LED Application Trainer



- LED control application training linked to various sensors
- LED control, data acquisition, or change in connection with PC
- Smart lighting implementation by combining various sensors, LED lighting, and computer communication
- Various practices for implementation of landscape lighting, emotional lighting, and etc.
- ON/OFF control, brightness control, and pattern control of multiple LED
- Production of LED control pattern and practice of LED lighting display by application program separately driven in PC
- The various sensors connected to the lighting device are modularized and designed to be detachable so that the experiment is facilitated.

Main Composition



Education Contents

- Bulb LED control practice using GPIO Port (AC)
- LED Bar control practice (DC) using GPIO port
- Text LCD control practice (GW)
- Keypad control practice (GW) using Interrupt method
- Rotary Switch control practice (GW)
- ADC sensor control practice
- LCD control practice (AC) using proximity sensor
- LCD control practice (DC) using a photosensor
- LED control practice (AC) using a CDS sensor
- U.G. LAMP control practice (AC) using a proximity sensor
- LED BAR control practice (DC) using a photosensor
- Full Color LED control practice (GW)
- DC LED LAMP PWM control practice (DC)
- SIGN LED control practice (DC)
- SIGN LED control practice (DC) using THERMISTOR
- REMOTE CONTROL control practice (GW, AC)

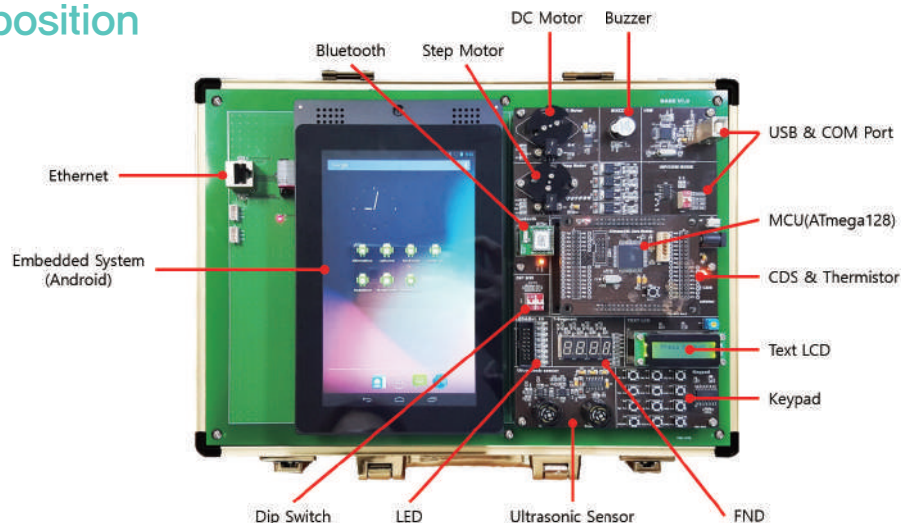
EST-2009

Android Platform Trainer



- Android App production education and Microprocessor programming education
- Practice from the foundation of Android App production to application
- Distinguish the Embedded system from the Microprocessor system and configure in one device
- Provides basic/application example programs for various kinds of practical training
- Practice linking Embedded and Microprocessor systems using Android App
- Control of external practice devices using Bluetooth and Wi-Fi
- Applying various input devices (switch, sensor, etc.), Display devices (LED, FND, CLCD, etc.), and Actuator devices (step motor, DC motor, etc.)

Main Composition



Education Contents

Android App Foundatio

- Android Studio environment construction
- Basic View 1 (Text view, Edit view)
- Basic View 2 (Image view, Button)
- Type and creation of layout
- Event processing and Event Listener
- Dialog box and Custom dialog box
- Advanced Widgets (List View, Spinner, Grid)
- Advanced Widgets (Progress Bar, SeekBar)
- Advanced Widgets (Date and time Input Method Editor(IME))
- Activity and Implicit/Explicit Intent
- Graphics (Drawing using custom views)
- Graphics (Drawing using image display and figure objects)

Android App Application

- Construction of Android and AVR usage Environment
- LED control practice
- BUZZER control practice
- FND control practice
- DC motor control and photo interrupt practice
- STEP motor control and photo interrupt practice
- Ultrasonic sensor data collection and display practice
- CDS sensor data collection and display practice
- DIP SWITCH control and display practice
- KEYPAD control and display practice
- TEXT LCD control practice
- Ultrasonic sensor and DC/STEP motor interworking control practice

EST-4013

Android Application Trainer



- Android Application program education
- A practice in producing Android App for remote monitoring and control of home device
- Practice from Android App production basics to modular application
- Configure the smart device module and wireless monitoring system that are actually being used
- Module configuration by dividing into Smart Appliance, Smart Security, Smart Healthcare, Smart Illumination, Smart Gas Leak Detector concept
- Module state monitoring and control with Gateway and wireless communication using Android-based smart devices (Smartphone, tablet, and etc.)
- Practice from the foundation of Android App production to application by module

- Each practice module transmits and receives data with the gateway via Zigbee communication.
- Gateway monitors and controls the status of the module via external smart device and wireless communication
- Individual device control and status monitoring for each practice module via TEXT LCD

Main Composition



Smart Gateway Module



Smart Illumination Module



Smart Healthcare Module



Smart Appliances Module



Smart Security Module



Smart Gas Leak Detector Module

Education Contents

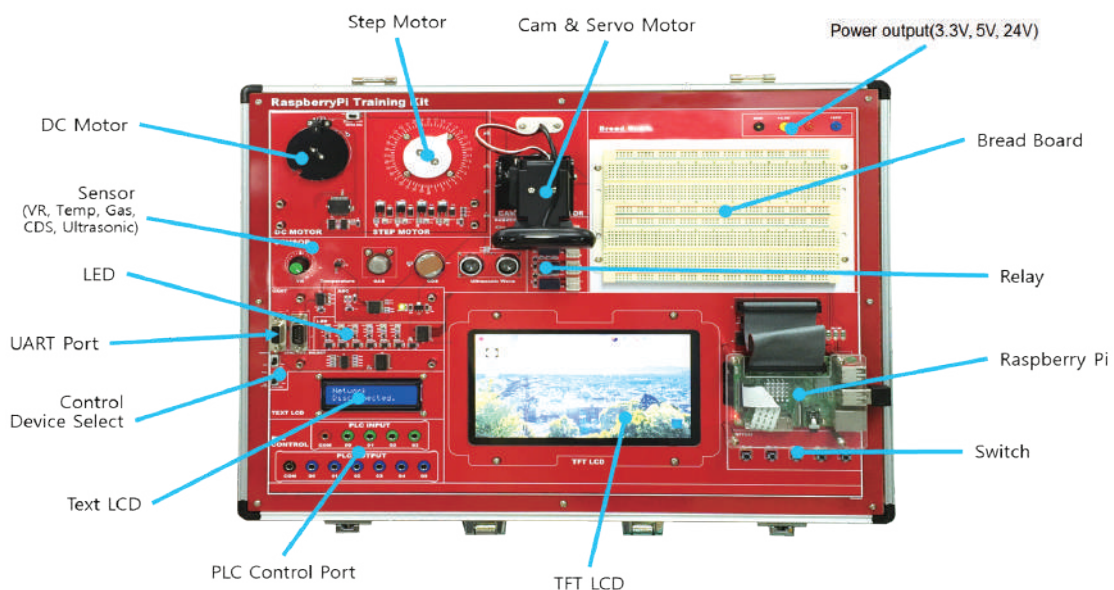
- | | | |
|------------------------|------------------------------|-------------------------------------|
| • Android | • Event | • APPLIANCES MODULE practice |
| • Android System | • Menu and Dialog Box | • GAS LEAK DETECTOR MODULE practice |
| • Program installation | • Advanced Widget | • SECURITY MODULE practice |
| • Basic View | • Activity and Intent | • HEALTHCARE MODULE practice |
| Layout | ILLUMINATION MODULE practice | |

EST-2012

Raspberry Pi Trainer



Main Composition



Raspberry Pi based embedded practice

- Using the ultra-small computer 'Raspberry Pi', we provide various practical examples using Python, C language, and JAVA, so that learners can easily practice
- The TFC LCD and raspberry pie are connected to monitor and control the operation screen without a separate monitor, enabling the convenient practice

Various practice element composition

- Provides a wide range of practical environments, from basic GPIO control to GUI and web server implementation applications practice
- Various practical contents such as 5kinds of sensor(VR, Temperature, Gas, CDS, Ultrasonic), 3 kinds of motor(DC Motor, Step Motor, Servo Motor), Relay, LED, Text LCD, Keypad and etc. are installed in bag type module.
- It is remotely monitored and controlled through control of control devices, camera-based video output, and video processing practice in various environments such as web server, GUI, and mobile.
- It is controllable by interworking with PLC equipment using PLC Control Port
- An additional breadboard is mounted to mount a separate sensor or actuator to enable the practice.

Item	Configuration
Main	Raspberry Pi 3
Sensor	VR, Temperature, Gas, CDS, Ultrasonic Wave
Display	Text LCD, TFT LCD
Motor	DC Motor, Step Motor, Servo Motor

Item	Configuration
Actuator	Camera, Relay
Input	Button Switch
PLC Port	Input / Output
Communication	UART, Bluetooth, Ethernet

Education Contents

Raspberry Pi and Python

- Output device control
 - LED ON/OFF control
 - Relay ON/OFF control
 - Buzzer ON/OFF control
 - DC Motor control
 - Step Motor control
 - Servo Motor control
- Input device monitoring
 - Keypad values monitoring
 - Ultrasonic sensor monitoring
- Control and monitoring using I2C communication
 - Text LCD output control
 - Temperature/Humidity sensor monitoring
- CDS sensor monitoring
- Variable resistance value monitoring
- Camera control and monitoring
 - Camera image output monitoring
 - Camera image control

TFT LCD control program of Raspberry Pi

- Create Widget
 - Create a Widget window
 - Create Text View
 - Create Button
 - Create Edit Text
 - Widget Application using Event
 - Widget Application using Layout
- Output device control
 - LED ON/OFF control
 - Relay ON/OFF control
 - Buzzer ON/OFF control
- DC motor control
- Step motor control
- Servo motor control
- Input device monitoring
 - Keypad values monitoring
 - Ultrasonic sensor monitoring
- Control and monitoring using I2C communication
 - Text LCD output control
 - Temperature/Humidity sensor monitoring
- CDS sensor monitoring
- Variable resistance value monitoring
- Camera control and monitoring
 - Image monitoring and LED control
 - Images and Keypad monitoring
 - Video monitoring and DC motor control
 - Image monitoring and Text LCD control

Web Server Construction of Raspberry Pi

- Use HTML
 - Create Text View
 - Create Button
 - Create Edit Text
 - Screen configuration using Layout
- Output device control
 - LED ON/OFF control
 - Relay ON/OFF control
 - Buzzer ON/OFF control
 - DC motor control
 - Step motor control
- Servo motor control
- Input device monitoring
 - Keypad values monitoring
 - Ultrasonic sensor monitoring
- Input device monitoring
 - Keypad values monitoring
 - Ultrasonic sensor monitoring
- Control and monitoring using I2C communication
 - Text LCD output control
 - Temperature/Humidity sensor monitoring
- CDS sensor monitoring
- Variable resistance value monitoring
- Camera control and monitoring
 - Image monitoring and LED control
 - Images and Keypad monitoring
 - Video monitoring and DC motor control
 - Image monitoring and Text LCD control

EST-2012

Raspberry Pi Trainer

PC control program of Raspberry Pi

- Create Widget
 - Create window
 - Create Text View
 - Create Button
 - Create Edit Text
 - Widget Application using Event
 - Widget Application using Layout
- Output device control
 - LED ON/OFF control
 - Relay ON/OFF control
 - Buzzer ON/OFF control
- DC motor control
- Step motor control
- Servo motor control
- Input device monitoring
 - Keypad values monitoring
 - Ultrasonic sensor monitoring
- Control and monitoring using I2C communication
 - Text LCD output control
 - Temperature/Humidity sensor monitoring
- CDS sensor monitoring
- Variable resistance value monitoring
- Camera control and monitoring
 - Image monitoring and LED control
 - Images and Keypad monitoring
 - Video monitoring and DC motor control
 - Image monitoring and Text LCD control

Communication of Raspberry Pi

- TCP/IP communication
 - Connection basics using TCP/IP communication
 - LED control using TCP/IP communication
 - DC motor control using TCP/IP communication
 - Keypad input monitoring using TCP/IP communication
 - CDS Sensor monitoring using TCP/IP communication
 - Camera image output using TCP/IP communication
- Serial communication
 - Connection basics using serial communication
 - LED control using serial communication
 - DC motor control using serial communication
 - Keypad input monitoring using serial communication
 - CDS sensor monitoring using serial communication
 - Camera image output using serial communication
- Bluetooth communication
 - Connection basics using Bluetooth communication
 - LED control using Bluetooth communication
 - DC motor control using Bluetooth communication
 - Keypad input monitoring using Bluetooth communication
 - CDS sensor monitoring using Bluetooth communication
 - Camera image output using Bluetooth communication

EST-6820

Emergency Equipment Trainer



- The automatic fire detection equipment is a facility that automatically detects heat or smoke generated in the initial stage when a fire occurs and indicates a place of fire to an official in the building and emits an alarm, and This equipment consists of a detector to detect heat and smoke, a receiver to indicate a place of fire, a transmitter, a sound device, wiring, and a power source.
- Design to experiment and practice the principles and control operated by interworking with fire hose station and sprinkler system
- The automatic fire detection equipment is designed to be easy to understand because the operation principle of the P-type multifunction receiver is expressed in the flow of LED, and the control of equipment is designed to experiment under the same conditions as the field.

- Fire hose station and sprinkler system is designed to express the operation principle of fire alarm by LED and to be composed of water tank, sprinkling tank, and feed water pump system to circulate the water of sprinkler
- Application of a movable locking wheel to facilitate the movement of equipment

EST-6600

Emergency Equipment Trainer (P-Type Receiver)



- The detector and the transmitter are modularized so that students can easily organize themselves, allowing fire fighting 5 circuit experiment practice
- It has a convenient structure to replace when the sensor fails and is designed to take a fire alarm test after circuit wiring
- The parts used are applicable to products that have passed fire safety inspections and can acquire basic fire fighting symbols.
- This equipment is manufactured to enable wiring circuit practice
- Detector specification is printed to each module and a manual fire alarm generator built-in
- This equipment is attached with terminals for actual wiring and 4Ø terminals so that students can work on wiring directly

- Fire detector, smoke detector for field use available
- Fire detector and smoke detector for filed use available

EST-6700

Emergency Equipment Trainer (R-Type Multifunction Device)



- The SRF type receiver monitors and controls disaster prevention facilities such as detectors and transmitters, fire hydrants, smoke control facilities, and gas leakage alarm facilities up to 2,540 times (order type 10,160 circuits) and the SFR type receiver is an intelligent GR type hybrid receiver that can monitor and control up to 31,496 Addressable devices (repeater, analog detectors, etc.) by connecting 31 FTM1.8A relay panels and M-net.
- the system which alarms to the related party and immediately automatically informs the fire break out to the jurisdiction fire department and performed
- The SRF system is currently installed in 3,500 domestic sites and is operated
- Pre-Alarm function, Loop Back function, ground failure notification function, easy alarm, check the status of failure

• Large 15-inch color LCD Touch Panel monitor integrated

• Receiver program upgrade support and building system floor plan display function

Four embedded repeaters are devices that relay the SRF type reception input and output signals, and these 4 repeaters analyze the signal of the H.L of the receiver and transmit/receive data.

EST-E4000

Electrical Equipment/Information and Communication Equipment



- Electrical equipment/information and communication equipment and application control practice by NCS module
- Each module has a clamping device capable of easily attaching/detaching to a practice plate and a panel in a direction with a drawing circuit
- Voltage is AC 220V and DC 24V supplied, which allows AC/DC circuit practice
- PLC and industrial PC-based practical programming can be trained to practice on-site control technology
- Variety of modules operation are available using input/output contacts
- The provided program simulation enables the operation of electrical equipment and the acquisition of various electrical circuits

EST-E6200

Extension Construction Trainer / Information and Communication equipment

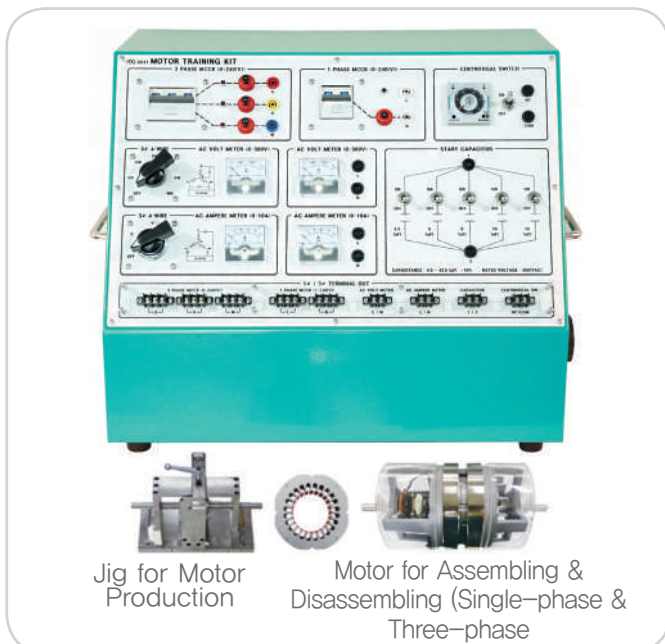


- Lighting facilities, disaster prevention facilities, information and communication equipment construction, facility operation method and system inspection practice related to NCS-based extension construction
- Customized practice by each part by module production
- Practical practice with the same parts as the industrial site
- Lighting equipment construction can practice various lighting equipments, panel boards, indoor wiring and grounding equipment
- The disaster prevention facility construction is designed to understand the overall fire fighting components and operation principles such as P-type receivers, detectors, and transmitters.

- Simulator installation where each output unit can be visualized
- Practices for NCS courses such as integrated wire of information and communication facilities, CATV, CCTV, Public Address(PA), and AV facility construction

EST-6041

Assembling and Disassembling of Motor Trainer



Jig for Motor Production

Motor for Assembling & Disassembling (Single-phase & Three-phase)

- Available for Practice of Assembling & Disassembling in Motor Using Motor Jig
- Available for Production of Motors such as 2, 4, 6 Poles Motors, Single-phase Motors, Three-phase
- Inductive Motors According to Users
- Available for Smooth Practice depending on Assessment Items & Method NCS Learning Module
- Available for Motor Analysis Test manufactured with Utilizing Practice Device for Motor Production
- Available for Utilizing Manufactured Motor in Characteristic Practice of Electric Devices & Sequence Control
- Available for Various Practice in Measuring of Manufactured Motor Utilizing Measuring Devices

Basic Supply

- Consumables : Insulating Thread, Insulating Paper,
- Wiring(Coil), Double Clip, Index Tag
- Accessory : 4 Φ Safety Terminal Cable, 3-phase Power Supply Cable, Single-phase Power Supply Cable, user Manual

Option



EST-6010

Motor Generator Trainer



- It is possible to practice the internal structure of various motors, and the operation principle characteristics and control of generators.
- Practice of various loads (Resistance, L/C, Reactance and Torque)
- The over-heating protection function is installed at rotational machines and circuit breakers, and it is possible to control a constant speed and torque.
- It is possible to practice the principle and characteristics while directly watching such motor internal structures as a Transparency $\varnothing 3$ SQ. Cage Inductance Motor, Transparency DC Machine, Transparency Synchro, Machine Motor, Transparency Multi-Function, Transparency Wound Rotor, Transparency Repulsion

EST-6011

DC(shunt/series wound)Motor / DC(compound)Generator



- It is possible to confirm the principle and operating method of motors since the internal structure of motors is fabricated in a transparent form so that it may be seen from the outside.
- Instruct the inputs and outputs of motors and generators by means of 7 amperemeter, voltmeters and RPM meters.
- Safe practice-compatible motors and generators with overload cut-off equipment
- Main Input Voltage : AC 220V
- Motor Speed : 1250~1800 RPM
- Motor Input Power : 120V, 3.5A
- Generator Speed : 1800 RPM
- Generator Output Power : DC 0~120V, 1A
- Indication Meter : 2-Current, 1-Voltage

- EST-6012 – Squirrel Cage Motor/DC(separately excited)Generator
- EST-6013 – Wound rotor IM/DC(shunt/compound wound)Generator
- EST-6014 – DC(shunt/compound wound)Motor/AC Generator
- EST-6015 – Synchronous Motor/DC(self commutation)Generator
- EST-6017 – 3-phase Synchronous Motor/Dynamometer

EST-6030

Electric Machine Structure Trainer



- Understanding of Structure, Operation & Control Characteristics of Various Generators & Motors. Available for Practice of Operation Method, Connection Procedure of Instruments, Measuring Method
- Open Structure of Parts for making Various Rotating Machines from Outside causes Fast Understanding of Structure.
- Since Practice is progressed in a way that Trainee installs, assembles, conducts wiring connections & operates the Device by oneself, this Device is suitable for learning Basic Principles & Structural characteristics for Electric Machine.

EST-3711

Motor Control Trainer



- Practice Device for AC Motor Control Utilizing a Motor with Transparent Structure
- Applying of 1/4 Horse Power Motor with Transparent Structure
- Available for Practice on Motor Control by Applying Inverter
- Applicable for Peripherals of Various Control Devices
- Verifiable of Operational State & Internal Structure of Motor

EST-3710

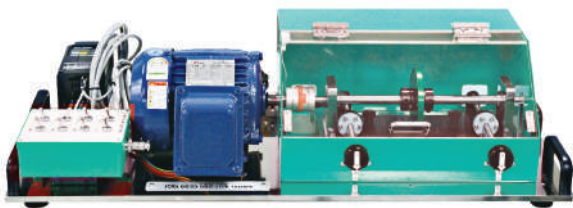
Inverter & 3 Phase Motor



- Practice Device for Control of Inverter & AC Motor
- Applying of Inverter from Mitsubishi
- Applying of 25W AC Motor
- Attaching of Cover for User Safety
- Utilizing as Peripherals of Various Control Devices
- Equipped with Sensor & RPM Meter for Revolution Control

EST-6035

Noise/Vibration Measuring Trainer



- Device Applicable to Qualification Exam for Industrial Engineer of Machinery Maintenance
- Available for Acquisition & Analysis of Vibration Measuring Data from PC due to PC-based Configuration
- Offering of LabVIEW-based Applications for Vibration Measuring & Analysis LabVIEW
- Likely Occurrence of Vibration due to Various Environment
- Practice for Problem Solving through Analysis & Comparison of Occurred Vibration Waves

EST-6401

PC based Digital Power Protection Monitoring (GIPAM)Trainer



- A wide range of numbers / monitoring for protection of distribution facilities, Measure, provide the over-current protection function against temporary and instantaneous elements, Smart transmission and distribution training equipment using LS Industrial Systems' digital power protection monitoring devices
- Monitoring through MIMIC Diagram is made available and operational status of a circuit breaker can be checked (On-line)
- Up to 800 event records such as operation and in/output status of relay and circuit breaker, a user's controlling details, and savable memory are available
- When a problem occurs, up to 200 detailed information regarding its root cause, voltage in breakdown/data on voltage
- By using PC interface program(G2K Manager), all kinds of relaying elements and various functions can be set up easily

- Inspection through the MIMIC Diagram and check the operation status of the breakers
- A variety of thinking environment settings and precision control practices through virtual environment generators
- Provide PC-based power control applications based on LabVIEW

EST-P1

Nuclear Power Simulator



- Realistically visually display nuclear reactor steam supply and generator system, auxiliary equipment and MCR system, and monitor and simulate pressure, output and various measured values according to pressurization
- Simulates the reload process of the reactor fuel rods and maximizes the realism by displaying the temperature change and flow of water in numerical and LED
- The electricity generated is composed of transmission substations (primary) and distribution substations (secondary) to visually display the process of transmission and distribution to factories and consumers. Insulator, transformer, substation, customer, etc. are made in miniature form
- Power lines that transmit are colored differently on each line to identify the flow of electricity.
- Control and generation data related to power generation, transmission and distribution, and power usage can be simultaneously controlled and monitored in local and remote forms.

EST-0901

Smart Power Distribution Trainer



- The pre-learning of the industrial power distribution facility used in the industrial sites is possible through the application of the instruments used in the actual industrial field including LBS, VCB, ACB, CAMS / W, MOF, ELB, power protection relay, ATS system, etc.
- This equipment is a fusion structure of Digital & Analog Type, which enables the principles, operation, and application training of various equipment systems.
- Practice on the failure analysis and countermeasures of artificial accidents and faults circuits through a circuit test machine
- The power system through the power distribution three-wire circuit diagram is possible to understand, and the movement route grasp of the electric power through Lamp is possible
- Secure safety of experimenters through insulation system construction, safety terminal(B-jack) usage and terminal size classification between the power line and the signal line

- With the application of industrial automation software, field control and monitoring can be performed on-site, but also on PC and Mobile.

EST-0905~7

Distribution Panel Trainer



Fire Hydrant /
Plumbing / Motor
Control Distribution
Panel
EST-0905



Distribution
Panel for the
Flow Control
EST-0906



Motor Control Panel for the Circuit Configuration and Instrumentation Practice EST-0907

EST-EEP1~4

Power Grid Diagram and Panel



EST-EEP1 / Electric power system map display panel (1)



EST-EEP2 / Electric power system map display panel(2)

- Understanding the power system by graphically expressing the overall power system from the power generation system of Korea to the power transmission and distribution system
- Provided a colored and beautiful display effect which facilitates understanding of power flow by applying optical fiber lighting to intersystem wiring
- By applying the control method using the touch panel and smart instrument the apparatus operation possible in the remote.



EST-EEP3 / Smart grid control panel

- Understanding and experience of smart grid concept and principles
- Understanding and operation experience of the principles of home automation system
- Understanding the principles of the telemetering system
- The various kinds device which is actually used is arranged in three dimensions on the plane and the classy display effect is offered



EST-EEP4 / Electric warning experience panel

- Indirect experience of the effects of electricity on the human body raise safety consciousness
- The setting about the electric shock path, voltage, time, moisture is possible
- Simulation results can be confirmed according to the setting, and the resuscitation rate according to artificial respiration is displayed
- * Provide LED display function for path

EST-IPSS

Power IT Streamline Water Distribution Simulator



- Configure high voltage water substation equipment used in actual industrial sites
- Able to implement and simulate various abnormal situations that may occur during water substation system operation
- Intuitive wiring between the major components of the equipment is made using LED lamps, and the colors of each R-S-T phase are different.
- We can implement various events that can occur in case of abnormal occurrence such as lightning, ground, disconnection, overload and phase loss.
- Monitoring device for each part is composed of control mode and equipment explanation mode
- Equipment operation can be both local and remote, and remote operation can be controlled from Master PC and smart device

PC Remote Control and Monitoring



[Control Mode]



[Explanation Mode]



AISS control panel

- AISS, LA
- Automatic/Manual control
- PC remote control

MOF, TR control panel

- MOF
- Transformer (TR)
- PC remote control

ABS, ATS panel

- ABS, ATS
- protective relay
- PC remote control

Load panel

- 3Phase Motor
- Production mode
- PC remote control

EDUCATIONAL SMART TECHNOLOGY

Smart Factory / IoT / VR / AR / Smart Car / 3D Printer / Drone
Robot / AI / Automatic Control / Renewable Energy
Electricity / Electronic / Software
Measuring Instrument

PART 11

Education Software

162	IoT Platform	IoT Platform (GiGA IoTmakers)
164	MESalpha	Manufacturing Execution System(MES) Solution
165	S-Prodis	PLM Virtual Process Simulation
166	Automation Studio	Automation System Simulation
167	SOLIDWORKS	

IoT Platform

IoT Platform (GiGA IoTMakers)

IoTMakers

IoTMakers is the OPEN IoT platform which can support IoT players to realize their idea and lead to success.

IoTMakers helps makers to focus on their business idea without worrying about high technology and trial costs.

Makers can connect devices easily, test before large scale deployment, store data in the cloud, create intelligent rule, and develop services with OPEN APIs.

- Homepage : <http://http://iotmakers.kt.com>
- Inquiry : iotmakers@kt.com



Easy Connectivity



Standard protocol

- KT Standard protocol
- SDKs supporting MQTT, CoAP, HTTP, TCP
- Global standard



Virtual device simulation

- simulate data to test your logic without real device



Device distribution

- copy devices and deploy them easily when finished the test of one device model

IoT Data & Event Management



Device management

- easy device and sensor registration
- streaming test with sensor log and chart



Event Rule management

- GUI-based event rule setting in real time
- complex rule, location based, time based event



My dashboard monitoring

- Device status, sensor stream monitoring
- real-time push monitoring



Public devices

- Open devices for sharing generated data
- OPEN APIs for public devices

어플리케이션 개발 지원



OPEN APIs

- APIs for registered devices information, data stream, and events



App. SDKs

- iOS SDKs
- Android SDKs



Public mobile app.

- Open mobile application using devices connected to IoTmakers

Basic service



Device registration
Up to five



Event registration
Up to five



SMS transmission
Up to 100 (One month)



Virtual device registration
Up to five (One per device)



App. registration
No limit



Data storage and retrieval
 – Keep logs for a month
 – Data retrieval of the last 10,000 cases of the retrieval condition

licenses for educational institutions

Basic type Provides the number of extended IoT number of usages	Advanced type Provides reactive dashboards	Basic type LTE-M line supported
30 devices	30 devices	30 devices
30 events	30 events	30 events
Unlimited App. registration	Unlimited App. registration	Unlimited App. registration
30 virtual devices (one per device)	30 virtual devices (one per device)	30 virtual devices (one per device)
Up to 100 SMS (one month)	Up to 100 SMS (one month)	Up to 100 SMS (one month)
Keep log data for 1 month	Keep log data for 3 month	Keep log data for 3 month
LTE-M line unsupported	LTE-M line unsupported	LTE-M line supported
Dashboard Pro unsupported	IoTmakers Dashboard Pro	IoTmakers Dashboard Pro



IoTmakers Dashboard Pro

The reactive dashboard allow you to monitor and control devices anytime and anywhere.

- Offer an instant available IoT service screen
- Configure a dashboard that meets your purpose with a variety of widgets Adding multiple dashboard pages



★ SMS may be exhausted early depending on usage

MESalpha

Manufacturing Execution System(MES) Solution



- It allows you to use the core features of the MES including lot tracing, work-in-process control/inventory control, process control, data collection and analysis, and so on while converting collecting and analyzing production information throughout the manufacturing operation into the one centered on the system, which allows you to experience the effect of productivity improvement on company-wide development
- Mounted with a standard report that can be immediately utilized without having additional development and also with a standard OI in which the operator's convenience is taken into consideration.
- Made up in a 3-tier architecture of DB layer, business logic layer and client layer, which ensures the safety of system operations.
- The server optimized for the MESalpha with standard specifications, OS and DBMS are provided in all-in-one package.

Overview of the MESalpha Software



Work / Report Module	Production Control	Material Control	Facility Control
	- Uploading production plans - Production-in-process Control, Production Status Inquiry - Manufacturing Records Control	- Material Storing/Transporting/Outgoing - Material Lot Status/Record Inquiry - Material Lot Inquiry by Storage	- Facility Status Control - Facility Breakdown/Repair Control
Criterion Information / System Module	Quality Control	SPC(Statistical Process Control) ¹⁾	Report
	- Measured Data Input - In-process Quality - Outgoing Inspection	- Lot data-based SPC Control - Facility data-based SPC Control	- Production Status Analysis - Work-in-process and Inventory Status - Actual-versus-Planned Performance Analysis, Defects Analysis
	System Management	Criterion Information	Barcode Label Control
	- Multilingual Feature, User Right Control - Alarm Control, Code Control - System Performance Control	- Product Criterion Information, Facility Criterion Information - In-Process/Flow Criterion Information - Measurement Parameter Control, Work Standard Control	- Barcode ID System Control - Barcode Label Design - Barcode Label Printout

1) SPC (Statistical Process Control)

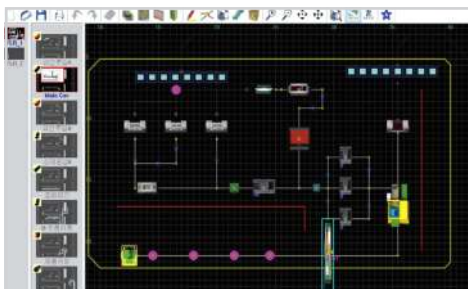
S-ProdIs

PLM Virtual Process Simulation



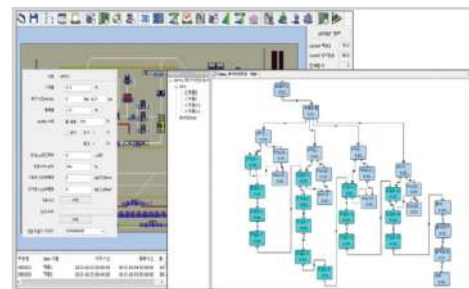
- It is a simulation solution of smart virtual processes that converts the existing process or the newly designed process into virtual reality for simulations that utilizes the resources (facilities, workers, etc.) and analyzes bottlenecks, layouts, loading capacities and non-operations so that the productivity is improved, and such operational improvement measures as cost savings and inventory reductions can be applied to work sites.
- The program is in the form of module so that it only takes a simple layout and a flow chart to make a production without coding.
- Based on the production plan written by the person in charge of work in the field, the improved layout and production plan can be provided to the work site after simulation and analysis.

Overview of the Process Simulation Software



1. Layout Editor

Writes the facility arrangement and logistic routes based on 2D CAD drawings



2. Processor Editor

Puts the process sequence and information into the flow chart and then enters equipment/warehouse/logistics/operator parameters information and writes production plans



4. 3D Viewer & System Monitoring

3D Viewer & System monitoring
(3D monitoring tool for simulation realizations)



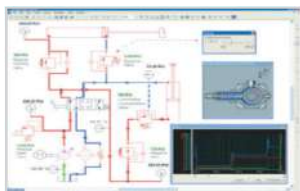
3. Simulation Analyzer

Simulation Analyzer (In-process analysis and simulation based on the written production plans)

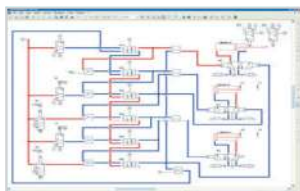
Automation Studio

Automation System Simulation

Hydraulic and Proportional hydraulic



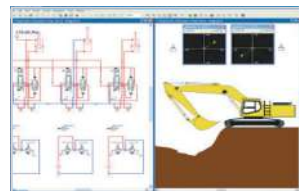
Pneumatic



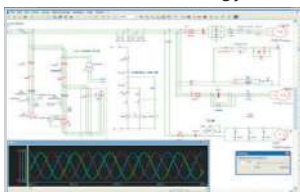
HMI and Control panel



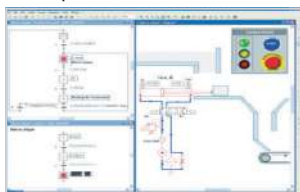
Electrical Control (IEC, JIC)



Electric technology



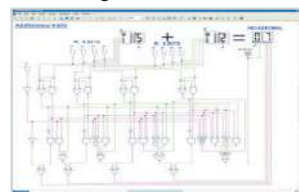
Sequential Function Chart



PLC



Digital electronic



• IEC, NEMA

• SFC : Grafcet

• Programmable Logic Controller

- Providing of Perfect, Economic and Effective Automation System Implementation as the Best Tool for Learning of Automation Technologies such as Pneumatic, Flow Pressure, Electric, Electronic Control, etc.
- Various Types of Circuit Design & Analysis are Performed Autonomically due to Simple Use Method. Improvement of Individual Ability by Introducing Stepwise Learning Program that Fits to Trainees.

- Realtime Analysis of System Operational Characteristics According to Parameter Changes Using Designing of Control Circuit that is Applied to Actual Environment, Analysis & Verification through Simulation, Built-in Voltage & Current meters and Floating Function
- Unique Software Absolutely Required for Site Educational System Focusing on Hands-on Works Applied in Actual Industry, System Engineering, Maintenance & Repair, Training.

Flow Pressure & Proportional Flow Pressure

- Flow Pressure & proportional flow pressure libraries provide a symbol suitable for ISO 1219-1 & 1219-2 standards which are required for flow pressure and include hundreds of symbols such as direction control valve, variable capacity pump, motor, etc. in order for handling from simple control circuit to complicate system design.
- Though components are defined in specifications, those are easily adjustable to actually reproduce the characteristics of system according to influx volume & change in input drop.
- Available for observation of characteristics by changing simulation variables such as load, fluid leakage, thermal phenomenon, fluid viscosity, fluid characteristics

Pneumatic

- Pneumatic libraries provide all symbols required for pneumatic, electro pneumatic & moving logic system production. possible to implement operation characteristics with reality by changing the variables of components of pneumatic system same as flow pressure module

PLC (Programmable Logic Controller)

- Automation Studio includes 3 independent plc ladder logic libraries that comply to regulations of Allen Bradley™, Siemens™ & IEC61131-1. each library includes contact point, elements for input & output, timer, counter, logic operation & mathematical functions.
- Design & simulation of control circuit of automation system can be easily experienced. complete implementation available on actual automation system by utilizing plc library with other libraries

Electrical Control (IEC, JIC)

- Electrical control library includes lots of control elements other than switch, relay, solenoid, push button that are compatible with elements of other libraries and possible to design electrical control system according to domestic & international specifications

HMI & Control Panel

- Animation shape & control panel can be easily produced using 2D based design module expressed visually and motion characteristics of entire system can be reproduced.
- Simulation function is able to reconstitute all forms of motions & animations, any form can be designated by variables
- Module elements include switch, push button, potentiometer, measuring instrument, etc

Electric Technology (IEC, NEMA)

- Electrical control library includes various control components from basic ones to complicate ones to design DC/AC electric circuit.
- Able to change not only simulation parameters such as resistance, inductance, torque, frequency, but high-level parameters like mutual inductance between motor's rotor and stator, inertia constant
- Change in simulation parameter enables to express the system with complicate & various specifications and can visualize the speed, torque or mechanical forces, etc.
- Parameters & constants applied in system can be analyzed and understood securely through simulation

Sequential Function Chart (SFC : Grafcet)

- Sequential function chart module is a comprehensive system that can be used together with other libraries and is the best tool that can constitute the control system complying to IEC61131-1 standards by utilizing circuit editing & simulation functions
- SFC allows to control the system more efficiently and additionally provides excellent documentation function for pneumatic, flow pressure & electrical control system that are suitable for ISO & IEC standards.

Digital Electronics

- Most of electronic components with general specifications such as inverter, logic gate, flip-flop, counter, shift register, decoder, multiplexer, comparator, switch, LED, 7-segment have been equipped.

Solidworks

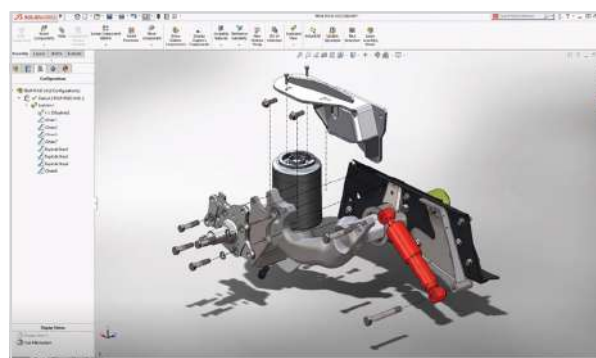
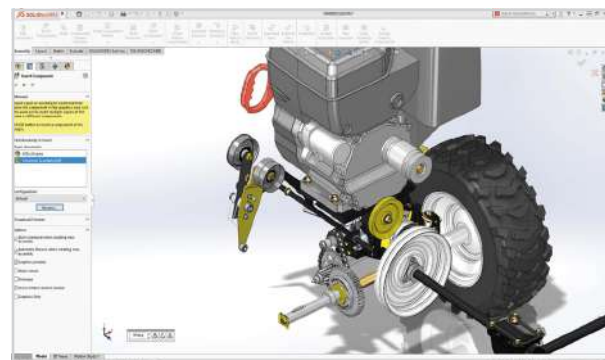
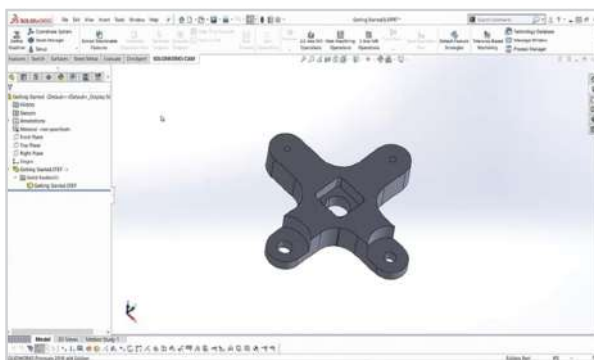


SOLIDWORKS Education Edition (One package, consisting of 11 types)

1. SOLIDWORKS CAD Premium
 2. SOLIDWORKS Motion
 3. SOLIDWORKS MBD (Model-based definition)
 4. SOLIDWORKS Simulation Premium (FEA TOOLS)
 5. SOLIDWORKS Flow Simulation (CFD TOOLS)
 6. SOLIDWORKS Plastics Premium
(Injection molding interpretation)
 7. SOLIDWORKS Electrical Professional
(Electric wiring design)
 8. SOLIDWORKS Visualize Professional
(Real rendering)
 9. SOLIDWORKS PDM Standard
(Product data management)
 10. SOLIDWORKS CAM Professional
 11. My SOLIDWORKS Professional
- * Software for practical examination of Craftsman 3D Printer Operation

SOLIDWORKS Education Edition to train future talent

- Students can demonstrate their expertise in SOLIDWORKS 3D solid modeling through SOLIDWORKS Academy certification
- certification through various methods as follows
 - List of authorized SOLIDWORKS that companies and individuals can identify applicants
 - An electronic certificate with the name of the school that can be submitted by e-mail to the company
 - Certification logos that can be inserted into e-mails, business cards, and resumes
- Develops expertise through SOLIDWORKS Virtual Testing Center



EDUCATIONAL SMART TECHNOLOGY

Smart Factory / IoT / VR / AR / Smart Car / 3D Printer / Drone
Robot / AI / Automatic Control / Renewable Energy
Electricity / Electronic / Software
Measuring Instrument

PART 12

Measuring Instrument

170	GDS-1000B Series	Digital Oscilloscope
170	MDO-2000E Series	Mixed Signal Oscilloscope
171	AFG-2100/2000 Series	Arbitrary Function Generator
172	GPE-x323 Series	Linear DC Power Supply
173	GDM-8342/8341	Benchtop Multimeter
174	Protek-3003D/3005D	Power Supply
174	Protek-3003T/3005T	Power Supply

GDS-1000B Series

Digital Oscilloscope



Features

- 100MHz/70MHz bandwidth
- 2CH/4CH channel
- 1GSa/s RTS
- 10M point record length
- 7 inch TFT LCD (WVGA 800x480)
- Zero key function: application of horizontal / vertical / trigger position key
- FFT measurements: 1Mpt frequency resolution
- Communication interface
- GDS-1072B/1102B : USB
- GDS-1074B/1104B : USB, LAN

Models	GDS-1072B	GDS-1074B	GDS-1102B	GDS-1104B
Channel	2CH+EXT	4CH	2CH+EXT	4CH
Bandwidth	DC~70MHz(−3dB)		DC~100MHz(−3dB)	
Rise time	5ns		3.5ns	
bandwidth limit	20MHz		20MHz	
Trigger source	CH1, CH2, CH3*, CH4*, Line, EXT**		*: Support only 4-channel models, **: Support only 2-channel models	
Sampling rate(RTS)	Max. 1GSa/s			
Record length	Max. 10Mpts			
Input power source	AC 100V~240V, 50Hz~60Hz, 자동 선택, 소모 전력 : 30W			

MDO-2000E Series

Mixed Signal Oscilloscope



Features

- Bandwidth : 200MHz/100MHz/70MHz
- Channel : 2CH/4CH
- 4Channel model : Max. 1GSa/s RTS
- 2Channel model : 1GSa/s RTS per channel
- Record Length : Max. 10M points
- Waveform update speed : 120,000wfms/s
- Display : 8" TFT LCD (WVGA 800x480)
- DC~500MHz Spectrum analyzer
- 16CH Logic analyzer
- 2CH 25MHz Arbitrary Waveform Generator(AWG)
- 5,000 Count digital multimeter (MDO-2000ES)
- 2CH 5V/1A DC Power supply (MDO-2000ES)
- VPO (fitting to catch jitter/glitch signal)
- Segment memory collection (Max. 29,000 segments)
- Waveform Search
- I2C/SPI/UART/CAN/LIN Bus Trigger/Analysis
- Digital filter (HPF, LPF, BPF) functions
- Datalog : Max. 1000 hours
- Network storage
- FFT measurement : 1Mpt frequency resolution
- Remote disk storage
- FRA(Frequency Response Analysis)
- Communication Interface : USB, LAN

Models	2072EC(S)	2074EC(S)	2102EC(S)	2104EC(S)	2202EC(S)	2204EC(S)
Channel	2CH+EXT	4CH	2CH+EXT	4CH	2CH+EXT	4CH
Bandwidth	DC~70MHz(−3dB)		DC~100MHz(−3dB)		DC~200MHz(−3dB)	
Rise time	5ns		3.5ns		1.75ns	
bandwidth limit	20MHz		20MHz		20MHz/100MHz	
Trigger source	CH1, CH2, CH3, CH4, Line, EXT*				*: Support only 2-channel models	
Sampling rate(RTS)	1GSa/s				4-channel model	
	채널 당 1GSa/s				2-channel model	
Record length	Max, 10Mpts/CH					
Input power source	AC 100V~240V, 48Hz~63Hz, Automatic selection					

AFG-2100/2000 Series

Arbitrary Function Generator



Features

- Frequency range : 25MHz/12MHz/5MHz
- Channel : 1
- Sampling Rate : 20MSa/s
- Waveform Length : 4k
- Frequency Resolution : 0.1Hz
- Frequency Stability : $\pm 20\text{ppm}$
- Amplitude Resolution : 10 bit
- 3.5" color TFT- LCD
- Sine, Square, Triangular, Noise and Arbitrary Waveform
- AM/FM/FSK modulation support (AFG-2100 series)
- TTL output, DC offset
- Frequency sweep, Frequency counter (AFG-2100 series)
- Providing PC software for Arbitrary Waveform editing
- USB(Device) Interface

Specification							
Models		AFG-2100 Series			AFG-2000 Series		
		AFG-2105	AFG-2112	AFG-2125	AFG-2005	AFG-2012	AFG-2025
Waveforms							
Waveform		Sine, Square, Ramp, Noise, ARB					
Arbitrary Waveform							
Sampling Rate		20MSa/s					
Repetition Rate		10MHz					
Waveform Length		4k points					
Amplitude Resolution		10 bit					
Frequency Characteristics							
Range	Sine/Square	0.1Hz~5MHz	0.1Hz~12MHz	0.1Hz~25MHz	0.1Hz~5MHz	0.1Hz~12MHz	0.1Hz~25MHz
	Ramp	0.1Hz~1MHz					
Resolution		0.1Hz					
Accuracy	Stability	±20ppm			Aging : ±1ppm/year		
	Tolerance	〈1mHz					
Power Source		AC 100~240V, 50~60Hz; Power Consumption : Max. 25VA					

GPE-x323 Series

Linear DC Power Supply



Features

- Number of Channel : 1CH/2CH/3CH/4CH
- Resolution : 10mV/1mA
- Load/Line Regulation : 0.01%
- Display : 4.3" LCD
- Optional : European Jack Type Terminal
- Function
 - Output ON/OFF switch
 - Analog Control (Remote I/O) for Output ON / OFF
 - Set View function for checking an original V / I setting during output on
 - Key Lock Function
 - Tracking series and parallel operation
 - Smart fan operation

Model / Description

1. GPE-1326 : 192W 1CH DC Power Supply (32V/6A x 1)
2. GPE-2323 : 192W 2CH DC Power Supply (32V/3A x 2)
3. GPE-3323 : 217W 3CH DC Power Supply (32V/3A x 2, 5V/5A x 1)
4. GPE-4323 : 217W 4CH DC Power Supply (32V/3A x 2, 5V/1A x 1, 15V/1A x 1)

Specification					
		GPE-1326	GPE-2323	GPE-3323	GPE-4323
Output Mode					
Number of Channel		1CH	2CH	3CH	4CH
Voltage	CH1	0~32V	0~32V	0~32V	0~32V
	CH2	—	0~32V	0~32V	0~32V
	CH3	—	—	5V	0~5V
	CH4	—	—	—	0~15V
Current	CH1	0~6A	0~3A	0~3A	0~3A
	CH2	—	0~3A	0~3A	0~3A
	CH3	—	—	5A	0~1A
	CH4	—	—	—	0~1A
Constant Voltage(CV) Operation					
Regulation	Line	≤0.01%+3mV			
	Load	≤0.01%+3mV (Rating current ≤3A)			
		≤0.02%+5mV (Rating current >3A)			
Ripple & Noise		≤1mVrms (5Hz~1MHz)			
Recovery Time		≤100μ s (50% Load Change, Min. 0.5A)			
Constant Current(CC) Operation					
Regulation	Line	≤0.2%+3mA			
	Load	≤0.2%+3mA			
Ripple & Noise		≤3mArms			
Tracking Operation					
Regulation (Parallel Operation)	Line	≤0.01%+3mV			
	Load	≤0.01%+3mV (Rating current ≤3A)			
		≤0.02%+5mV (Rating current >3A)			
Regulation (Series Operation)	Line	≤0.01%+5mV			
	Load	≤100mV			
Meter					
Resolution	Voltage	10mV			
	Current	1mA			
CH3 Operation for (GPE-3323)					
Output	Voltage	—	—	5.0V±5%	—
	Current			5A	
Regulation	Line			≤3mV	
	Load			≤5mV	
Ripple & Noise		—	—	1mVrms (5Hz~1MHz)	—
Other					
Power Source		AC 100V/120V/220V±10% ;230V(+10%~-6%) 50/60Hz			

GDM-8342/8341

Benchtop Multimeter



Features

- 43/4 Digit dual measurement multimeter
- 50,000 count, VFD display
- 0.02% DCV Basic Accuracy
- Dual measurement/Dual display
- Automatic range setting
- 2 line resistance measurement
- Max. 10A current range
- VFD Display
- 40 Readings/s Max. Measurement speed (When measuring DCV)
- True RMS(AC, AC+DC) measurement
- AC/DC voltage, AC/DC current, AC+DC voltage/current, 2W resistance,
- Continuity, Diode, Frequency, and capacitance measurement functions
- Temperature measurement function(GDM-8342/8342G)
- Max/Min, REL, Compare, Hold, dB, dBm, Math(MX+B, %, 1/X) assisted measurement function
- PC control/logging software(EXCEL, ADDIN)
- USB flash disk logging function(GDM-8342/8342G)
- USB, GPIB (GDM-8342G) interface

DC voltage

Range*3	Resolution	Input Resistance	Accuracy 1 Year (23°C ± 5°C)
500.00mV	10uV	10MΩ or>10GΩ	0.02+4
5.0000V	100uV	10MΩ or>10GΩ	0.02+4
50.000V	1mV	11.1MΩ	0.02+4
500.00V	10mV	10.1MΩ	0.02+4
1000.0V	100mV	10MΩ	0.02+4

Resistance

Range*3	Resolution	Test Current	Accuracy 1 Year (23°C ± 5°C)
500.00Ω	10mΩ	0.83mA	0.10+5*4
5.0000kΩ	100mΩ	0.83mA	0.10+3*4
50.000kΩ	1Ω	83uA	0.10+3
500.00kΩ	10Ω	8.3uA	0.10+3
5.0000MΩ	100Ω	830nA	0.10+3
50.000MΩ	1kΩ	560nA//10MΩ	0.30+3

DC Current

Range*3	Resolution	Burden Voltage	Accuracy 1 Year (23°C ± 5°C)
500.00uA	10nA	Max. 0.06V	0.05+5
5.0000mA	100nA	Max. 0.6V	0.05+4
50.000mA	1uA	Max. 0.14V	0.05+4
500.00mA	10uA	Max. 1.4V	0.10+4
5.0000A	100uA	Max. 0.5V	0.25+5
10.000A	1mA	Max. 0.8V	0.25+5

Continuity Test

Range*3	Resolution	Test Current	Accuracy 1 Year (23°C ± 5°C)
5000.0Ω	100mΩ	0.83mA	0.10+5

Diode Test

Range*3	Resolution	Test Current	Accuracy 1 Year (23°C ± 5°C)
5.0000V	100uV	0.83mA	0.05+5

Protek-3003D/3005D

Power Supply



- Voltage and current display with LCD display
- Voltage, Current adjustment LCD display
- Stable voltage, current automatic conversion
- Multi-loop high precision voltage adjustment
- Progressive current adjustment
- Automatic tracking operation in series or parallel connection
- Stable operation in full load
- Expansion output terminal

Model	PL-3003D	PL-3005D
Voltage	0 ~ 30V	0 ~30V
Current	0 ~ 3A	0 ~5A

Protek-3003T/3005T

Power Supply



Features

- Voltage and current display with LCD display
- Voltage, Current adjustment LCD display
- Stable voltage, current automatic conversion
- Multi-loop high precision voltage adjustment
- Progressive current adjustment
- Automatic tracking operation in series or parallel connection
- Stable operation in full load
- Expansion output terminal

Model		PL-3003T	PL-3005T
Dual Output	Voltage	0 ~ 30V	0 ~ 30V
	Current	0 ~ 3A	0 ~ 5A
Fixed Output	Voltage	5V	5V
	Current	3A	3A





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