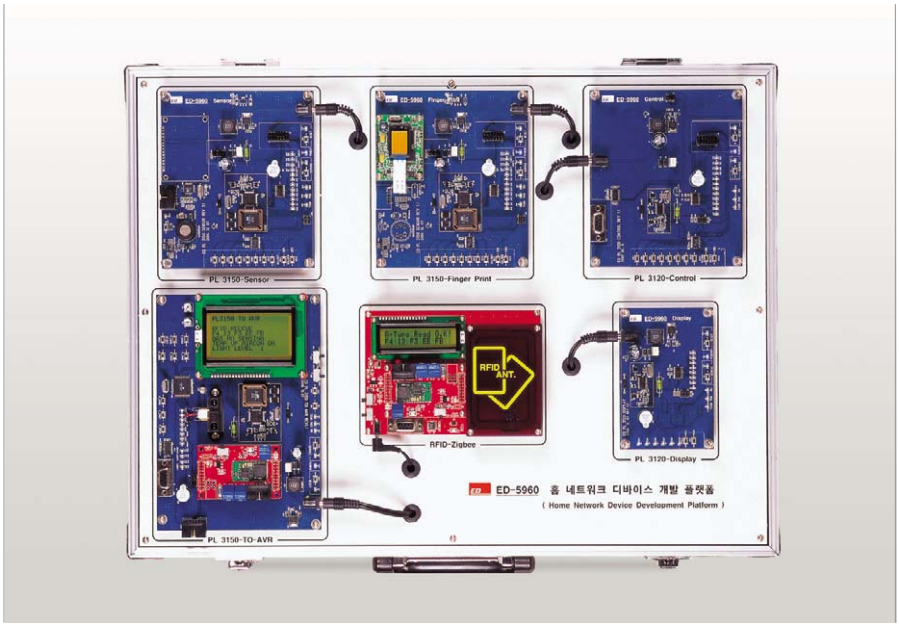
IsoTest®

LON DEVICE DEVELOPMENT KIT

ED-5960

- Home network based experiments suitable for ubiquitous computing
- Integrated ubiquitous device using ZigBee/RFID and finger print recognition
- Designed to help develop home network on the ground of Lon Protocol
- Equipped with each PLC module(Power Line Communication) for home network
- Related experiments through Neuron C and MICOM programming



> EXPERIMENTS

- Overall understanding of home network technology
- Programming for operations of each device
- Composition of home network scenarios
- Interoperable self installation
- Theories on the hardware/software related to home network Device
- Commissioning and network binding experiments using LonMaker

> SPECIFICATIONS

- **Common Feature(per module)**
  - » Interface : RS-232
  - » Operating System : Protocol Scheduler
  - » Communication : Power Line Communication
  - » Application Program : Neuron C
- **General Characteristics**
  - » Module Dimension : 575(W) x 225(H) x 460(D)mm
  - » Input Voltage : 220V

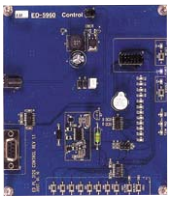
ACCESSORIES

- MiniEVK Compiler CD : 1ea
- Adaptor for Power Line Communication : 5ea
- User's Guide : 1 copy

LON DEVICE DEVELOPMENT KIT

ED-5960

Experiments Module



ED-5960-1
PL3120 Control

- GAS, CDS and TEMP DATA output control
- Adjustment of actuator's range through control of the input data's level
- Processor : PL3120 Transceiver
- Memory : EEPROM 0.5kB, SRAM 2kB, external 64kB

ED-5960-2
PL3150 Sensor

- Serves to read the GAS, CDS and LIGHT DATA through AVR, and send them to UART PL3150; and deliver them to each device through NV
- Processor : PL3150 Transceiver, ATMEGA8
- Memory : EEPROM 0.5kB, SRAM 2kB, external 64kB Flash

ED-5960-3
PL3150 Finger Print

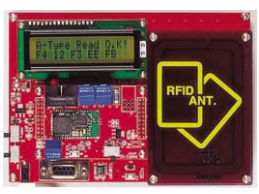
- Finger print recognition using the Finger Print Sensor module
- Indicates the status of finger print recognition's process
- Executes Access Control Program through finger print recognition
- Processor : PL3150 Transceiver, ATMEGA8
- Memory : EEPROM 0.5kB, SRAM 2kB, External 64kB Flash

ED-5960-4
PL3150 TO-AVRM

- ATMEGA128 in use
- LCD DISPLAY IR Sensing by the changes in NV INPUT, NV_SW ON/OFF output by SW INPUT
- Executes Access Control Program by receiving RFID READ DATA through ZigBee
- Processor : PL3150 Transceiver, ATMEGA8
- Memory : EEPROM 0.5kB, SRAM 2kB, external 64kB Flash

ED-5960-5
PL3120 DISPLAY

- Displays the status of operation by GGAS, CDS, TEMP NV_SW ON/OFF
- Displays the status of operation by IR Sensing, SW NV_SW ON/OFF
- Displays Access Control SW ON/OFF by the data proceeded by RFID and finger print recognitions
- Processor : PL3120 Transceiver, ATMEGA8
- Memory : EEPROM 0.5kB, SRAM 2kB, external 64kB



ED-3120-ZB
RFID READ ZigBee

- Detects the RFID CARD and displays a proper code serial; then sends the data to PL3150 TO-AVR module through ZigBee
- 13.56MHz RFID Reader's sensing distance : 100mm
- ISO/IEC 14443 Type A, Type B
- Processor : AT89C51(8051), ZigBee module(CC 2420)

POWER LINE COMMUNICATION TRAINER

ED-5964

- Learning experience for Power Line Communication using the network products
- PC Based Control(LabVIEW) using the external Power Line Communication modem
- Home appliance control using C Language
- Noise Blocking Filter for blocking incoming data from outside
- Anti collision
- C source for firmware experiments

> EXPERIMENTS

- Overview of Power Line Communication
- Training equipment for Power Line Communication
- Operation device using Power Line Communication
  - » Using Power Line Communication Modem
  - » Using PDA
- Power Line Interface
  - » Filter(LPF, HPF) / Resonance(Serial,Parallel) / Zero Cross Detector
- Modulation : ASK(Amplitude Shift Keying)
- Transmitter & Receiver
  - » Transmitter & Receiver
  - » Collision Detector
- Firmware Experiments
  - » Compiler & Programming
  - » Basic(LED, Tactile Switch, Dip Switch, FND)
  - » Protocol(X10, Z256)
- Application Program
  - » LabVIEW programming experiments

> SPECIFICATIONS

POWER LINE COMMUNICATION DEVICE

- **Frequency(Carrier)**
  - » Rated Voltage : AC 250V
  - » Cut Off Frequency : 120kHz
  - » Bandwidth : 110kHz~380kHz
  - » Distortion : -40dB
- **Gas Breaker Device by Remote Control**
  - » Rated Voltage : AC 220V(Controller), DC 12V(Breaker)
  - » Power Consumption : 2.2W
  - » Operation Method : Current control(Controller), Motor(Breaker)
  - » Frequency : 120kHz, Max. Communication Speed: 360bps
- **Remote Control Socket**
  - » Rated Voltage : AC 220V
  - » Power Consumption : 2.2W
  - » Operation Method : Relay operation
  - » Frequency : 120kHz, Max. Communication Speed : 360bps

POWER LINE COMMUNICATION MAIN

- **CPU :** AVR(ATMega128)
- **Line Coding :** Manchester
- **Modulation :** ASK(Amplitude Shift Keying)
- **Anti Collision Function**
- **Liquid Crystal Display(LCD) :** Display of received data frame
- **Dip Switch, Tactile Switch, LED, FND :** Data Set, Transmit, Display
- **Filter, Resonance, Modulator, Zero Cross Detector**
- **Power Line Communication :** Control of Home Network Products
- **Bread Board :** for designing and testing the circuit

ACCESSORIES

- Connection Cable : 1 set
- Program CD : 1 set
- User's Guide : 1ea

HOME NETWORK DESIGN PLATFORM

ED-5965

- Home network based experiments suitable for ubiquitous computing
- Designed to help develop network devices on the basis of Lon Protocol
- Control of each device installed in the field through power line communication
- Related experiments through Neuron C and MICOM programming
- Home network control in utilization of LabVIEW
- Modular structure with a rack for convenient wiring
- Home network device control through the Internet(Home Gateway)

ACCESSORIES

- MiniEVKComiler
- LonMaker 3.1
- Experimental Rack
  - » Single Unit Power Source Rack
  - » Built-in 15A Circuit Breaker
  - » Built-in Indication Lamp
  - » Dimension: 1490(W) x 918(H) x 320(D)mm
- Connection Cables
- AC Power Cord
- User's Guide Manual

OPTIONS

- Experimental Table
  - » MDF Material, Wheel type With Drawers
  - » 1490(W) x 800(D) x 846(H)mm

> EXPERIMENTS

- Overview of Home Network technology
- Principles on Home Network device related hardware and software
- Understanding of Home Network scenarios
- Programming for each device's operation
- Commissioning and network binding Using LonMaker
- Control of each device
- Interoperable self installation

Wall Pad Module

- 7″ touch LCD and similar functions as offered by the Wall Pad at home
- Control of door using C-MOS Camera
- Home gateway experiments
- Control of ED-5965 model through Internet in utilization of PDA and PC

IO Switch Control Module

- Control by power line communication
- Remote control through each module's switch
- F/W programming with Neuron C

Heating Control Module

- Control by power line communication
- Control by the remote controller
- Control through IO_SWITCH
- F/W programming with Neuron C

Blinds Control Module

- Control by power line communication
- Control by the remote controller
- Control through IO_SWITCH
- F/W programming with Neuron C

Electric Outlet Module

- Control by power line communication
- Control by the remote controller
- Control through IO_SWITCH
- External control interface through UART
- F/W programming with Neuron C

Illumination Module

- Control by power line communication
- Control by the remote controller
- Control through IO_SWITCH
- IR(remote controller) reception F/W experiments
- F/W programming with Neuron C

Gas/Door Control Module

- Control by power line communication
- Control by the remote controller
- Control through IO_SWITCH
- F/W programming With Neuron C

HOME NETWORK DESIGN PLATFORM

ED-5965

Experiments Module

ED-5965-1
Wall Pad Module

- Icons for the module components on 7″ touch LCD for control
- C-MOS Camera
- Monitoring and door control
- Processor : PX270 ARM CORE/PL3120 Transceiver
- Display : 7″ touch LCD
- Communication : Ethernet , Power Line Communication

ED-5965-2
Heating Control Module

- Temperature control device for heating valve control
- Encoder Switch for temperature control
- Control of the valve through Main Control module
- Control by LabVIEW program
- Control by the Remote Controller(Integrated type)
- Control through Wall Pad

ED-5965-3
Main Control Module

- Modular control through the switches
- Remote Controller for controlling each module
- External output terminal for customized experiments
- Processor : PL3120 Transceiver
- 12V Relay, 24V Relay OUT Terminal
- Total of 8 input switches
- Infrared(IR) communication in utilization of the Remote Controller

ED-5965-4
Gas/Door Control Module

- GAS Detector for gas valve control
- Main Control module for door control
- Control By LabVIEW program
- Control through Wall Pad
- ZigBee/RFID for door control
- Processor : PL3120 Transceiver
- Digital door lock
- Gas detector, DC 12V gas valve
- CC2420 ZigBee module

ED-5965-5
Blocking Filter Module

- Isolates the equipment from its surrounding and blocks Communication once power line communication goes through this filter
- Rated Voltage : 220/110V
- Rated Current : 50A
- Operating Temperature : -10C~+40C
- Distortion : above 40dB
- Bandwidth : 110kHz ~ 140kHz

HOME NETWORK DESIGN PLATFORM

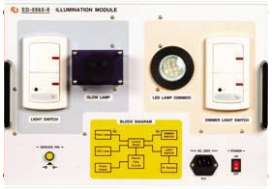
ED-5965

ED-5965-6
Electric Outlet Module

- Electric outlet control
- Control by LabVIEW program using RS-232 Interface
- Processor : PL3120 Transceiver
- RS-232 monitoring

ED-5965-7
Blinds Control Module

- Control of blinds through Main Control module
- Control by LabVIEW program
- Control by the Remote Controller(Integrated type)
- Control through Wall Pad
- Processor : PL3120 Transceiver
- DC 24V Motor Control(Power Line Communication)



ED-5965-8
Illumination Control / IR Module

- ON/OFF Switch for Lamp control
- Main Control module for Lamp control
- Control By LabVIEW Program
- Control by the Remote Controller(Integrated Type)
- Control through Wall Pad
- Processor : PL3120 Transceiver
- AC 220V Glow Lamp, DC 12V LED Lamp
- Combined Infrared Switch

Experiments Module

RFID/ZigBee Access Control Module

- Control through power line communication
- Door control using RFID and ZigBee
- RFID, ZigBee, PLC (Power Line Communication) Access
- F/W programming through Neuron C
- 13.56MHz RFID Reader
- Sensing Distance: 100mm
- ISO/IEC 14443 Type A, Type B
- Processor : AT89C51(8051)
- ZigBee module(CC 2420)

Software

Each device's control is possible through each Icon of the integrated HMI that enables controlling illumination, heating, blinds, electric outlet, dimmer and indoor temperature

SYSTEM CHARACTERISTICS

- **Memory :** ROM 24kB, EEPROM 4kB, SRAM 2kB
- **Interface :** RS-232
- **Operating System :** Protocol Scheduler
- **Communication Channel :** PLC
- **Dimension :** 420(W) x 300(H) x 95(D)mm
- **Input Voltage :** 220V

• Ubiquitous

EMBEDDED BASED HOME NETWORK TRAINER

ED-5967

- Home network control in liaison with Embedded PXA 255/270/272/320
- Power line communication and ZigBee modules with Multi Port in use together
- Embedded
  - » System design using PXA270
  - » System upgrade simply by replacement of Embedded PXA255/270/272/320
  - » Embedded based LINUX porting and Device Driver
  - » Enhances GUI (Graphical User Interface) program coding abilities
  - » C-MOS Image Sensor
- Home Network
  - » Understanding of Home Network System and LonWorks System
  - » Design and experiments on power line communication
  - » Device control and binding Experiments using LonMaker (LonWorks Protocol)

• QT Program (Embedded GUI)

• Initial Operation Screen (Communication Port)

• Equipment Control Screen

> EXPERIMENTS

Embedded

- Introduction
- LINUX
- CDK(Cross Development Kit)
- JTAG(Joint Test Action Group)
- Boot loader(u-boot)
- Embedded Linux booting
- Embedded Linux porting
- Device Driver
- GPIO LED Device Driver
- LED Device Driver
- Network Program
- QT Installation
- QT Program Application

Home Network

- Home Network System
- Protocol
- LonWorks System
- LonWorks Device
- Definition of Device Interface
- Neuron C
- Commissioning
- Device Hardware Design
- Network Program
- MiniEVK Compiler
- Device F/W Programming
- LonMaker for Windows in utilization

ZigBee (Option)

- Overview of USN
- Software Installation
- Ad-hoc Network and Application
- TinyOS Installation and Folder Structure
- NessC
- LED Control using Task and Timer
- Radio Communication
- Wireless Communication
- Control of Home Network System

EMBEDDED BASED HOME NETWORK TRAINER

ED-5967

> SPECIFICATIONS

EMBEDDED PXA255/270/272/320

- **CPU :** INTEL PXA255/270/272/320(520MHz)
- **Memory**
  - » SDRAM 128MByte(32bit width)
  - » FLASH _ PXA255 : 32MByte , PXA270 : 32MByte
    _ PXA272 : 64MByte , PXA320 : 128MByte
  - » SDRAM 1 MByte(32bit width)
- **Serial Communication**
  - » FF UART 1Port
  - » Standard UART 1Port
  - » Bluetooth 1Port
- **Ethernet**
  - » 10/100Base-T 1Port(LAN91C11)
  - » 10Base-T 1Port(CS8900)
- **Display**
  - » TFT-LCD, 7″ wide
  - » Touch Screen
- **Card Slot**
  - » CF(Compact Flash) Card 1Slot
  - » SD/MMC Card 1Slot
- **RTC :** RTC4513
- **USB**
  - » Host 1Port
  - » Client 1Port
- **C-MOS Image Sensor**
  - » Hynix HYCA3(1/4) Camera module
- **LED :** 8ea
- **Buzzer :** 1ea
- **Software :** Qtopia, Linux, QT

HOME NETWORK

- **Gas Leak Alarm**
  - » Gas Detection : LNG, LPG
  - » Voltage : DC 12V
  - » Output Type : On/Off
  - » Alert beep sounds at the time of detecting gas
- **Heater**
  - » Open/Close : Electronic Valve Control
  - » Voltage : 12V
  - » Displays the valve's current status
- **Lighting**
  - » On/Off function
  - » Lighting control by PWM Method(0~9steps)
- **Power Control**
  - » On/Off function
  - » Control using TRIAC and Photo Coupler

PLC(POWER LINE COMMUNICATION)

- **Processor**
  - » PL3120 Transceiver
- **Communication Channel**
  - » Power line communication
- **PL3120 F/W programming through LonMaker**

ZIGBEE(OPTION)

- **Processor**
  - » ATmega128L, 8bit RISC
- **Memory**
  - » 128k Program Flash, 4k EEPROM
- **Operating System**
  - » F8W, TinyOS
- **Multi Channel Radio**
  - » 2.4/2.4835GHz
- **Data Rate :** 250kBaud
- **RF Chip :** CC 2420(IEEE 802.15.4)
- **Power :** 3.0~3.3V
- **Interface**
  - » RS-232, GPIO Port
- **Program Download :** J TAG

GENERAL CHARACTERISTICS

- **Dimension :** 680(W) x 90(H) x 480(D)mm
- **Power**
  - » Input Voltage : AC220V
  - » Embedded Board : DC +3V, DC +5V
  - » Power Line Communication : AC220V, DC +12V

ACCESSORIES

- SW CD (Program Source, Circuit Diagram, DataSheet)
- Serial Cable
- Power Cord
- Ethernet Cross Cable
- LPT Cable
- JTAG Downloader Cable
- User Manual

OPTIONS

- ZigBee Module : 4ea

HOME NETWORK TRAINER

ED-5968

- Home network control in liaison with Embedded PXA 255/270/272/320
- Power line communication and ZigBee modules with Multi Port in use together
- Home Network
  - » Understanding of Home Network System and LonWorks System
  - » Design and experiments on Power Line Communication
  - » Device control and binding experiments using LonMaker (LonWorks Protocol)

> CONFIGURATION

- Home Network
- PLC(Power Line Communication)
- Embedded PXA255/270/272/320(Option)
- ZigBee(Option)

※Please refer to Page 95 on ED-5967 Model

> EXPERIMENTS

Embedded (Option)

- Introduction
- LINUX
- CDK(Cross Development Kit)
- JTAG(Joint Test Action Group)
- Boot loader(u-boot)
- Embedded Linux booting
- Embedded Linux porting
- Device Driver
- GPIO LED Device Driver
- LED Device Driver
- Network Program
- QT Installation
- QT Program Application

Home Network

- Home Network System
- Protocol
- LonWorks System
- LonWorks Device
- Definition of Device Interface
- Neuron C
- Commissioning
- Device Hardware Design
- Network Program
- MiniEVK Compiler
- Device F/W Programming
- LonMaker for Windows

ZigBee (Option)

- Overview of USN
- Software Installation
- Ubiquitous Senser Network
- Ad-hoc Network and Application
- TinyOS Installation and Folder Structure
- NessC
- LED Control using Task and Timer
- Radio Communication
- Wireless Communication
- Control of Home Network System

> SPECIFICATIONS

GENERAL CHARACTERISTICS

- **Dimension**
  - » 160(W) x 90(H) x 480(D)mm
- **Voltage**
  - » AC220V, DC +12V

ACCESSORIES

- Software CD(Program Source, Circuit Diagram, Datasheet)
- Serial Cable • Power Cable
- User Manual

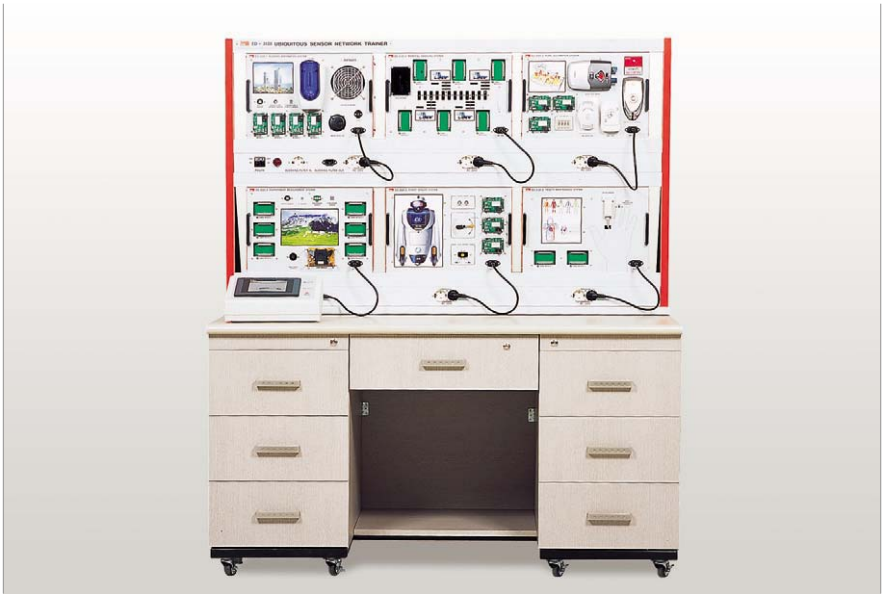
OPTIONS

- ZigBee Module : 4ea

• USN / RFID System

UBIQUITOUS SENSOR NETWORK TRAINER

ED-3120



> FEATURE

- Fundamental and concept of the Ubiquitous Sensor Network, ZigBee(IEEE 802.15.4) System
- TinyOS and various types of sensors(Illumination, Temperature, Humidity, Gas, Ultrasonic Wave, Pyroelectric)
- Total solutions needed for Sensor Network System training and development
- Various application fields(OS, network, security, robot, H/W development, sensor application)
- Mobile SMS reception(through PC) of a warning information on fire or gas leakage, which was accepted by PAN Coordinator
- Standard shipped components are the total of seven modules including PAN Coordinator(Sink Node) & SMS Transmitter Which is a main module
  [PAN Coordinator(Sink Node) & SMS Transmitter, Building Automation System, Materials Handling System, Home Automation System, Environment Measurement System, Robot Sensor System, Health Maintenance Module]
- ZigBee modules to communicate one another and also with the main module
- PC interface and monitoring on Touch Panel
- Consists of the sensors widely being used for the management of building, home automation, environment, robot and health

> EXPERIMENTS

- **U-Building(Building Automation System)**
  - » Remote light control using Illumination Sensor by ZigBee communication
  - » Remote management/alarm for intruders using Human Body Sensor
  - » Refrigeration and air conditioning using Temperature/Humidity Sensor by ZigBee communication
  - » Fire alarm using Fire Detection Sensor by ZigBee communication
- **U-Logistics(Material Handling System)**
  - » Logistics automation using RFID by ZigBee communication
  - » Logistics transfer by RFID data using a virtual conveyor by ZigBee communication
  - » Load capacity control for each warehouse using ZigBee communication
- **U-Home(Home Network System)**
  - » Remote gas detection by ZigBee communication
  - » Remote door OPEN/CLOSE, monitoring and management by ZigBee communication
  - » Gas valve breaker through remote gas alarm by ZigBee communication
- **U-Environment(Environment Measurement System)**
  - » Environmental monitoring through various densors by ZigBee communication
- **U-Robot(Robot Sensor System)**
  - » Object detection through Ultrasonic Sensor by ZigBee communication
  - » Gradient measurement using Gradient Sensor by ZigBee communication
  - » Calculation of the robot's rotation Speed Using Gyro Sensor by ZigBee communication
- **U-Health(Health Maintenance Module)**
  - » Pulse measurement using SpO_2 Sensor by ZigBee communication
  - » Body temperature detection using Body Temperature Sensor by ZigBee communication

UBIQUITOUS SENSOR NETWORK TRAINER

ED-3120

Main Module

ED-3121
U-sensor Network Monitoring System

- **Touch Panel**
  - » 7″ wide TFT LCD(640 x 480 resolution)
  - » Analog Touch
  - » 32bit RISC CPU
- **ZigBee Module**
  - » Performing as PAN Coordinator(1ea)
- **PC Interface :** RS-232C
- **Power Source :** AC 220V
- **Feature**
  - » Capable of data analysis and control using Touch Panel
- **Dimension :** 300(W) x 142(H) x 284(D)mm

u-Building

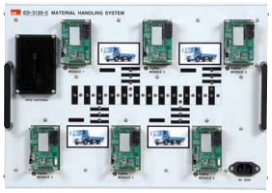
ED-3120-1
Building Automation System

- **ZigBee Module :** Node(4ea)
- **Illumination Sensor(1ea)**
  - » Measuring Range : 0~25000Lux
  - » DC 5V
  - » Output type : Current(μA)
- **Human Body Detection Sensor(1ea)**
  - » Pyroelectric detection
  - » DC 5V
  - » Output type : Digital output
- **Temperature/Humidity Sensor(1ea)**
  - » Measuring Range : 0~110˚C, 0~100%
  - » DC 5V
  - » Output type : Voltage(V)
- **Fire(Smoke) Detection Sensor(1ea)**
  - » Smoke detection using infrared rays
  - » DC 12V
  - » Output type : On/Off
- **Application Components**
  - » Alarm, ø10 LED, AC
  - » FAN(Cold/Warm wind)
- **Power Source :** AC 220V
- **Dimension :** 420(W) x 300(H) x 137(D)mm

UBIQUITOUS SENSOR NETWORK TRAINER

ED-3120

u-Logistics



ED-3120-2
Material Handling System

- **ZigBee Module :** Node(6ea)
- **RFID Reader**
  - » 13.56MHz RFID Reader, low electric power design
  - » Detection Distance : Min. 100mm
  - » ISO/IEC 14443 Type A, Type B Read, ISO 15693 Read
  - » Alarm for gas detection
- **Virtual Conveyor**
  - » ø3 high brightness Blue LED(40ea)
  - » Easy to trace logistics(IN/OUT)
- **Load Capacity Indication**
  - » Red 10 Bar LED
  - » Indication by unit of 10%
  - » Easy to find out the current status of each warehouse
- **Zyro Sensor**
  - » Measuring Range : ±70deg/sec
  - » DC 5V
  - » Output type : Voltage(V)
  - » Resolution : 0.1 degree
  - » Response Time : 0.5Sec
- **Power Source :** AC 220V
- **Dimension :** 420(W) x 300(H) x 80(D)mm

u-Home Network System

ED-3120-3
Materials Handling System

- **ZigBee Module :** Node(3ea)
- **Gas Leakage Alarm**
  - » Detection : Gas(LNG, LPG)
  - » DC 12V
  - » Output type : On/Off
  - » Alarm for detection of gas
- **Gas Valve Breaker**
  - » OPEN/Close using DC motor
  - » DC 12V
  - » Indicates the current valve status
- **Virtual Gas Meter**
  - » 4-digit digital switch
  - » Range : 0~9999
- **Digital Door-Lock**
  - » OPEN/CLOSE Method : password, electronic tag
  - » DC 6V(battery x 4)
  - » Automatic Lockup, Lock

UBIQUITOUS SENSOR NETWORK TRAINER

ED-3120

u-Environment

ED-3120-4
Environment Measurement System

- **ZigBee Module :** Node(6ea)
- **Illumination Sensor**
  - » Measuring Range : 0~25000Lux
  - » DC 5V
  - » Output type : Current(μA)
- **O_3 Sensor**
  - » Smoke detection using infrared rays
  - » DC 12V
  - » Output type : On/Off
- **Atmospheric Pressure Sensor**
  - » Red 10 Bar LED
  - » Indication by unit of 10%
  - » Easy to find out the current status of each warehouse
- **Earthquake Detection Sensor**
  - » Measuring Range : ±2~±1000G
  - » DC 5V
  - » Output type : Voltage(V)
- **Wind Velocity Sensor**
  - » Measuring Range : 3~60m/s
  - » DC 5V
  - » Output type : 1 rotation/clock
- **Minute Dust Sensor**
  - » Measuring Range : 0~30000pcs/liter
  - » DC 5V
  - » Output type : Voltage(V)
- **Power Source :** AC 220V
- **Dimension :** 420(W) x 300(H) x 80(D)mm

u-Robot

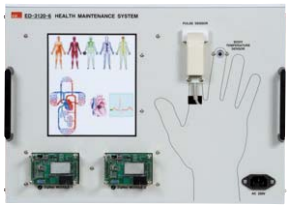
ED-3120-5
Robot Sensor System

- **ZigBee Module :** Node(3ea)
- **Ultrasonic Wave Sensor**
  - » Measuring Range : 3~200cm
  - » DC 5V
  - » Output type : Pulse width
- **Gradient Detection Sensor**
  - » Measuring Range : Single Axis ±60°
  - »DC 5V
  - »Output type : Voltage(V)
  - »Resolution : 0.1 degrees
  - »Response Time : 0.5 second
- **Input Voltage :** AC 220V
- **Dimension :** 420(W) x 300(H) x 80(D)mm

UBIQUITOUS SENSOR NETWORK TRAINER

ED-3120

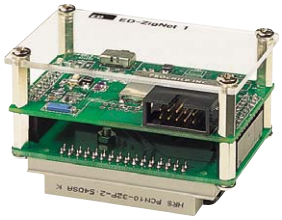
u-Health



ED-3120-6
Health Maintenance System

- **ZigBee Module :** Node(2ea)
- **SpO_2 Sensor**
  - »Pulse detection using infrared rays
  - »DC 12V
  - »Output type : Pulse
  - »Finger Probe type
- **Body Temperature Detection Sensor**
  - »Measuring Range : 0~110˚C
  - »DC 5V
  - »Output type : Voltage(V)
  - »Resolution : 10.0mV/˚C
- **Input Voltage :** AC 220V
- **Dimension :** 420(W) x 300(H) x 80(D)mm

ZigBee Module(25ea)



Cluster Header

- **Interface :** RS-232C, GPIO Port
- **Program Downloader :** JTAG
- **Processor :** Atmega 128, 8bit RISC
- **Memory :** 128k Program Flash
- **OS :** TinyOS, F8W(Z-Stack)
- **Multi Channel Radio :** 2.4/2.4835GHz
- **Data Rate :** 250kBaud
- **RF Chip :** CC2420(IEEE 802.15.4)
- **Power :** 2.7V~3.6V

Software and Development Environment

Monitoring Software

- F8W, TinyOS, Multi-Hop, Ad-hoc Routing Protocol
- Sensor Library, Network Monitor Program, Application Program

ACCESSORIES

- Experiment Rack
  - » Power source single unit type
  - » Built-in 15A power source circuit breaker
  - » Easy to mount and demount modules
  - » Built-in power source indication lamp
  - » Dimension : 1490(W) x 918(H) x 320(D)mm
- Application Program : 1Copy
- AC Power Cord : 1Set
- User Manual

OPTIONS

- Work Table
  - » Material : MDF
  - » Trolley type for easy mobility
  - » Drawers
  - » Dimension : 1490(W) x 846(H) x 800(D)mm
- ED-ZigM(Main ZigBee Module)

• USN / RFID System

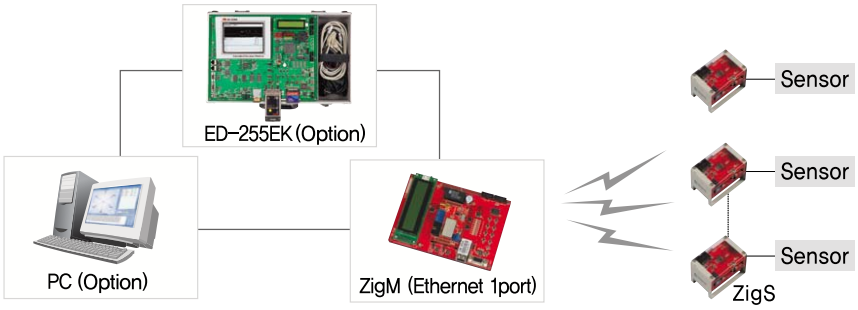
UBIQUITOUS SENSOR NETWORK TRAINER

ED-3160

- The optional Embedded System(ED-255EK) can be linked as a gateway
- ZigBee network can be built using TinyOS, F8WOS
- Capable of control and monitor through Ethernet
- The RFID Card Reader is supplied as a standard shipped component for applied experiments on security, home automation and robot
- The Mote Expansion enables easy build of the USN Control System
- 10 types of basic sensors(standard shipped components) & additional 7 types of sensors(Options)

> EXPERIMENTS

- Overview of the sensor network
- Understanding of the sensor network hardware
- Sensor network development environment build
- Sensor network configuration method
- Data transmission among ZigBee modules using the sensor network
- Description of each sensor supplied in the equipment
- Zigbee module and programming of the sensor control program
- Sensor data collection using the sensor network
- Usage and programming knowledge of the PC monitoring software
- Sensor control using the PC monitoring software



UBIQUITOUS SENSOR NETWORK TRAINER

ED-3160

> SPECIFICATIONS

ED-ZigM

- **Interface :** RS-232, TCP/IP, GPIO Port
- **JTAG**
- **Processor :** Atmega128L, 8bit RISC
- **Memory :** 128k Program Flash, 64k SRAM
- **Operating System :** F8W, TinyOS
- **Multi Channel Radio :** 2.4/2.4835GHz
- **Data Rate :** 250kBaud
- **RF Chip :** CC2420(IEEE 802.15.4)
- **RTC :** DS1307
- **Network :** 10/100 Auto Detect
- **Power :** 3.0~3.3V

ED-ZigS

- **Interface :** RS-232, GPIO Port
- **JTAG**
- **Processor :** Atmega128L, 8bit RISC
- **Memory :** 128k Program Flash
- **Operating System :** F8W, TinyOS
- **Multi Channel Radio :** 2.4/2.4835GHz
- **Data Rate :** 250kBaud
- **RF Chip :** CC2420(IEEE 802.15.4)
- **Power :** 3.0~3.3V

ED-255EK(GATEWAY)(OPTION)

- **Processor :** PXA255 400MHz
- **Memory**
  - » FLASH : 32MByte
  - » SDRAM : 128MByte
  - » SRAM : 1MByte
- **Ethernet :** 10/100Mbps 2Port
- **Serial :** UART FF UART, ST UART, BT UART
- **USB :** Host, Client
- 6.4″ TFT LCD/Touch Screen, Multi Media Card, PCMCIA, CF, MMC PS2, IIC, IrDA, RTC, Sound(AC'97 Codec)
- **OS :** Linux-2.4.19, WinCE 4.2

※Detail Specification : refer to ED-255EK product specification

ACCESSORIES

- Serial Cable
- PC Program
- DC 5V Adapter
- JTAG
- Ethernet Cable

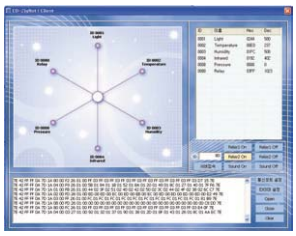
OPTIONS

- Optional Sensor Modules(7ea)
  - » Acceleration Sensor
  - » GPS Sensor
  - » Interface Module
  - » PH Sensor
  - » Finger Print Sensor
  - » Azimuth Sensor
  - » Relay Module

Software and Development Environment

- F8W, TinyOS
- Multi-Hop, Ad-hoc Routing Protocol
- Library of each sensor
- Network monitor program

Application Program



UBIQUITOUS SENSOR NETWORK TRAINER

ED-3160

Sensor (Basic : 10ea)

Illumination Sensor

Lux Meter and Photo Alarm Experiments

- Illumination measurement using Cds, Photo IC (AMS302)
- Designed for low electric power
- Temperature compensation function(Built-in)
- In the use of general-purpose ATMega8L
- RS-232 communication
- Measuring Range : 0.1~50,000LUX

Magnetic Sensor

Magnetic Flux Meter, Tachometer, Speed Meter Experiments

- 2-axis magnetic field intensity measurement
- Designed for low electric power
- Possible use as for a compass
- In the use of general-purpose ATMega8L
- RS-232 communication
- Measuring Range : -6.00~+6.00gauss

Temperature Sensor

Thermometer Experiments

- Precision measurement using Thermistor, IC
- Designed for low electric power
- Calculation of humidity and dew point
- In the use of general-purpose ATMega8L
- RS-232 communication
- Measuring Range : -40~123.8˚C
- Minimum Resolution : 0.1˚C

Humidity Sensor

Hygrometer Experiments

- Precision measurement using Thermistor, IC
- Designed for low electric power
- Capable of relative/absolute humidity measurement
- In the use of general-purpose ATMega8L
- RS-232 communication
- Measuring Range : 0~100%
- Minimum Resolution : 0.03%

Pyroelectric Sensor

Human Body Detection Sensor

- Distance measurement using infrared rays
- Entrance & exit monitoring by human body detection
- Infrared sensing
- In the use of general-purpose ATMega8L
- RS-232 communication
- Measuring Range : 10~80cm

UBIQUITOUS SENSOR NETWORK TRAINER

ED-3160

Ultrasonic Wave Sensor

- Distance measurement using ultrasonic waves
- Temperature compensation function
- In the use of general-purpose ATMega8L
- RS-232 communication
- Measuring Range : 50~200cm

Sound Sensor

Sound Detection

- Sound detection using microphone
- Display by Level Meter
- In the use of general-purpose ATMega8L
- RS-232 communication
- Frequency : 31.5Hz~8.5kHz
- Measuring Range : 35~130dB

Pressure Sensor

Atmospheric Pressure Measurement

- Atmospheric pressure measurement using Barometer
- Contact pressure measurement using FSR(Force Sensing Resistor)
- Possible measurement of temperature and altitude
- In the use of general-purpose ATMega8L
- RS-232 communication
- Measuring Range : 300~1100mbar(Barometer), 0.5~10kgf/cm^2(FSR)

GAS Sensor

Gas Measurement

- Capable of measuring Carbon Monoxide, Methane, Ethanol, Propane, Isobutane, Hydrogen
- In the use of general-purpose ATMega8L
- RS-232 communication
- Measuring Range : 500~10000ppm

RFID

RF Card Reader

- 13.56MHz RFID Reader
- Designed for low electric power
- Detection Distance : 100mm
- ISO/IEC 14443 Type A, Type B Read
- ISO 15693 Read

Sensor (Optional : 7ea)

Acceleration Sensor(2-axis)

Motion Sensing

- Measurement of 2-axis Gradient
- Measurement of 2-directional acceleration of gravity
- Useful for measuring the target's motion
- In the use of general-purpose ATMega8L
- RS-232 communication
- Measuring Range : ±25˚(Gradient)
- Minimum Resolution : 0.1˚

UBIQUITOUS SENSOR NETWORK TRAINER

ED-3160

Azimuth Sensor
Direction Sensing

- Electronic compass sensor
- LED Display of the North Pole(10°)
- Designed for low electric power
- In the use of general-purpose ATMega8L
- SPI communication

PH Sensor
PH Density Measurement

- Sensor connection through BNC Cable
- Liquid pH sensing using the Probe
- Designed for low electric power
- In the use of general-purpose ATMega8L
- RS-232 communication
- Measuring Range : 0~14pH

GPS Sensor
Location Detection

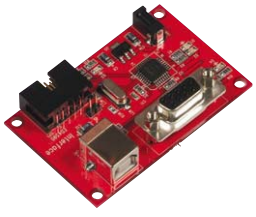
- Location detection using GPS module and antenna
- Altitude detection
- Designed for low electric power
- In the use of general-purpose ATMega8L
- RS-232 communication
- Latitude & longitude indication : 0.01 sec
- Target speed indication : 300m/sec(max)

Finger Print Sensor
Finger Print Sensing

- High speed finger print recognition using DSP
- Programmable
- Designed for low electric power
- Sensing Area 16 x 19mm
- In the use of capacitive sensor for excellent imaging quality
- 500dpi image resolution
- Low Avg EER

Relay Module

- Relay 2EA
- Buzzer 1EA
- Illumination measurement using Cds
- Temperature measurement using Thermistor
- Relay & Buzzer drive using the software



Interface Module

- Connection between Base Station and PC
- Serial communication for PC
- USB communication for PC
- USB 2.0 compatible
- Capable of using the power source of Mote or USB