

Wireless Embedded Training System

[BT-3000]

1. System Configuration



2. Characteristics

Wireless Embedded System, BT-3000 was developed to educate **wireless control and embedded technology**. It's distinguished technology compared to wired embedded system is wireless control using **Bluetooth protocol**. Wireless embedded technology will be used in application of **Home networking, Ubiquitous sensor networking, Telemetric, Industrial control** in the near future.

Through experiment using BT-3000, students learn **hardware design** and **wireless communication protocol** easily. Hardware design includes **Controller and modules** and software design includes **Bluetooth communication protocol**.

3. Functions

- Embedded educational system by GUI control
- Experiment of concentrated wireless embedded system using application module
- General education to industrial embedded system
- Software and Hardware training to each module
- Experiment of Embedded programming using controller
- Detail experiment using thirteen modules
- Experiment of communication protocol Programming
- Manufacturing of sensor hardware module

4. Specifications

RF Specifications	
Chipset Maker	CSR Core Chip Set (AirLogic Module)
Chipset Specification	Bluetooth Ver1.1 or 1.2
Range	10m, 100m (Class2, Class1)
Interface	UART, USB, SPI

Sensor Specifications			
Sensor Type	Temperature Sensor (2 Types)	Temp. Measurement (SMDType, Semiconductor Type)	-40[°C] ~ 120[°C]
	Infrared Sensor (2 Types)	Transmit/Receive Type Detection Type	5 ~ 20 [μ m], about 3 [m]
	Touch Sensor	Application to Security	Response immediately
	Ultrasonic Sensor	Application to Security	About 10 [m]
	Gas Sensor	Application to Home Automation	CO2 or Alcohol
	Humidity Sensor	Application to Home Automation	0 ~ 100 [%]
	Pressure Sensor	Application to Security	10 [psi]

Controller Specification	
Chipset Maker	PIC16F877 or F74
Speed	4MHz ~ 20MHz
Interface	UART, I2C, SPI
Functions	interrupt, A/D Converter, Timer

5. Training Steps

- 1) Basic experiments of Wireless Embedded
 - Experiment of Inquiry to the equipments in around
 - Experiment of Data mode connection
 - Experiment of Voice mode connection
- 2) Remote Motor control
- 3) Remote power control
- 4) Remote sensor control
- 5) Experiment of Simulation for Wireless Application

6. Contents

Part I Introduction to Wireless Embedded System (BT-3000)

Chapter 1 Introduction to Wireless Embedded System (BT-3000)

Chapter 2 Understanding of the PIC Microcontroller

Chapter 3 Installation of server program and understanding it's operational principal

Chapter 4 Understanding of the Bluetooth

Part II Experiment of basic wireless

Chapter 5 Experiment of Inquiry Response to the wireless equipments

Chapter 6 Experiment of Connection to the wireless equipments

Chapter 7 Experiment of Wireless Data/Voice Communication

Chapter 8 Experiment of the Disconnection to the wireless equipments

Part III Experiment of Wireless Application

Chapter 9 Experiment of remote DC/Step-motor control

Chapter 10 Experiment of remote Power/Current control

Chapter 11 Experiment of remote control to the Temperature sensor

Chapter 12 Experiment of remote control to the Infrared sensor

Chapter 13 Experiment of remote control to the Touch sensor

Chapter 14 Experiment of remote control to the Ultrasonic wave sensor

Chapter 15 Experiment of remote control to the Gas sensor

Chapter 16 Experiment of remote control to the Humidity sensor

Chapter 17 Experiment of remote control to the Pressure sensor

Contents are able to change for system upgrade.

7. Components

1) Server Package (BT-3000MS)

- . Server hardware 1EA
- . Server program CD 1EA
- . Bluetooth module 1EA
- . Antenna 1EA
- . USB cable 1EA
- . UART cable 1EA
- . SPI cable 1EA
- . Textbook 1EA
- . User manual 1EA
- . Power Adaptor(9V 1A, 50/60Hz) 1EA
- . Carriage & Storage bag 1EA



2) Motor Control Experiment Package (BT-3000MC)

- . Slave Hardware 1EA
- . DC Motor experiment module 1EA
- . Step Motor Exp. module 1EA
- . Controller module 1EA
- . Antenna 1EA
- . PIC16F877 2EA
- . DC Motor 1EA
- . Step Motor 1EA
- . Power Adaptor(9V 1A, 50/60Hz) 1EA
- . Carriage & Storage Bag 1EA



3) Power Control Experiment Package (BT-3000PC)

- . Slave Hardware 1EA
- . Power control module 1EA
- . Power control module 1EA
- . Controller module 2EA
- . Antenna 1EA
- . PIC16F877 1EA
- . Power Adaptor(9V 1A, 50/60Hz) 1EA
- . Carriage & Storage Bag 1EA



4) Sensor Control Experiment Package (BT-3000SC)

- . Slave hardware 1EA
- . Temperature sensing control module1 1EA
- . Temperature sensing control module2 1EA
- . Infrared sensor control module 1EA
- . Touch sensor control module 1EA
- . Supersonic control module 1EA
- . Gas sensor control module 1EA
- . Pressure sensor control module 1EA
- . Humidity sensor control module 1EA
- . Controller module 1EA
- . Antenna 1EA
- . PIC16F877 2EA
- . DC motor 1EA
- . Step motor 1EA
- . Power Adaptor(9V 1A, 50/60Hz) 1EA
- . Carriage & Storage Bag 1EA



< System Components >

System components are able to change for system upgrade.

8. Knowledge can be acquired after experiment

- 1) Understanding of **Controller** (Pic16XXX, 80XXX)
- 2) Technology of **RS-232C control** and **Hardware design**
- 3) Understanding of **wireless communication** and **basic design technology**
- 4) Understanding of **wireless communication Protocol**
- 5) Design technology of **wireless Data communication** module
- 6) Design technology of **wireless Voice communication** module
- 7) Design technology of **Motor control** (DC motor & STEP motor)
- 8) Understanding of **sensor operation and acquire it's control & design** technology
- 9) Design technology of **power control** module
- 10) Design technology of **control algorithm**

9. Applications

- 1) Home networking
- 2) Ubiquitous Sensor Network
- 3) Control & Measurement
- 4) Medical science & Engineering
- 5) Automobile
- 6) Wireless control of the Industrial equipment
- 7) Traffic control system
- 8) Many devices can operate from wired to wireless terminal in data & voice communication