Basic sensor experiment trainer with Arduino MCU without C language experience

HBE-Arduino-Sensor

- Block program tool for easy understanding from other fields not knowing Electronic engineering
- No need of Hardware knowledge for Input and Output
- Accessible and controllable easily of 20 kinds of I/O and sensor devices.
- Able to check the result of program due to compiled and downloaded with a button
- Avaialbe of various applications with Bread board

Introduction

Ardunio is Open Platform, which can check the result of Control without studying Electronic engineering or Computer engineering , because this makes various Hardwares with so easy language. This provides own Software so we do not need other information. We can compile and download at a time if connecting Hardware with Jumper cable, programming with Block building program and pushing a button. And we do not need to know the function of Compile and Download. We can see the result immediately and we have increased interests so this will help us use other system. From the process to solve questions of operation one by one continuously, we can study how to control various devices. We can use this to various fields after studying how to use various sensors. This provides Bread board and Ext.Power so user can make other circuit by themselves.

Features

- Ardunio IDE.
- Completely compatible with Arduino Standard Shield.
- Programmable immediately to block program just with basic circuit without wiring.
- Designed for wiring to desired No. pin.
- The latest version Ardunio 1.0.5.
- Bread broad and various Powers usable for application.
- 20 kinds of I/O device.
- Available to controlled by Smart phone with built-in Bluetooth and Wireless LAN.
  (Note : Android App is not provided)

Specifications

• MCU Board

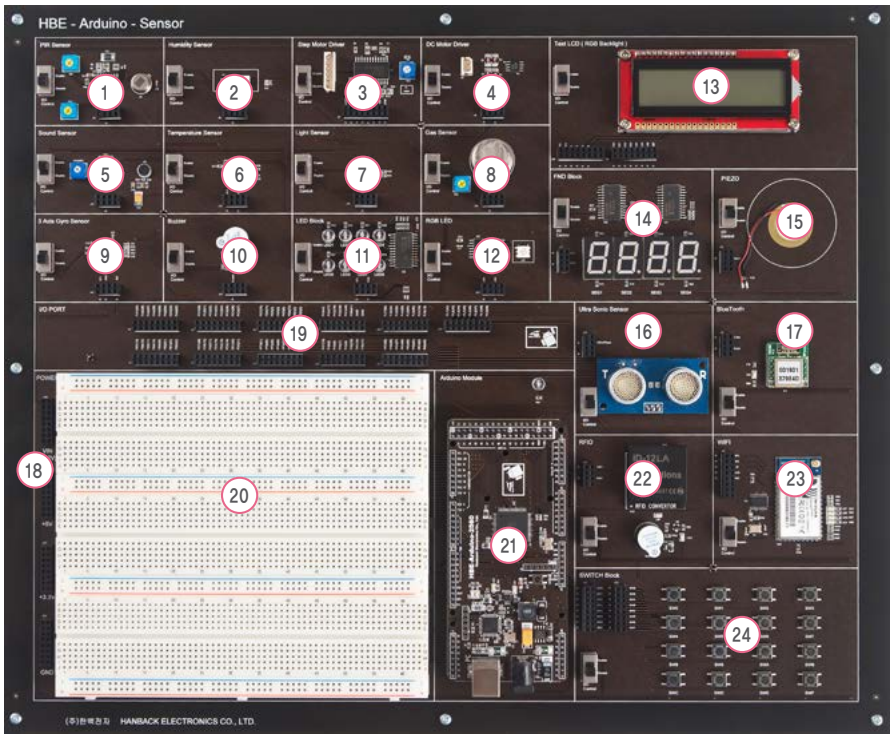
Type	Specification	Remark
MCU	ATmega2560	
Operating Voltage	5V	
Input Voltage	7-12VDC	
Max. Input Voltage	6-20VDC	
GPIO	70 pin, current 50mA	Including PWM pin
ADC	16Ch	
Flash Memory	256KByte	Bootloader 8KByte
SRAM	8KByte	
EEPROM	4KByte	
Clock	16Mhz	External Crystar
Compatible Shield	Compatible with Arduino Shield	

• Sensor Board

No	Type	description	interface
1	PIR	PIR motion sensing sensor, adjustable Sensitivity and Response Time	GPIO
2	3-axis accelerometer	Analog output included, measurable of Tilt	ADC
3	Sound	Sensing after amplifying noisy around. Microphone	ADC
4	LED	5Pi RED LED 8EA. Controlled with I^2C chip	GPIO
5	Gas	LNG, LPG, Propane, Butane measurable. 2,000~10,000 PPM measurable	ADC
6	Wi-Fi	Chip Antenna IEEE 802.11 b/g 2.4GHz	SPI
7	Ultrasonic	NT-TS601 20cm ~400cm distance measurable	GPIO
8	Bluetooth	Connectable directly with Chip Antenna, Smart phone	UART
9	RFID	13.56MHz Read Range 5Cm, RFID card 2EA. UART type	UART
10	Push Button	4x4 Push Button (16EA button)	GPIO
11	7 Segment	4Digit, Anode	I^2C
12	Text LCD	16x2 Line	GPIO
13	Piezo Sensor	Used as Buzzer or Speaker. Responded to Shock and Sound waves around Capacitance 10nF ± 30%	GPIO ADC
14	RGB LED	Various colors displayable with adjusting brightness of each Red, Green, Blue	GPIO
15	Humidity Sensor	Measuring Analog output value by Humidity, 0~100% humidity measured	ADC
16	Buzzer	Operating voltage : 5VDC / Frequency : 2400 ±50Hz Current consumption : Max. 35mA / SPL : Min. 90dB	PWM
17	Light Sensor	Analog output by brightness, 20 lx ~ 100 lx, connected with ADC	ADC
18	Temp. Sensor	Digital Temperature Measurement sensor, error 40℃~125℃ (±0.5℃)	I^2C
19	Step Motor	1.8°/pulse, Wheel provided	GPIO/ PWM
20	DC Motor	Output avg. Current 1.2A, max. 3.2A, Wheel provided	PWM

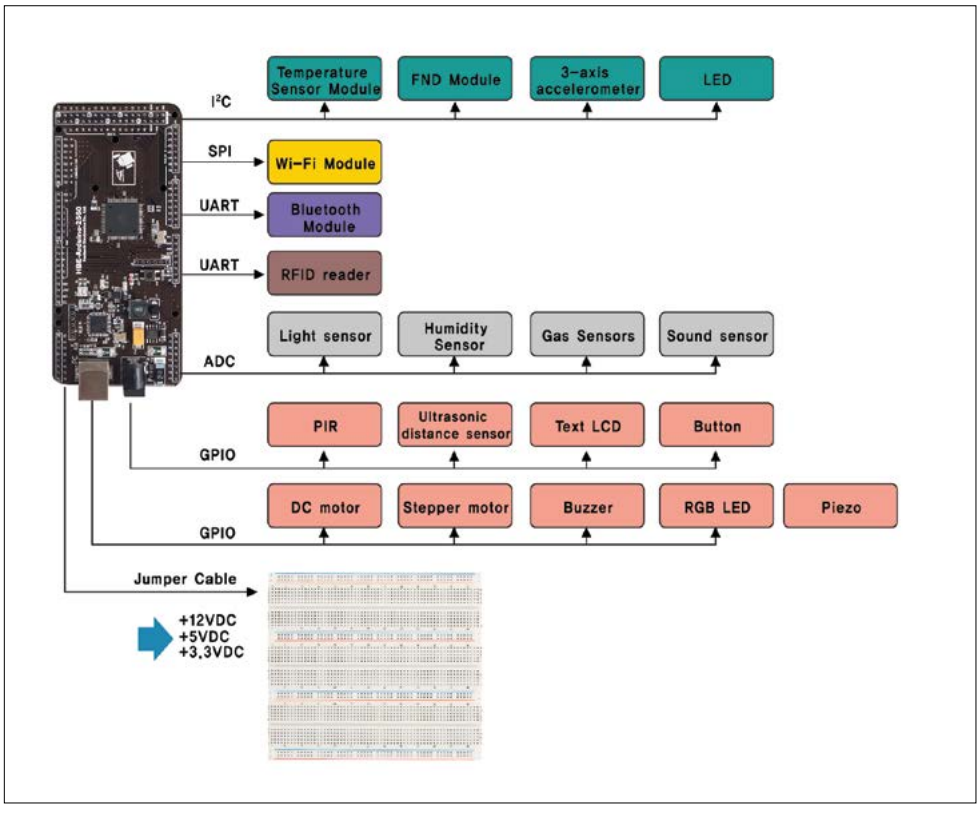
Main configuration

Circuit in HBE-Arduino-Sensor is composed enough to make us understand the system basically. And this provides Bread board and various Voltages. We can use Bread board to make application circuit and test it.



1. PIR sensor
2. Humidity sensor
3. Step motor
4. DC motor
5. Sound sensor
6. Temperature sensor
7. Light sensor
8. Gas sensor
9. 3 axis Gyro sensor
10. Buzzer
11. LED 8EA
12. RGB LED 1EA
13. TEXT LCD
14. FND 2EA
15. Piezo sensor
16. Ultrasonic Distance sensor
17. Bluetooth module
18. DC voltage(+12V, +5V, +3.3V)
19. Wiring port(corresponded to no.21 port)
20. Bread board
21. MCU module(compatible with Arduino Shield)
22. 13.56MHz RFID reader
23. WLAN module
24. 16EA Buttons

Block diagram



Text Book

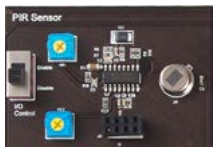
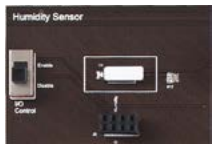
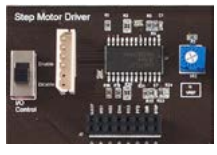
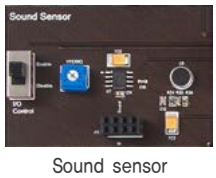
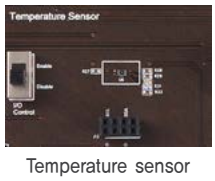
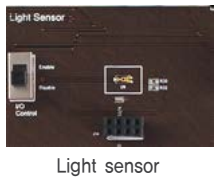
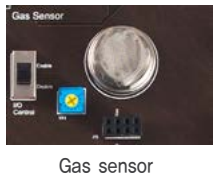
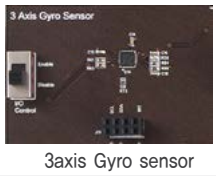
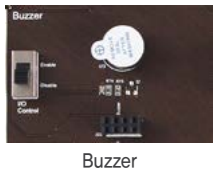
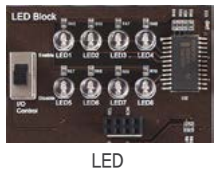
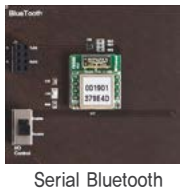
Educational content

To learn HBE-Arduino-Sensor Arduino programming

1st week. AVR Microcontroller
2nd week. Ardnino Development Environment
3rd week. Basic Structure of Arduino Program
4th week. LED, FND control
5th week. Text LCD, Buzzer control
6th week. DC motor control
7th week. Step motor control
8th week. Push button control
9th week. Light sensor, Sound sensor control
10th week. PIR sensor control
11th week. Temperature, Humidity and Gas sensor control
12th week. Ultrasonic Distance sensor
13th week. Piezo sensor, Gyro sensor control
14th week. RFID reader test
15th week. Bluetooth test
16th week. Wi-Fi test

Sensor and I/O Component

Next picture shows Sensors and I/O devices. They all have Switch to be connected to Arduino module with default wiring, and they have other connector to connect a device to a random pin. Firstly, we study Arduino with default wiring and also we study Control from random wiring. We can see total 20 devices as below.

 PIR sensor	 Humidity sensor	 Step motor	 DC motor
 Sound sensor	 Temperature sensor	 Light sensor	 Gas sensor
 3axis Gyro sensor	 Buzzer	 LED	 RGB LED
 Text LCD	 FND	 Piezo sensor	 Ultra Sonic sensor
 Serial Bluetooth	 13,56Mhz RFID reader	 Wi-Fi	 Buttons

Accessories


HBE-Arduino-Sensor


Manual and CD
1EA


USB Cable
(Micro to A)

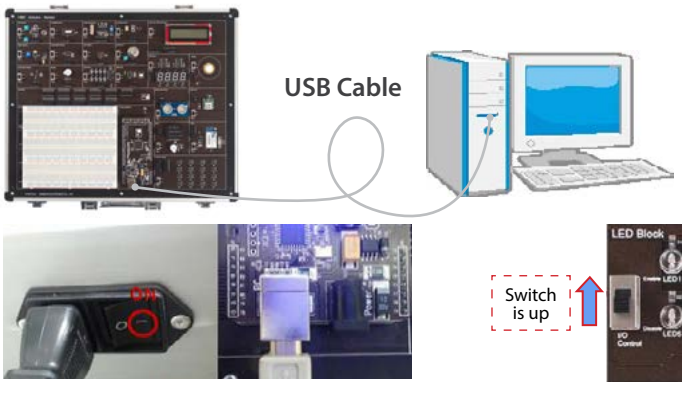

USB Cable 2EA
(A to B Type)


Power Cable 1EA

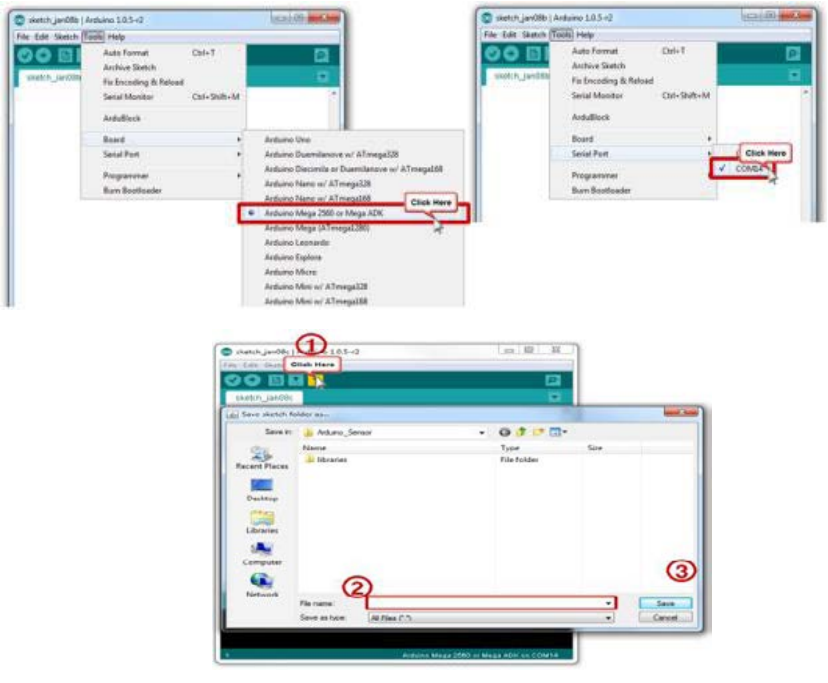

Jumper Cable 1EA

Experiment

1. Hardware



2. Software
-Execute Arduino



Download it to HBE-Arduino-Sensor
from Ardunio and check the operation

Result