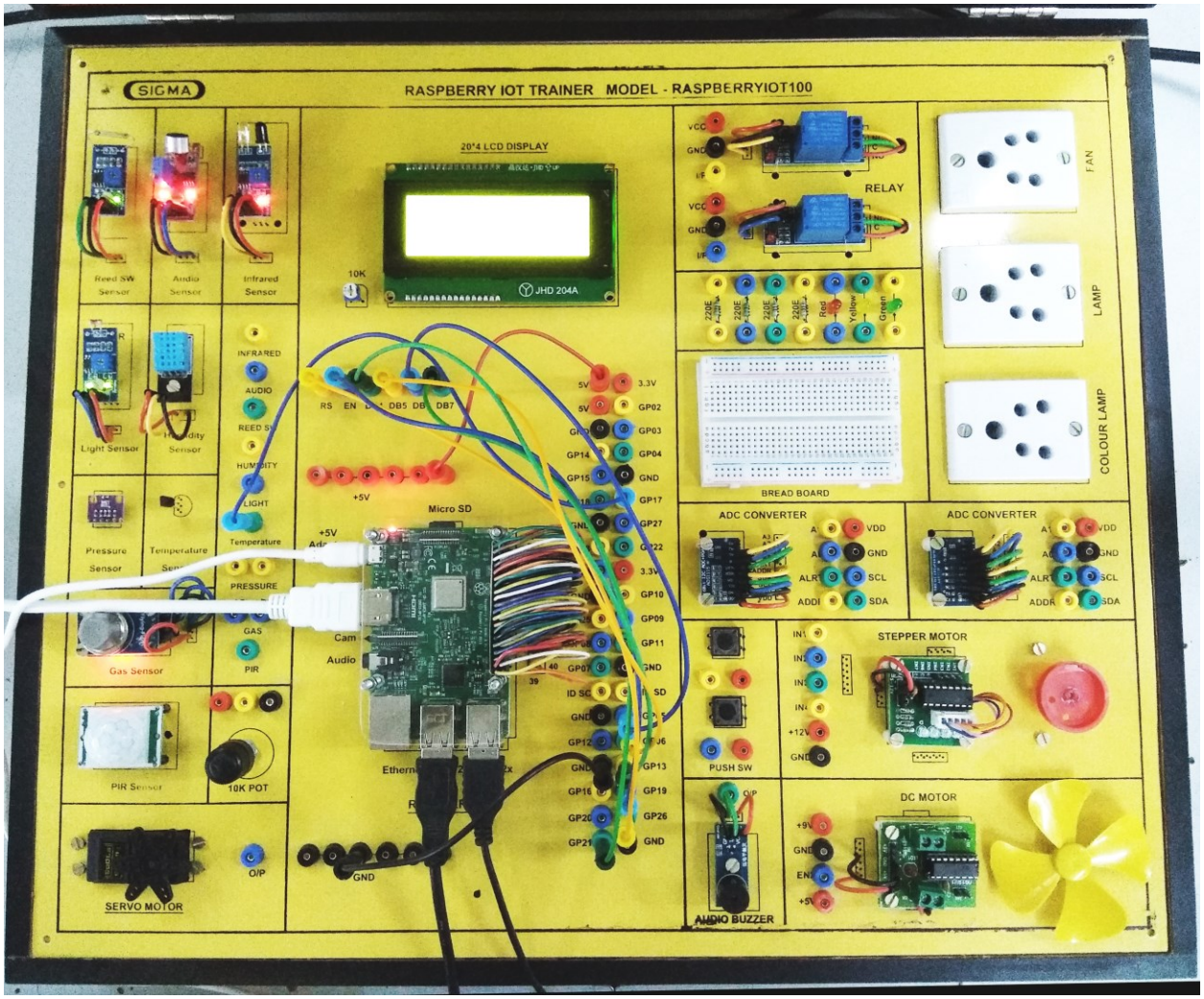
INTERNET OF THINGS TRAINER
MODEL IOT100-HY-20A05603P

This trainer has been designed with a view to provide practical and experimental knowledge of Internet of Things (IOT) with Sensors programing with Raspberry, Arduino and ESP32 IOT Boards.




SIGMA
RASPBERRY IOT TRAINER MODEL - RASPBERRYIOT100
20*4 LCD DISPLAY
JHD 204A
RELAY
Reed SW Sensor
Audio Sensor
Infrared Sensor
Light Sensor
Humidity Sensor
Pressure Sensor
Temperature
Gas Sensor
PIR Sensor
10K POT
SERVO MOTOR
PUSH SW
AUDIO BUZZER
DC MOTOR
ADC CONVERTER
BREAD BOARD
COLOUR LAMP
INFRARED
AUDIO
REED SW
HUMIDITY
LIGHT
GAS
PIR
RS EN DB4 DB5 DB6 DB7
3.3V
GND
+5V

SPECIFICATIONS

1. Hardware

Following Parts are assembled on Single PCB of size - 18 Inch x 15 Inch

1. Raspberry Microcontroller Board – Pi-4

1. Processor : 64bit, ARMv7
2. RAM - 1 GB
3. Memory - 32GB
4. OS: Open Source Linux
5. Connectivity:
   Dual-Band 2.4/5.0 GHz Wireless LAN,
   Bluetooth 5.0, USB Interface – USB 2.0 – 2 Ports, USB 3.0 – 2 Ports,
   Gigabit Ethernet
6. Video and Sound
   2 × micro HDMI Interface ports (up to 4Kp60 supported)
   Power - 5V, 3A DC via USB-C Connector

2. Arduino Board – UNO

1. Arduino Uno Microcontroller board based on the ATMEGA328P
2. 14 Digital Input / Output pins
3. 16 MHz Ceramic Resonator
4. USB Port
5. Power Jack – 9V DC, 1A

3. ESP32 Board

1. ESP32 Processor
2. Onboard TF card slot for data storage
3. Bluetooth - Bluetooth 4.2 BR/EDR and BLE
4. WiFi - IEEE 802.11 b/g/n/e/i
5. Power supply: 5V

2. Sensors:

1. LDR Light Sensor
2. Ultrasonic Distance Sensor
3. Temperature and Humidity measurement Sensor DHT11
4. PIR sensor
5. IR sensor
6. Servo Motor
7. Stepper motor
8. 2 Channel Relay - 5A and 1 Channel Relay - 30A
9. Joystick
10. Small Drone

3. Gateway & Nodes

1. ESP32 IoT Gateway – 2.4 GHz
2. Online Cloud/Server Services for 1 year on Our Sigma Server

4. Modules and Hardware:

1. 20 X 4 - LCD Display
2. Buzzer
3. Breadboard - 400 Points for making Amplifiers and Filter circuits as below
4. Different Resistors, Push Switches, Potentiometer and LEDs
5. 2 mm interconnections

2. Accessories

1.	Memory card	: 16 GB SD Card
2.	USB Cable	: 2 No
3.	Ethernet Cable	: 1 No
4.	HDMI Cable	: 1 No
5.	Power Supply Adaptor	: 9V, 3A - 1 No, 5V, 2A
6.	Jumper wires	: 50 Nos.
7.	Pen Derive with Software, Library, Driver, Codes, Soft Copy of Manual and Mobile App	: 16 GB
8.	Printed Practical Manual	: 1 No.
9.	E-Books for IOT Subject	: 10 Nos. in PDF Format
10.	Mp4 Video Class for IOT Subject	: 40 Nos
11.	Excitation accessories for each sensor	

3. Cabinet and PCB

The complete circuit diagram is screen printed on component side of the PCB with circuit and Parts at the same place. The PCB with components on front side is fitted in elegant wooden box having lock and key arrangement. The acrylic cover is fitted on PCB to safeguard parts. It works on 230 V AC Supply.

EXPERIMENTS

A. Theory Experiments for Raspberry PI

1. To understand theory and working of Raspberry
2. To understand Operating System for Raspberry
3. To understand Communication Protocols - UART, I2C, SPI, RS232 and RS485.
4. To understand USB Interface for Raspberry PI
5. To understand Ethernet Cable Interface for Raspberry PI
6. To understand micro SD Card Interface for Raspberry PI
7. To understand that how to connect 20 x 4 LCD Display to Raspberry PI
8. To understand theory of I2C Channel
9. To understand theory of Port Forwarding with Static IP

B. Theory Experiments of Arduino

10. To understand theory and working of Arduino UNO.
11. To understand 20 x 4 LCD Display
12. To connect Arduino to 20 x 4 LCD Display.

C. Theory Experiments for ESP32 Microcontroller

13. To understand theory and working of ESP32
14. To understand Operating System for ESP32
15. To understand Communication Protocols - UART, I2C, SPI, RS232 and RS485.
16. To understand USB Interface for ESP32
17. To understand that how to connect 20 x 4 LCD Display to ESP32

D. Theory Experiments for Sensors

1. To understand theory and working of Serial Monitor and LED
2. To understand theory and working of Servo Motor
3. To understand theory and working of joystick.
4. To understand theory and working of Ultrasonic sensor
5. To understand theory and working of LDR Sensor
6. To understand theory and working of Alarm
7. To understand theory and working of Temperature and Humidity Measurement
8. To understand theory and working of PIR sensor
9. To understand theory and working of IR sensors
10. To understand theory and working of Stepper motor
11. To understand theory and working of ThingSpeak
12. To understand theory and working Blynk app
13. To understand theory and working of HTTP, webpage and Server
14. To understand theory and working of MQTT Protocol
15. To understand theory and working of UAV and Drone

E. Practical Experiments

1. Serial Monitor, LED, Servo Motor - Controlling

1. To control actuators through Serial Monitor, create different LED patterns and control them using push button switches using Arduino

   To control Servo Motor with the help of joystick using Arduino.

2. Distance Measurement of an object

2. To calculate the distance to an object with the help of an ultrasonic sensor and display it on a 20 x 4 LCD using Arduino.

3. DR Sensor, Alarm and temperature, humidity measurement

3. To control Relay state based on ambient light levels using LDR sensor.

   To make Basic Burglar alarm Security System with the help of PIR sensor and Buzzer.

   To display Humidity and Temperature values on 20 x 4 LCD

4. Experiments using Raspberry Pi

4. To controlling relay state based on input from IR sensors using ESP32 and Raspberry

   To interface Stepper Motor with Raspberry PI Microcontroller

   To make advanced burglar alarm security system with the help of PIR sensor, buzzer and keypad, where alarm gets disabled if correct keypad password is entered with Raspberry PI

   To make automated LED light control based on input from PIR i.e to detect if people are present using LDR - ambient light level with Raspberry PI

5. IOT Framework

5. To upload Humidity & Temperature data to ThingSpeak or Sigma Server, periodically logging ambient light level to ThingSpeak or Sigma Server

6. To control LEDs, Relay & Bbuzzer using Blynk app

6. HTTP Based

7. To control various digital based actuators i.e Led, Buzzer and Relay from a simple web page using ESP32 and HTTP. Hosting and Server

8. To Display various sensor readings on a simple web page hosted on the ESP32 Server

7. MQTT Based

9. To control LEDs and Motors from an Android or Web app,

   To control AC Appliances from an Android or Web app with the help of relay.

10. To display Humidity and Temperature data on a web-based application

8. UAV/Drone

11. To demonstrate UAV Elements and Flight Controller using small Drone

    To make Mission Planner flight planning design using Drone

12. To make Python program to read GPS coordinates from Flight Controller