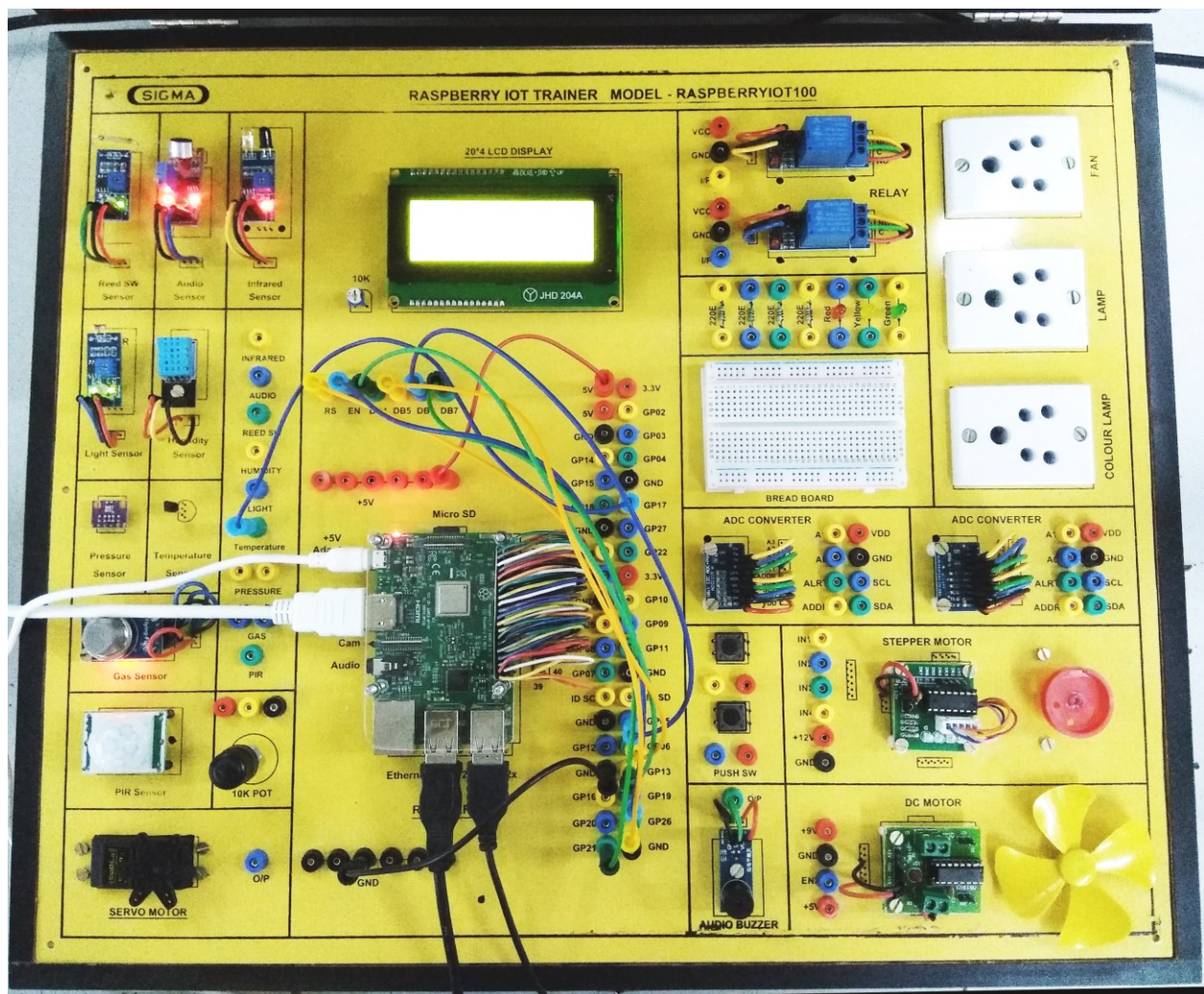




INTERNET OF THINGS TRAINER MODEL IOT100-HY-19A05701P

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



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. Temperature Sensor LM35
2. Humidity Sensor DHT11
3. Light Sensor LDR
4. CO Sensor
5. PM2.5 Dust Sensor
6. O2 Sensor
7. PH Sensor
8. Water Level Sensor
9. PIR Motion sensor
10. 2 Channel Relay

3. Gateway & Nodes

1. Bluetooth wireless module
2. ESP32 Wireless Module
3. 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 |
| 6. | Jumper wires | : 50 Nos. |
| 7. | Pen Drive 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 and Bluetooth Wireless Module

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
18. To understand theory and working of Bluetooth Wireless Module

D. Theory Experiments for Sensors

1. To understand theory and working of Temperature Sensor LM35
2. To understand theory and working of Humidity Sensor DHT11
3. To understand theory and working of Light Sensor LDR
4. To understand theory and working of CO Sensor
5. To understand theory and working of PM2.5 Dust Sensor
6. To understand theory and working of O2 Sensor
7. To understand theory and working of PH Sensor
8. To understand theory and working of Water Level Sensor
9. To understand theory and working of PIR Motion sensor
10. To understand theory and working of 2 Channel Relay
11. To understand theory and working of HTTP, webpage and Server
12. To understand theory and working of MQTT Protocol

E. Practical Experiments

1. To Control LED ON and OFF using Raspberry Board
2. To read data from an Analog sensor like LM35 and display its value on 20 x 4 LCD display
To read data from an Digital sensor like DHT11 and LDR and display its value on 20 x 4 LCD display
3. To send Sensor data like DHT11 and LDR to main station using Bluetooth wireless module
4. To transmit and receive Sensor data like DHT11 and LDR using ESP32 TX and RX on same Local Area Network.
5. To create any cloud platform account on Sigma Server or AWS Server
6. To send and display Sensors Data in a Sigma Cloud server Web Page using HTTP, Java and PHP Code
7. To control Home Light and Fan remotely using a Website Page using IOT Cloud
8. To send Sensors data to IOT Cloud and store them into MySQL Server for any data analytics or visualization services.
9. To receive and show Sensors data on Android based Mobile App made by yourself
To change Brightness of LED light remotely using Mobile App and IOT server
10. To design an IoT based Air Pollution Control System which monitors the air pollution by measuring CO, PM2.5 Dust, Ammonia etc and gives alarm or sends message when the pollution level is more than permitted range.
11. To design an IoT based system which measures the physical and chemical properties of the water like PH value, Water Level etc and displays the measured values on 20 x 4 display.
12. To identify a problem in your local area or college which can be solved by integrating the things you learned and create a prototype to solve it - Mini Project – e.g to check and display attendance of Students using IOT sensors like PIR motion sensor
13. To design a business model canvas for a digital display using IOT i.e to display Total 9 different data of a business like Key partners, Key activities, Key resources, Value propositions, Customer relationships, Channels, Customer segments, Cost structure, Revenue streams etc.