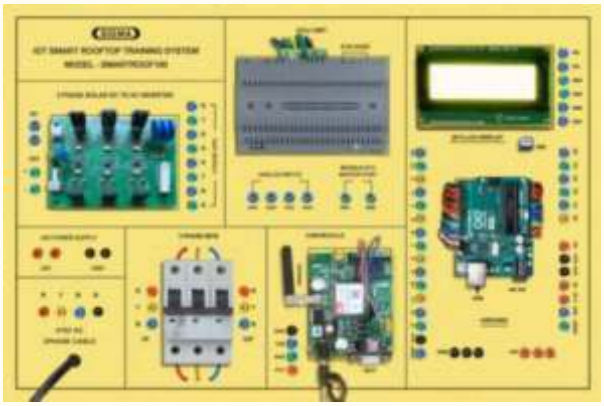
IOT BASED SMART ROOF TOP / SOLAR PUMP SYSTEM (APPLICATION PROJECT) MODEL-SMARTROOFTOP100

This trainer has been designed with a view to provide practical and experimental knowledge Sensors programing for IoT Smart Roof Top System for 3 Phase street Lighting system with Arduino IOT Board.



SPECIFICATIONS

(1) Hardware

Following Hardware is assembled on Single PCB of size - 18 Inch x 15 Inch

1. Arduino Microcontroller Board

1. Arduino Uno Microcontroller board based on the ATMEGA328P
2. 14 Digital Input / Output pins (of which 6 provide PWM output)
3. 16 MHz Ceramic Resonator
4. USB Port
5. Power Jack – 9V DC, 1A

2. Data Concentrator Unit - DCU

1. IoT based Energy Monitoring Data Concentrator Unit (DCU) for Three Phase 415 VAC input
2. Two RS485 MODBUS Communication Device with Ethernet Port
3. Four Analog Inputs (24-bit ADC, 0.1%FSR) for integration of weather sensors
4. SD Card Storage – 16 GB
5. Four Analog Inputs (24-bit ADC, 0.1%FSR) for integration of Weather sensors
6. Remote GSM/GPRS connectivity using Quad Band GSM/GPRS Module

Sigma Trainers and Kits
E-113, Jai Ambe Nagar,
Near Udgam School,
Thaltej,
AHMEDABAD - 380054.
INDIA.

Phone(O): +91-79-26852427
Phone(F): +91-79-26767512
Mobile : +91-9824001168
Email : sales@sigmatrainers.com
: drluhar@gmail.com
Web : www.sigmatrainers.com

Dealer:-

3. Sensors & Other Components

1. Temperature and Humidity Sensor DHT22
2. Air Quality Detection Sensor - PM2.5
3. UV Index Sensor
4. Atmospheric Pressure Sensor - BMP180
5. Solar Panel - 40W
6. Solar Battery Charger with 400 to 700V DC MPPT
7. DC Battery - 24 V / 26 AH
8. 3 Phase Solar DC to AC Inverter
9. 3 Phase Digital Energy Meter MFM376
10. 3 Phase 415V MCB
11. Serial TTL to RS485 Converter – for RS Communication Port
12. Single Channel Relay for switching of streetlight
13. SMC box with IP65 and IK10 ratings

4. Modules and Hardware:

1. 20 X 4 - LCD Display
2. Quad Band GSM/GPRS Module – 2.4 GHz
3. ESP32 Wifi Module
4. 2 mm interconnection Sockets

5. Web Application

1. Responsive Web application for Smart Energy management system having with map view based dash board and individual system details.
2. Various energy management reports such as Load Profile, Consumption Pattern, Generation Pattern, %CUF (Capacity Utilization Factor), %PR (Performance Ratio) etc.

2. Accessories

1.	Memory card	: 32 GB SD Card
2.	USB Cable	: 2 No
3.	Micro USB to USB cable for ESP32	: 1 No
4.	Ethernet Cable	: 1 No
5.	HDMI Cable	: 1 No
6.	Power Supply Adaptor	: +9V DC, 1A
7.	Jumper wires	: 50 Nos.
8.	Pen Derive with Software, Library, Driver, Codes, Soft Copy of Manual and Mobile App	: 16 GB
9.	Printed Practical Manual	: 1 No.
10.	E-Books for IOT Subject	: 10 Nos. in PDF Format
11.	Excitation accessories for each sensor 230V AC Bulb	

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 Arduino Board

1. To understand theory and working of Arduino Operating software.
2. To understand Pin and Connection Diagram of Arduino.
3. To understand USB Interface for Arduino.
4. To understand 20 x 4 LCD Display.

B. Theory of ESP32 Wireless Module

5. To understand theory and working of ESP32
6. To understand Operating System for ESP32
7. To understand Pin and Connection Diagram of ESP32
8. To understand USB Interface for ESP32

C. Theory Experiments for Sensors and Modules

9. To understand theory of Temperature and Humidity Sensor
10. To understand theory of Air Quality Detection Sensor - PM2.5
11. To understand theory of UV Index Sensor
12. To understand theory of Atmospheric Pressure Sensor - BMP180
13. To understand theory of Door Sensor
14. To understand theory of LDR Sensor
15. To understand theory of Single Channel Relay
16. To understand theory of Serial TTL to RS485 Converter – for RS Communication Port
17. To understand theory of Solar Panel - 40W
18. To understand theory of Solar Battery Charger with 400 to 700V DC MPPT
19. To understand theory of DC Battery - 24 V / 26 AH
20. To understand theory of 3 Phase Solar DC to AC Inverter
21. To understand theory of 3 Phase Digital Energy Meter MFM376
22. To understand theory of 3 Phase 415V MCB
23. To understand theory of GSM/GPRS Module – 2.4 GHz

D. Practical Experiments

24. To measure Air Temperature and Humidity using sensor
25. To measure UV Index of solar rays using Index Sensor
26. To measure Atmospheric Pressure using Atmospheric Pressure Sensor - BMP180
27. To measures Air Pollution Detection using PM2.5-PM10 Dust Sensor
28. To generate 24V DC using Solar Panel, DC Battery and Solar Charger
29. To generate 230V AC 3 Phase using Solar DC to AC Inverter
30. To make Street lights ON and OFF at required time.
31. To make Street lights ON and OFF with Sunset and Sunrise time automatically
32. To measure Energy units used using 3 Phase Energy meter
33. To log all events in Storage Card
34. To acquire Sensors data using GPRS IOT Data Acquisition using GPRS Port
35. To derive various energy management reports such as Load Profile, Consumption Pattern, Generation Pattern, %CUF (Capacity Utilization Factor), %PR (Performance Ratio) etc

D. Server, Cloud Configuration, IOT Gateway, Nodes and Mobile App Experiments

36. To send Weather and Light Sensors data by SMS to Mobile using GSM IOT Gateway
37. To send Weather and Light Sensors data using Wifi Wireless Node to Main Base IOT Receiver
38. To send and display Weather and Light Sensors data a server Web Page
39. To send Weather and Light Sensors data to website webpage and store them into MySQL Server
40. To receive and show Weather and Light Sensors data on Android based Mobile App
41. To send and display Weather and Light Sensors data on website Smart Dashboard on a server