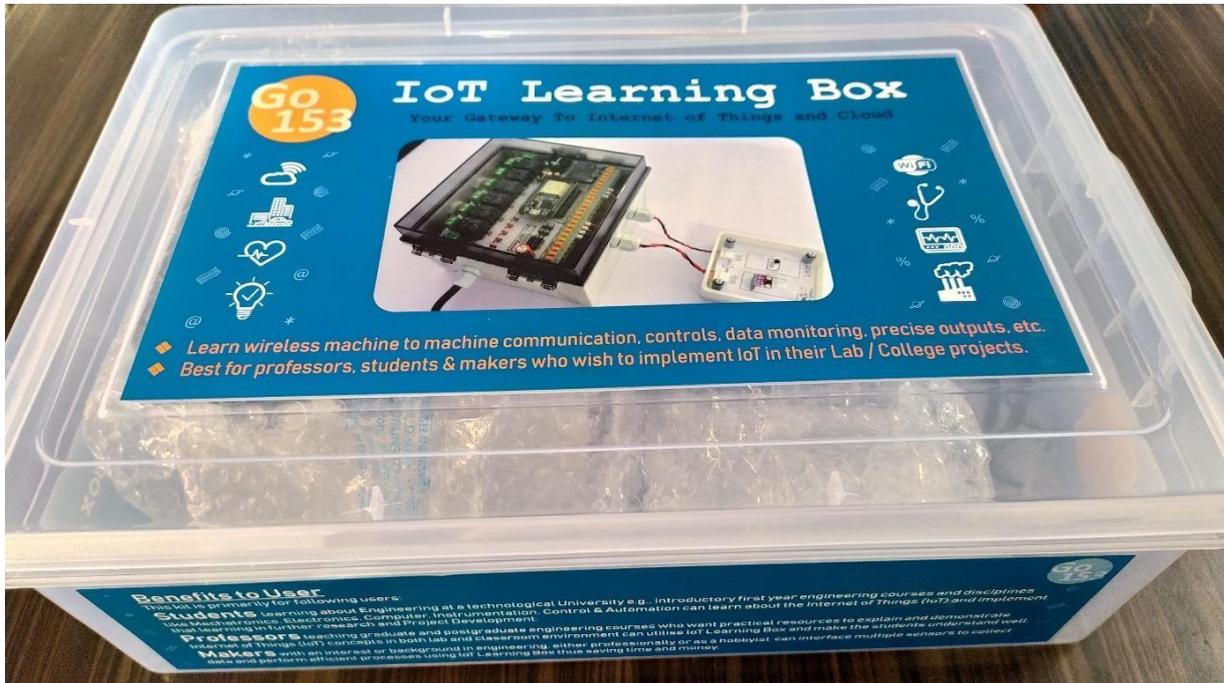


IoT Learning Box

Platform with AICTE approved experiments on
Internet of Things
(Hardware + Online Training Content)



Introduction

The IoT Learning Box is the ideal solution for university students, providing state-of-the-art, hands-on incorporation of IoT technology in an educational setting. It supports a lot of features which enables researchers and students to explore different aspects and develop different applications in the IoT field. The most popular protocols used for the realization of IoT are MQTT, TCP, UDP, Bluetooth and HTTP. Sensors used with the IoT Learning Box are the building blocks of the system which can collect values of different parameters. On-Board Micro-Controller ESP32 transmits information to our IoT cloud Platform. This platform will make the values of collected parameters available over the internet so that they are globally accessible.

Recommended for:

- **Students** learning about Engineering at a technological University/ institute
- **Professors** teaching graduate and postgraduate engineering courses
- **Makers & Hobbyist**

Features

- We can use the IoT Learning Box for various mini and major projects as it has 36 i/o pins. One can easily add other components or modules to it.
- Works on Standard 230V AC Power Outlet (No separate power source needed)
- Easily accessible hinged door box that is rust free, splashproof and shockproof.

- Uses Robolab's IoT cloud Platform for data collection, processing, visualization, and device management.
- Built in WIFI and Bluetooth Connectivity.
- It uses industry standard IoT protocol - MQTT for device Connectivity
- IoT Learning box consume ultra-low power for its functioning.
- We can also use IoT Learning Box for Commercial Use.
- Sensor Modules:
 - **Patient Monitoring Module:** SPI based pulse oximeter heart rate sensor and temperature sensor. High sample rate capability & fast data output capability
 - **Air Pollution Monitoring Module:** Dust sensor (enable to distinguish smoke from house dust), gas sensors (sensitivity to Benzene steam, alcohol, smoke and carbon monoxide), a temperature sensor (calibrated directly in °Celsius)
 - **IR Sensor Module:** Infrared rays-based sensor consisting of IR IC
 - **HT Sensor module:** Digital sensor used for reading temperature and humidity readings
- In addition to the state-of-the-art, high-quality hardware provided, after registering online, students will have access to a dedicated e-learning platform and other learning materials.

Learning Objectives include, but are not limited to the following:

- Connect Robolab's IoT cloud Platform to the ESP32 Micro-Controller, for reading data from connected sensors and actuating peripheral devices.
- Learn to use Robolab's IoT cloud Platform for data logging, processing, visualization, and device management.
- Interfacing ESP32 Microcontroller to analyze and visualize data from Arduino IDE
- Study behavior and dynamics of wireless sensor networking
- Micro Controller ESP32 Programming using Embedded C language
- Exchange of data between publisher and subscriber through MQTT Protocol

AICTE Approved Experiments

All the experiments suggested by AICTE in IoT Syllabus can be performed using IoT Learning Box. Link : <https://www.robolab.in/list-of-practicals-for-internet-of-things-iot/>

1. Familiarization with Arduino and perform necessary software installation.
2. To interface LED with Arduino and write a program to turn ON LED for 1 sec after every 2 seconds.
3. To interface Digital sensor (IR) with Arduino and write a program to turn ON LED at sensor detection.
4. To interface DHT11 sensor with Arduino and write a program to print temperature and humidity readings.

5. To interface motor using relay with Arduino and write a program to turn ON motor at sensor detection.
6. To interface OLED with Arduino and write a program to print temperature and humidity readings on it.
7. To interface Bluetooth with Arduino and write a program to send sensor data to smartphone using Bluetooth.
8. To interface Bluetooth with Arduino and write a program to turn LED ON/OFF when '1'/'0' is received from smartphone using Bluetooth.
9. Write a program on Arduino to upload temperature and humidity data to Robolab's IoT cloud Platform.
10. Write a program on Arduino to retrieve temperature and humidity data from Robolab's IoT cloud Platform.
11. Write a program on Arduino to publish temperature data to MQTT broker.
12. Write a program on Arduino to subscribe to MQTT broker for temperature data and print it.
13. Write a program to create TCP server on Arduino and respond with humidity data to TCP client when requested.
14. Write a program to create UDP server on Arduino and respond with humidity data to UDP client when requested.

IoT Learning Box Exclusive Experiments:

- **Home Automation:** Home Automation is the project based on IoT to remotely control and program the appliances in your home. It can be useful in detecting and avoiding thefts.
- **Patient Monitoring System:** Patient Monitoring system identifies health problems. The patterns of heart rate, pulse, digestive system, and blood pressure can be monitored and diagnosed for anomalies. The information can be sent to the doctor for analysis. This system will be very useful to senior citizens and disabled people who live independently.
- **Air Pollution Monitoring System:** This experiment detects Air pollution. We can monitor the emissions from factories and vehicles to minimize air pollution.

