Shobhit

Institute of Engineering & Technology

Deemed to-be-University

EDUCATION EMPOWERS

Topics

- Purpose
- Birth of IoT
- Introduction to IoT
- How IoT works
- Latest Advances and Applications of IoT
- Raspberry Pi
- IoT Training at Shobhit University IoT lab, Meerut.
- IoT Projects made by the Students at Shobhit University.

Purpose

- This workshop introduces you to the amazing world of IoT and its fascinating applications and how it contributes to the technology advancement.
- Brief of the Quality IoT training we are providing to the students at Shobhit University, Meerut.

Birth of IoT

- The term “The Internet of Things” (IoT) was coined by **Kevin Ashton** in a presentation to Proctor & Gamble in 1999. He is a co-founder of MIT’s Auto-ID Lab.
- He pioneered RFID (used in bar code detector) for the supply-chain management domain. He also started Zensi, a company that makes energy sensing and monitoring technology.

Introduction to IoT

- Internet of Things, or IoT in short, is the idea of making devices and objects smarter by linking them to the internet.
- IoT is creating a giant network where all the devices are connected to each other and providing them with the capability to interact with each other. This is driving the automation to a next level where devices will communicate with each other and make decisions on their own without any human interventions.

Introduction to IoT

"In the near future, our everyday lives will be more and more filled with intelligent, connected objects. They will appear in our homes, in our working environments and in the cities we live in as well as travel with us everywhere we go in the form of wearables, smart clothing and things we cannot even imagine right now. This development is called the internet of things, IoT."

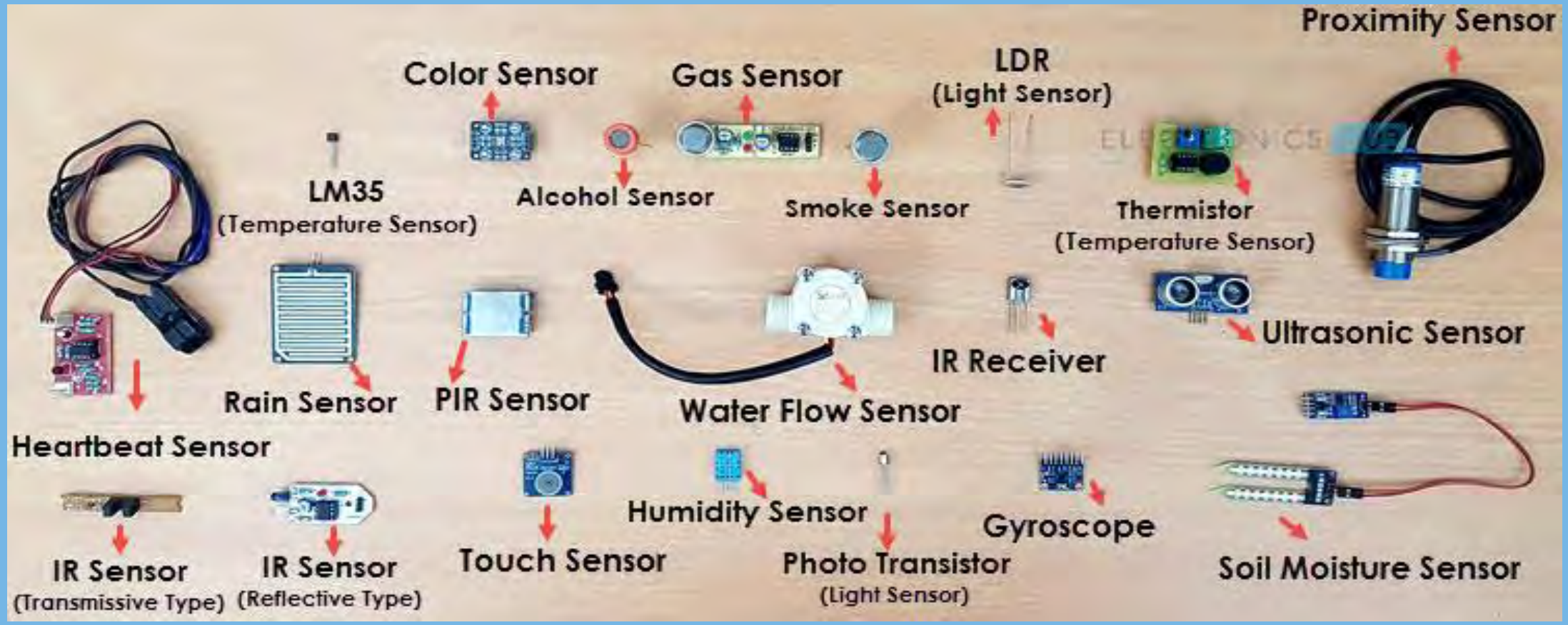
How IOT Works ?

- A complete IoT system integrates four distinct components:
  - Sensors/devices.
  - Connectivity.
  - Data processing
  - A user interface.

- let’s briefly explain each component and what it does.

How IOT Works ?

Sensors/ Devices



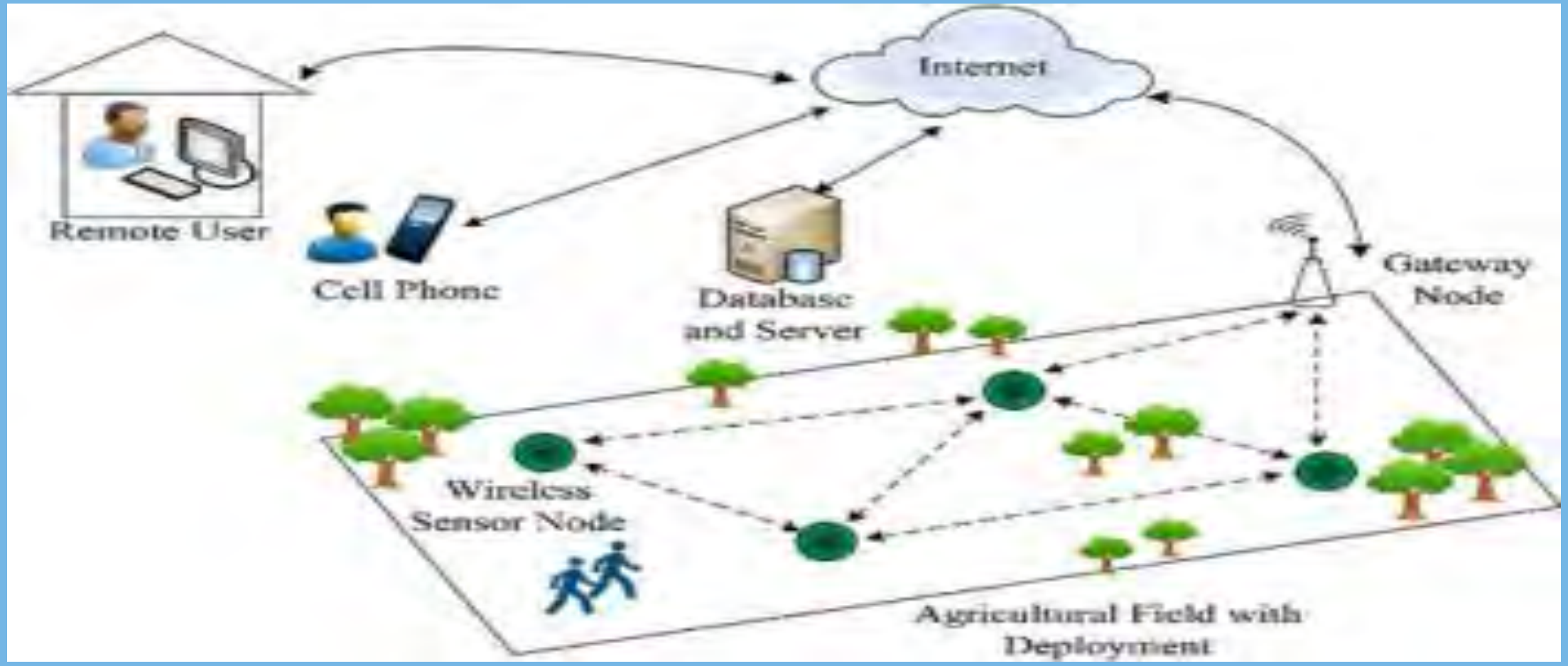
How IOT Works ?

Sensors/ Devices

- First, sensors or devices collect data from their environment. This could be as simple as a temperature reading or as complex as a full video feed.
- I use “sensors/devices,” because multiple sensors can be bundled together or sensors can be part of a device that does more than just sense things. For example, your phone is a device that has multiple sensors (camera, accelerometer, GPS, etc), but your phone is not *just* a sensor.
- However, whether it’s a standalone sensor or a full device, in this first step data is being collected from the environment by *something*.

How IOT Works ?

Connectivity



How IOT Works ?

Connectivity

- Next, that data is sent to the cloud, but it needs a way to get there!
- The sensors/devices can be connected to the cloud through a variety of methods including: cellular, satellite, WiFi, Bluetooth, low-power wide-area networks (LPWAN), or connecting directly to the internet via ethernet.
- Each option has tradeoffs between power consumption, range and bandwidth. Choosing which connectivity option is best comes down to the specific IoT application, but they all accomplish the same task: getting data to the cloud.

How IOT Works ?

Data Processing

- Once the data gets to the cloud, software performs some kind of processing on it.
- This could be very simple, such as checking that the temperature reading is within an acceptable range. Or it could also be very complex, such as using computer vision on video to identify objects (such as intruders in your house).
- But what happens when the temperature is too high or if there *is* an intruder in your house? That's where the user comes in.

How IOT Works ?

User Interface

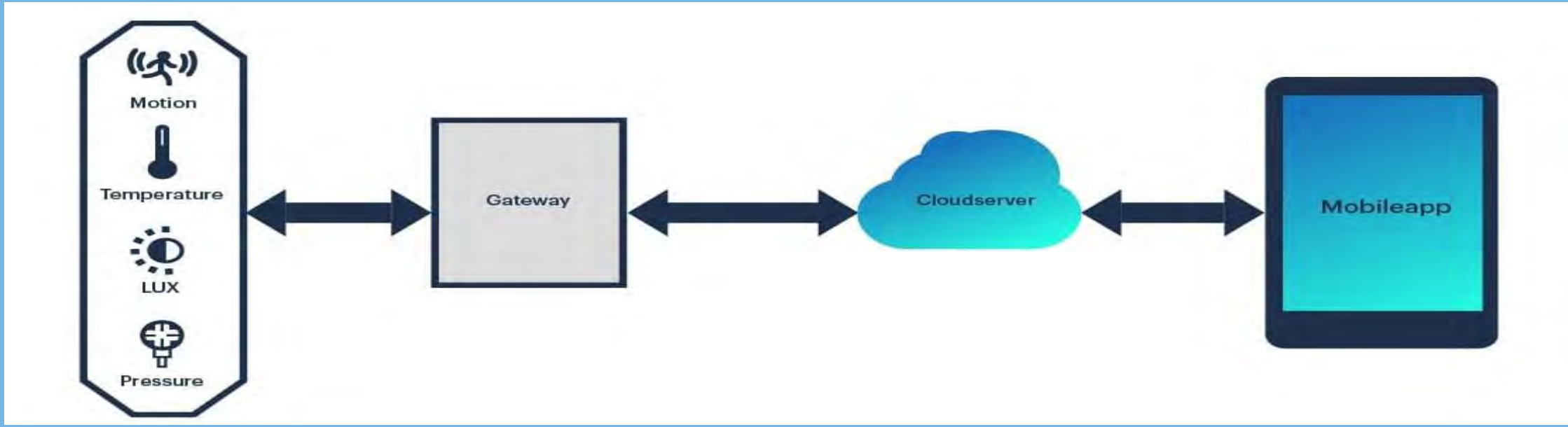
How IOT Works ?

User Interface

- Next, the information is made useful to the end-user in some way. This could be via an alert to the user (email, text, notification, etc). For example, a text alert when the temperature is too high in the company's cold storage.
- Also, a user might have an interface that allows them to proactively check in on the system. For example, a user might want to check the video feeds in their house via a phone app or a web browser.
- However, it's not always a one-way street. Depending on the IoT application, the user may also be able to perform an action and affect the system. For example, the user might remotely adjust the temperature in the cold storage via an app on their phone.
- And some actions are performed automatically. Rather than waiting for you to adjust the temperature, the system could do it automatically via predefined rules.

How IOT System actually Works ?

- An IOT system consists of sensors/devices which “talk” to the cloud through some kind of connectivity.
- Once the data gets to the cloud, software processes it
- After processing, it might decide to perform an action, such as sending an alert or automatically adjusting the sensors/devices without the need for the user.

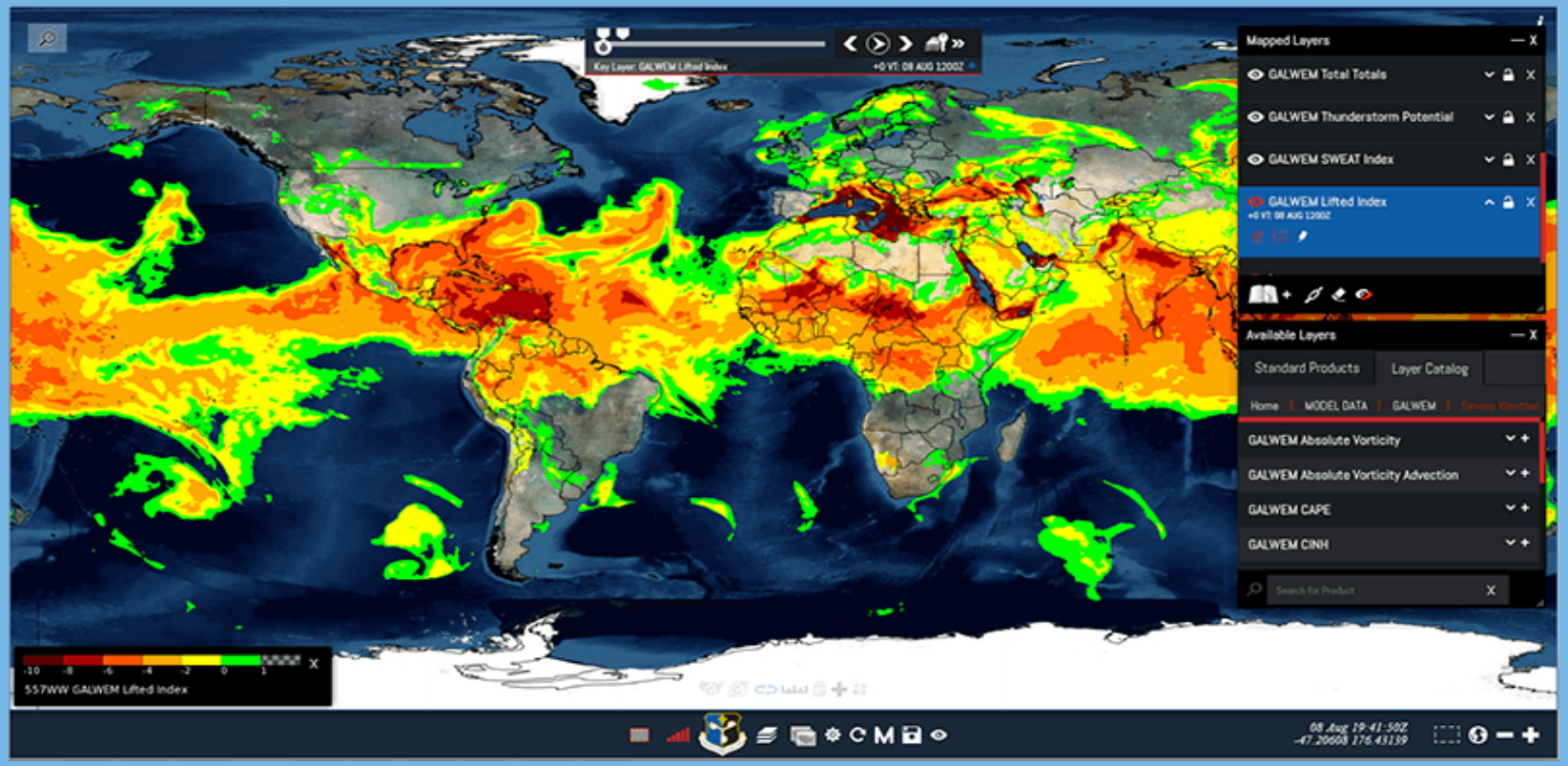


Latest Advances and Applications of IOT

- The IoT, along with artificial intelligence, machine learning and cloud technology, has been one of the most important trends in high-tech over the past couple years
- Let’s focus on current advancements in the world of the IoT,

Natural Disaster Management with IoT

- The Internet of Things platform can be used to accumulate data related to a specific geographic location using remote monitoring tools and perform analytics so that early warnings of a disaster can be found out.



Better Health-Care with IoT

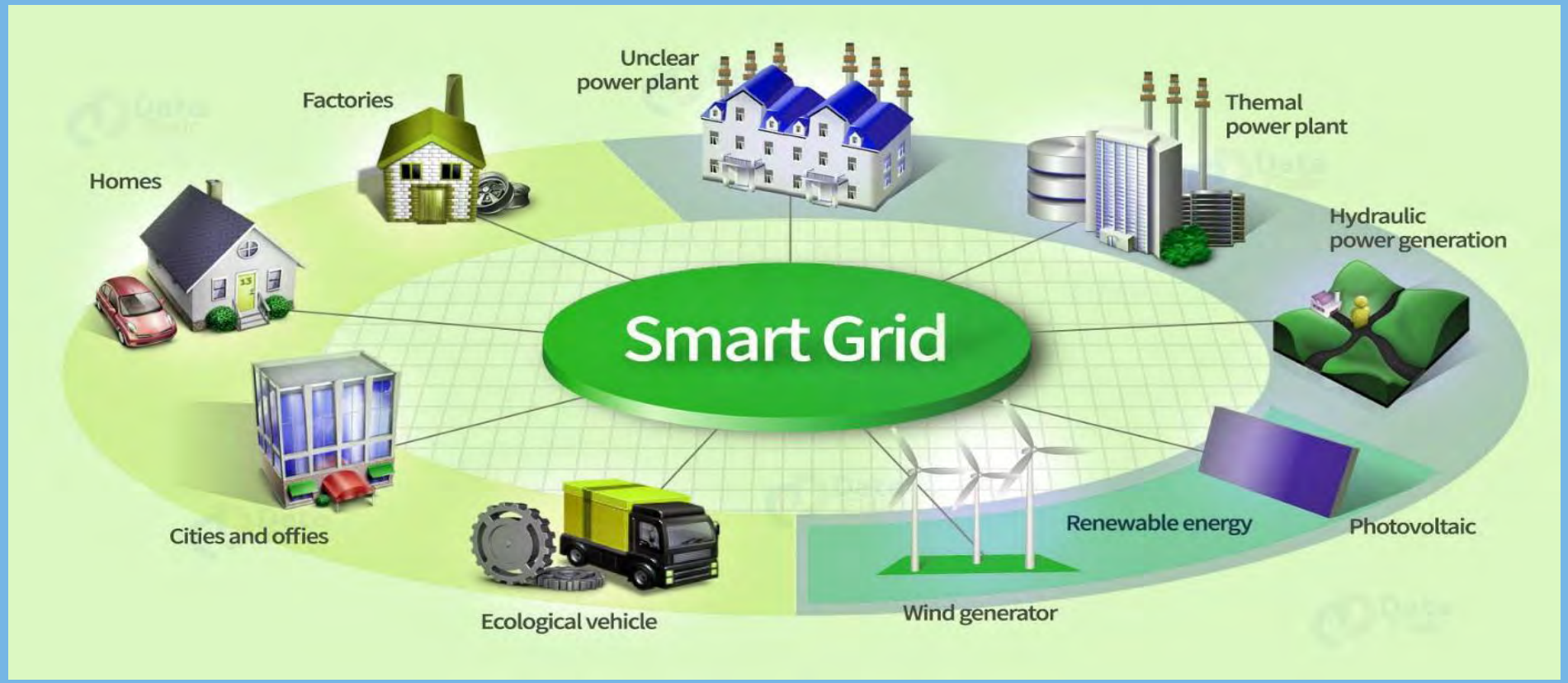
- IoT can have a major impact when it comes to remote health monitoring. Even though the patient is on the move, his vitals can be continuously sent to the doctors with the help of IoT platform.

Smart Farming with IoT

- The task of irrigation can be automated with the help of IoT. A set of sensors such as light, humidity, temperature can be used to continuously monitor the field conditions.

Smart energy management with IoT

- With small grids, energy distribution can be optimized. These grids also keep collecting real-time data which helps in distributing electricity efficiently and also to reduce the outages.



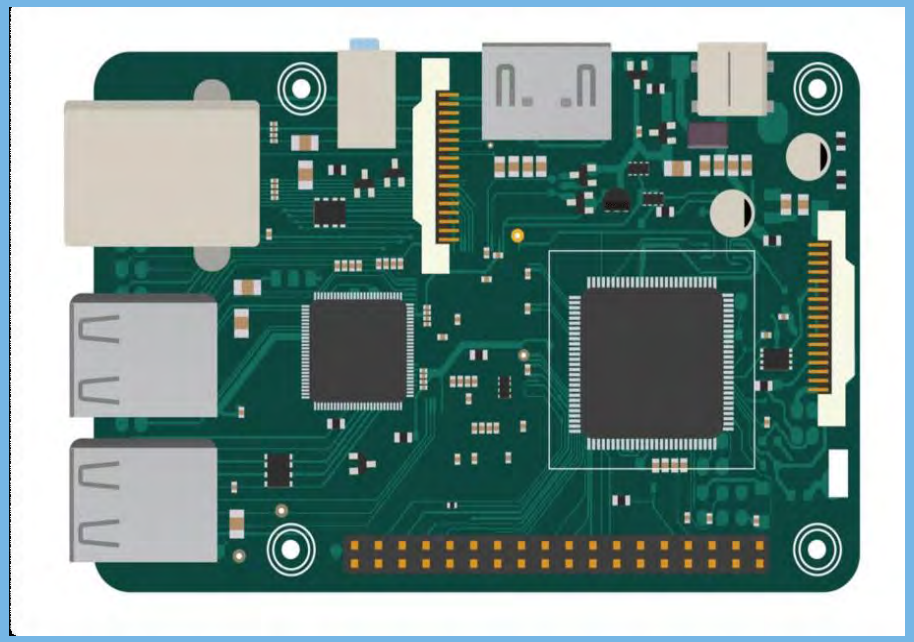
Pollution Control with IoT

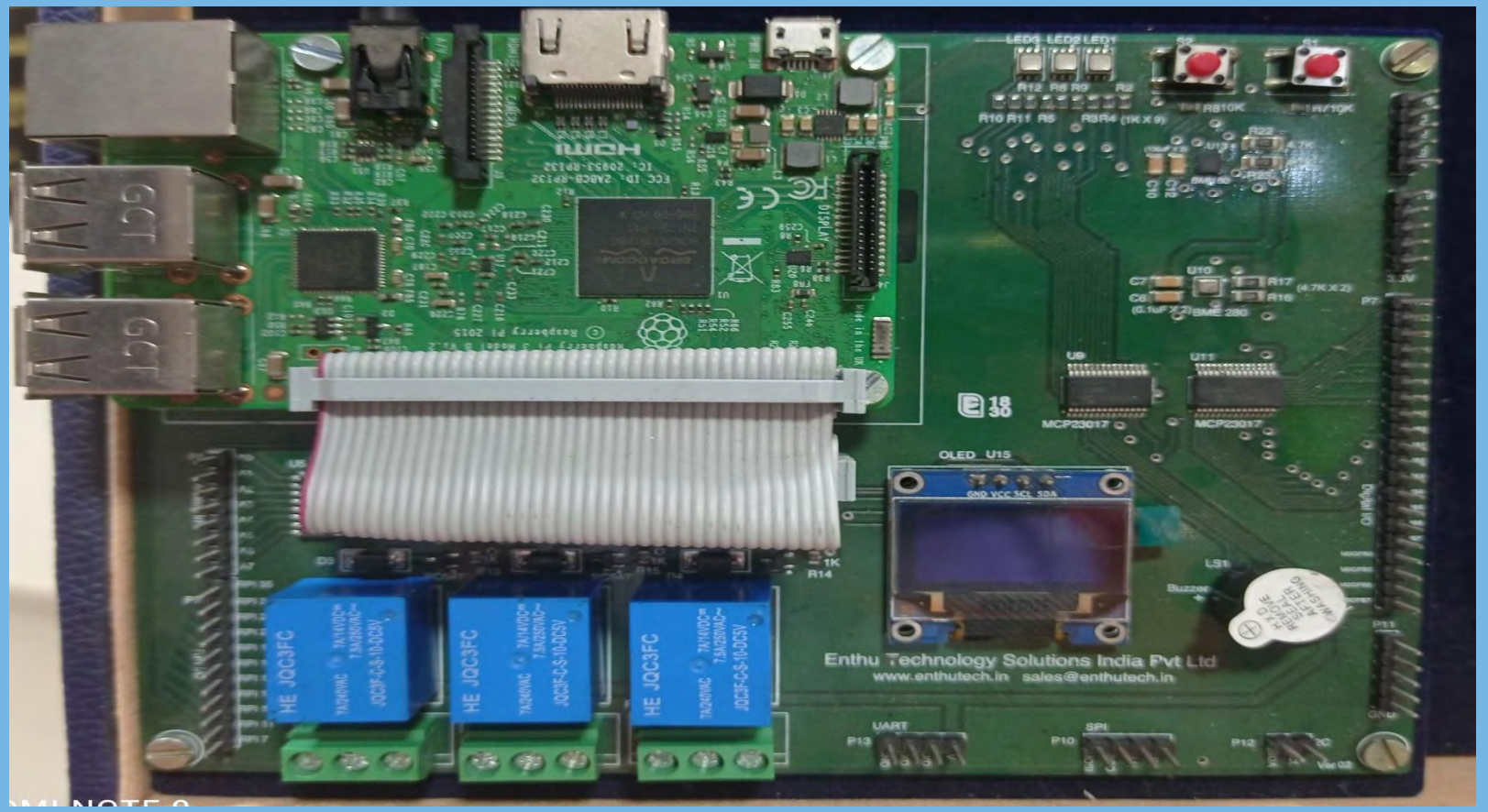
- The IoT platform helps us to continuously monitor the air quality and water quality. This data will be sent to the cloud, where further analytics can be performed so that a proper action can be taken to control pollution.

What is Raspberry Pi ?


The Raspberry pi is a credit card sized computer

Raspberry Pi

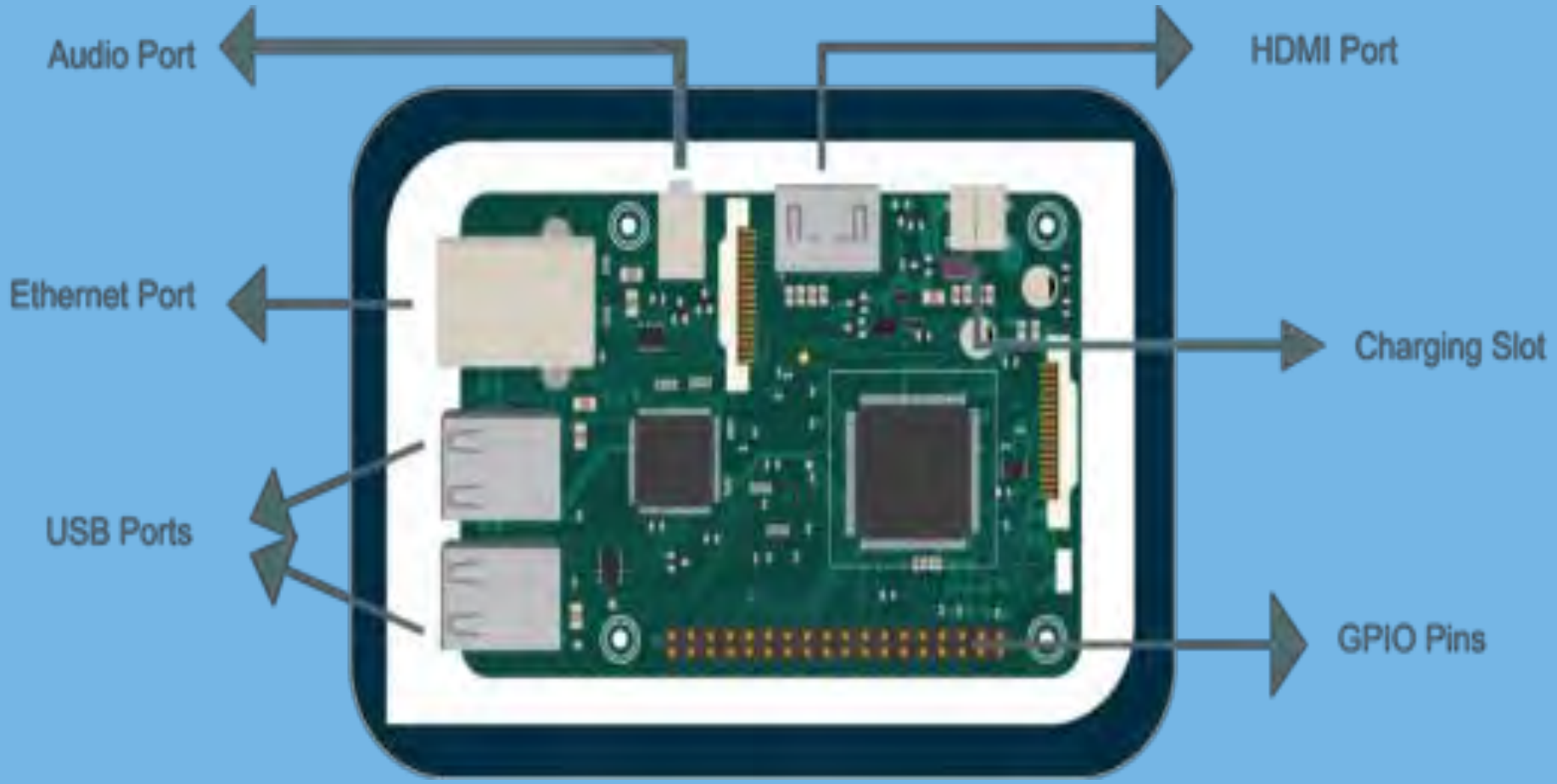




Raspberry Pi

- it’s a fully functional credit-card sized computer which can be plugged into a monitor.
- 64 bit, quadcore, 1.2 GHz, 1GB inbuilt RAM.
- Noobs : Modified version of Linux.
- Since Raspberry Pi is a fully functional computer, we can perform various task just like we do in our computers.

Let’s have a look at the different components of the Raspberry Pi 3 – B model:



How Raspberry Pi is different from Arduino ?

- An Arduino is a microcontroller motherboard. A microcontroller is a simple computer that can run one program at a time, over and over again. It is very easy to use.
- A Raspberry Pi is a general-purpose computer, usually with a Linux operating system, and the ability to run multiple programs. It is more complicated to use than an Arduino.

What would I use each for?

- An Arduino board is best used for simple repetitive tasks: opening and closing a garage door, reading the outside temperature and reporting it to Twitter, driving a simple robot.

For example: I want to monitor my plants and have them Tweet me when they need water." That can best be done by an Arduino.

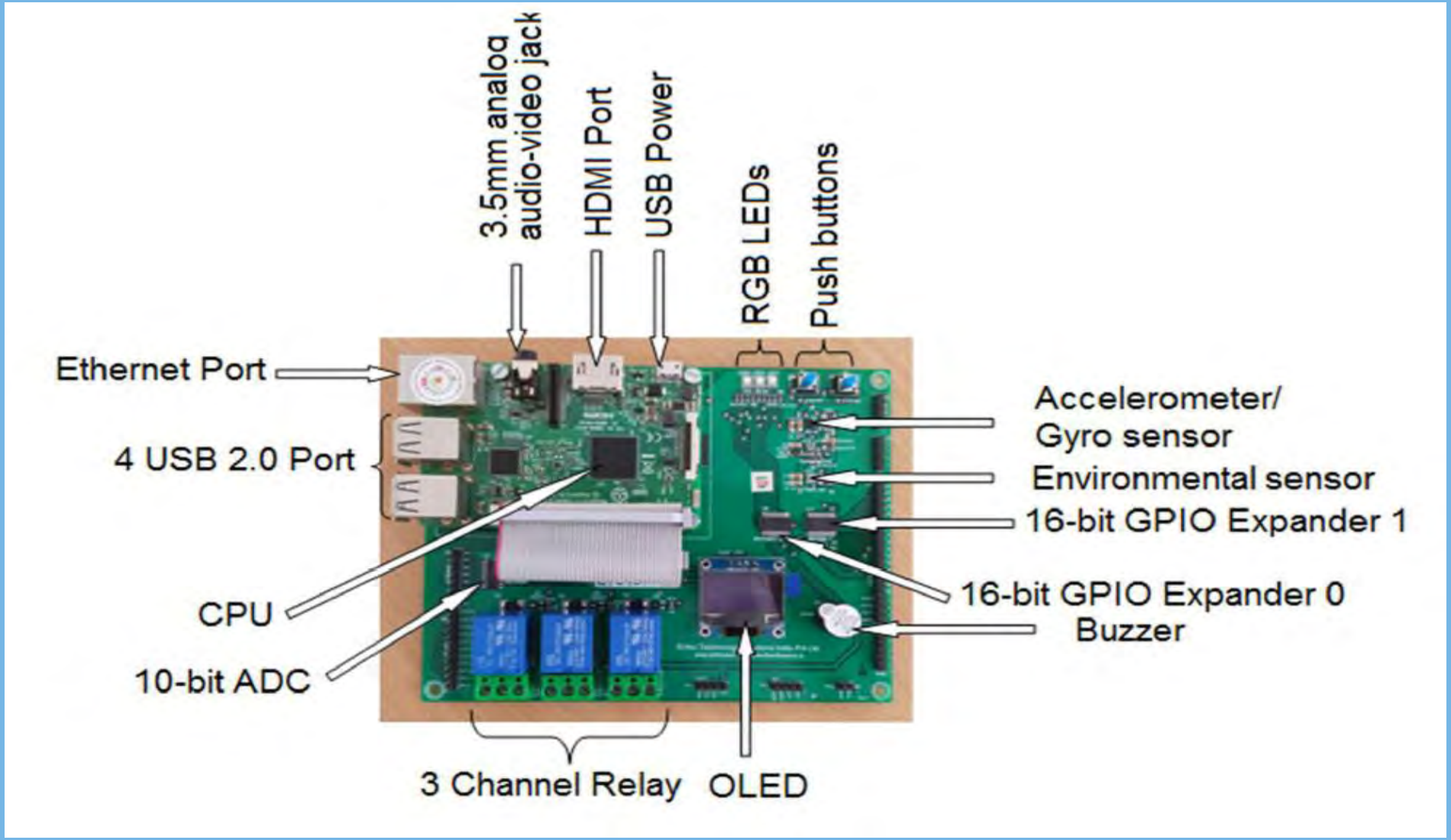
- Raspberry Pi is best used when you need a full-fledged computer: driving a more complicated robot, performing multiple tasks, doing intense calculations (as for Bitcoin or encryption)

For example: "I want to monitor my plants and have them Tweet me when they need water and check the National Weather Service, and if the forecast is for fair weather, turn on the irrigation system and if the forecast is for rain, do nothing." That would best be handled by a Raspberry Pi.

IoT lab at Shobhit University, Meerut

- Raspberry pi3 model B+ (Latest and on the board).
- 64 bit, quadcore, 1.2 GHz, 1GB inbuilt RAM.
- Noobs : Modified version of Linux.

IoT lab at Shobhit University, Meerut



Topic covered in Training

- Introduction to Raspberry and Python.
- Introduction to ETS tool Kit.
- **Onboard experiments:**
  - LED blinking
  - Switch interfacing
  - Buzzer interfacing
  - OLED interfacing O
  - Onboard sensors (temperature, pressure, humidity, accelerometer).
- **Off board experiment:**
  - Digital sensor interfacing
  - Analog sensor interfacing.
- Data monitoring using thingspeak cloud.
- Data monitoring using thingview mobile application.
- Device Control using IOT mobile application.

Sensors used in the IoT Lab

Onboard Sensors:

Inertial Sensors:

- Accelerometer (measure proper acceleration)
- Gyroscope (angular rate, mobile phone orientation, altitude and position of aircraft)

Environment Sensors:

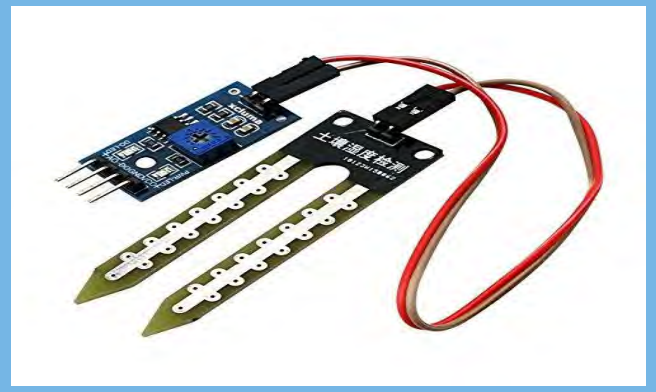
- Temperature
- Humidity
- Pressure (measure pressure, weather monitoring)

Sensors

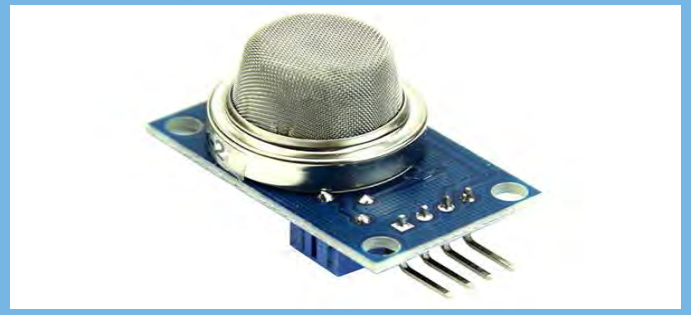
External Sensors:

1. Ultrasonic senor

2. Soil Moisture Sensor



3. Gas Sensor

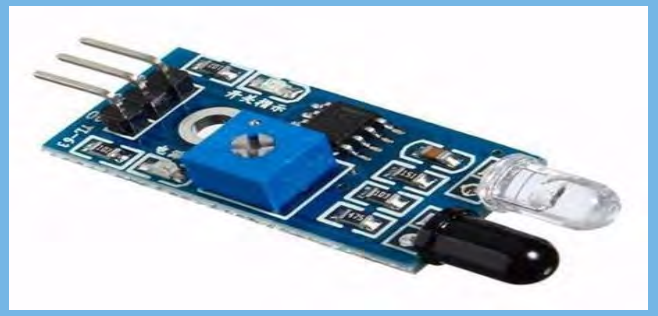


4. Flex sensor (bend of a surface)

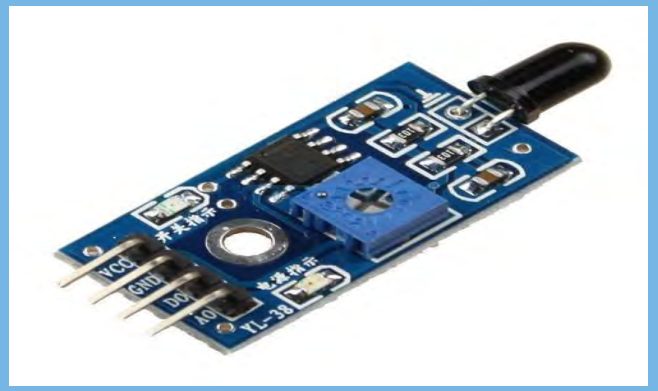
Sensors

External Sensors:

5. IR senor

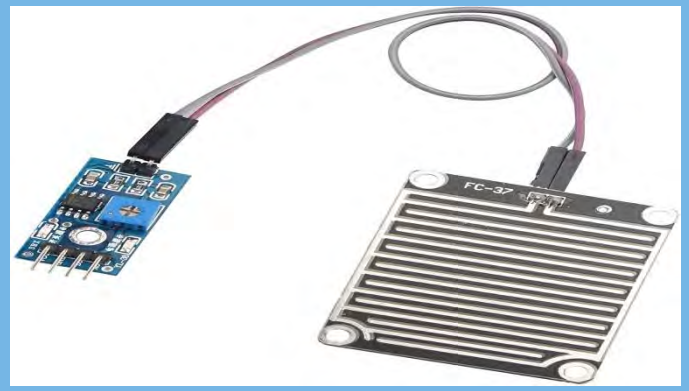


6. Fire Sensor



7. LM35 Sensor (Temperature sensor)

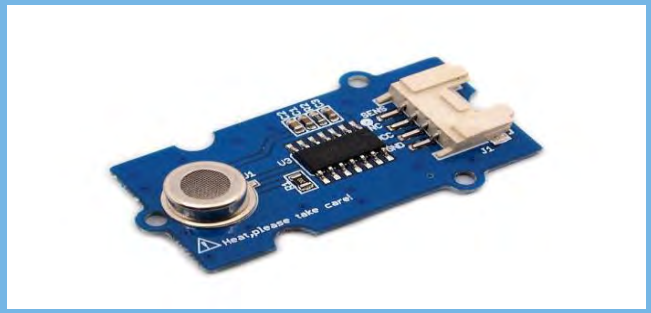
8. Rain sensor



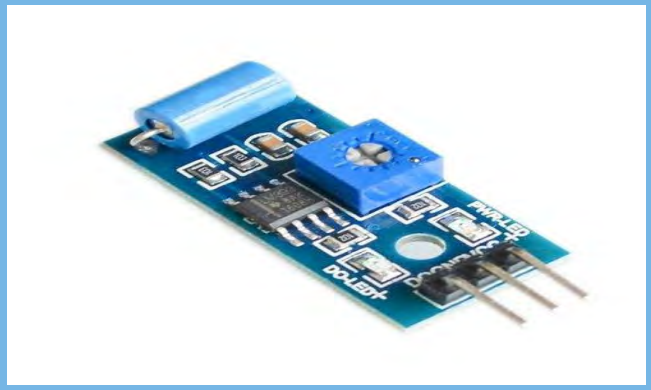
Sensors

External Sensors:

9. Air Quality senor

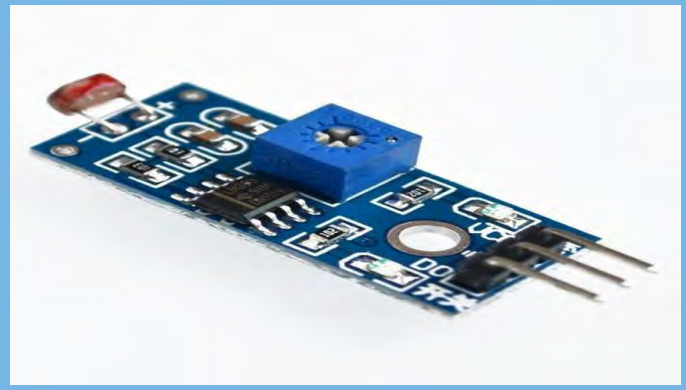


10. Vibration Sensor



11. PIR Sensor (Motion detection)

12. LDR sensor (Light dependent resistor)

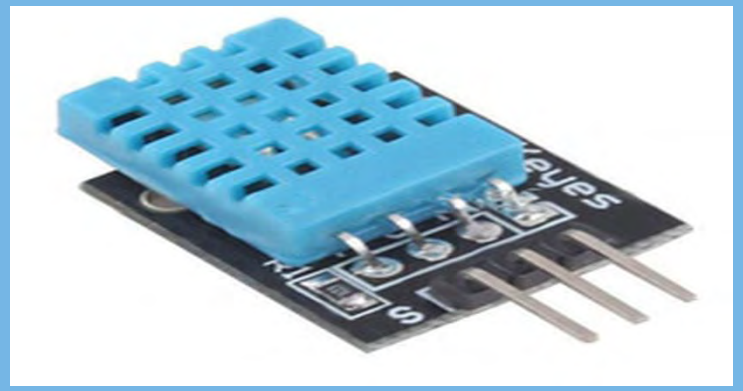


Sensors

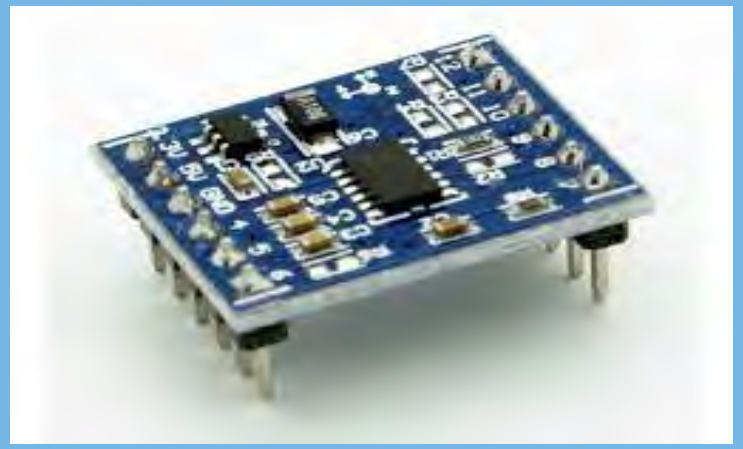
External Sensors:

13. DHT11 Sensor

    (Temp. & Humidity)



14. Accelerometer

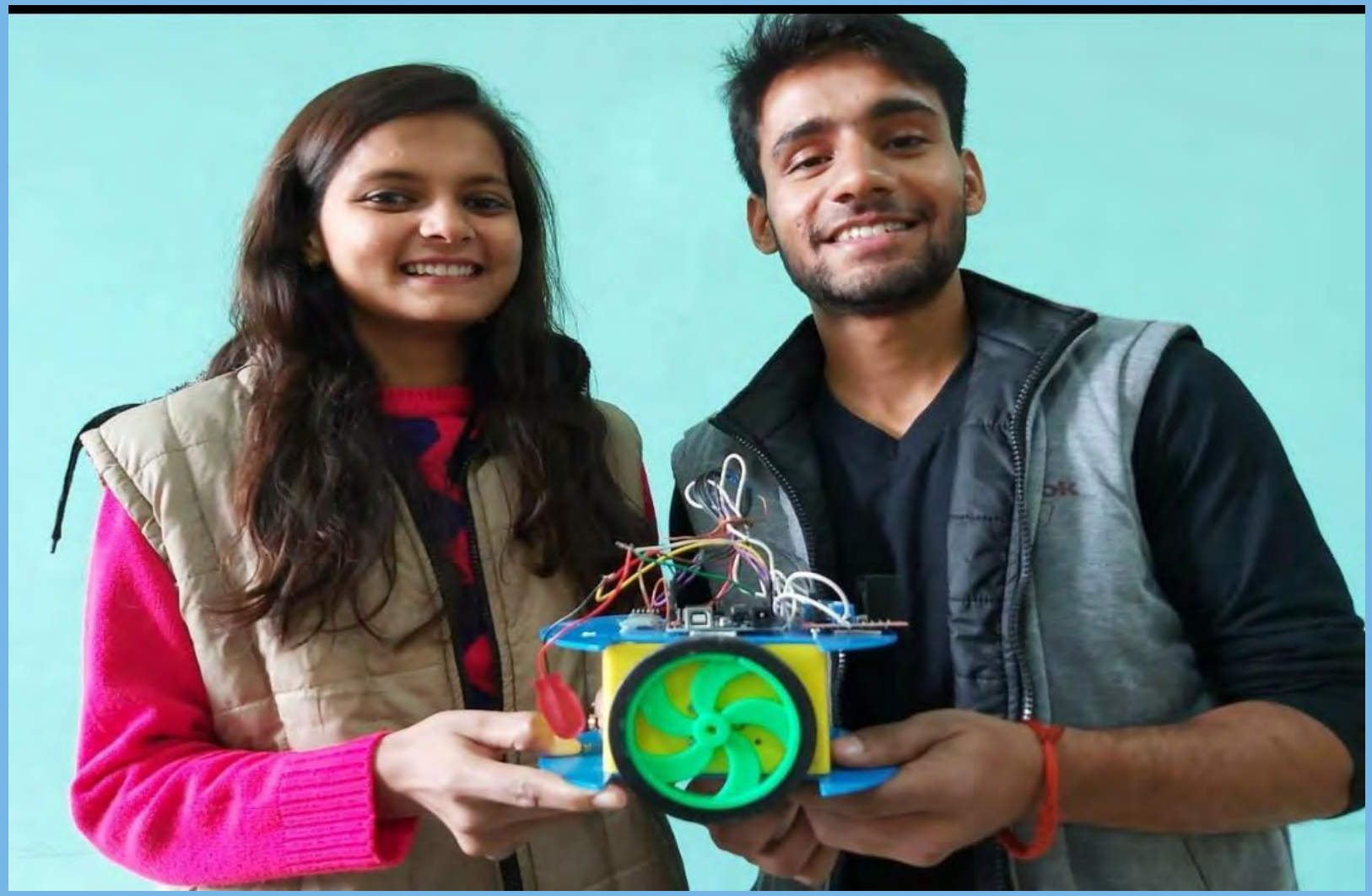


Some of the Good Projects Developed by our Proud Students.

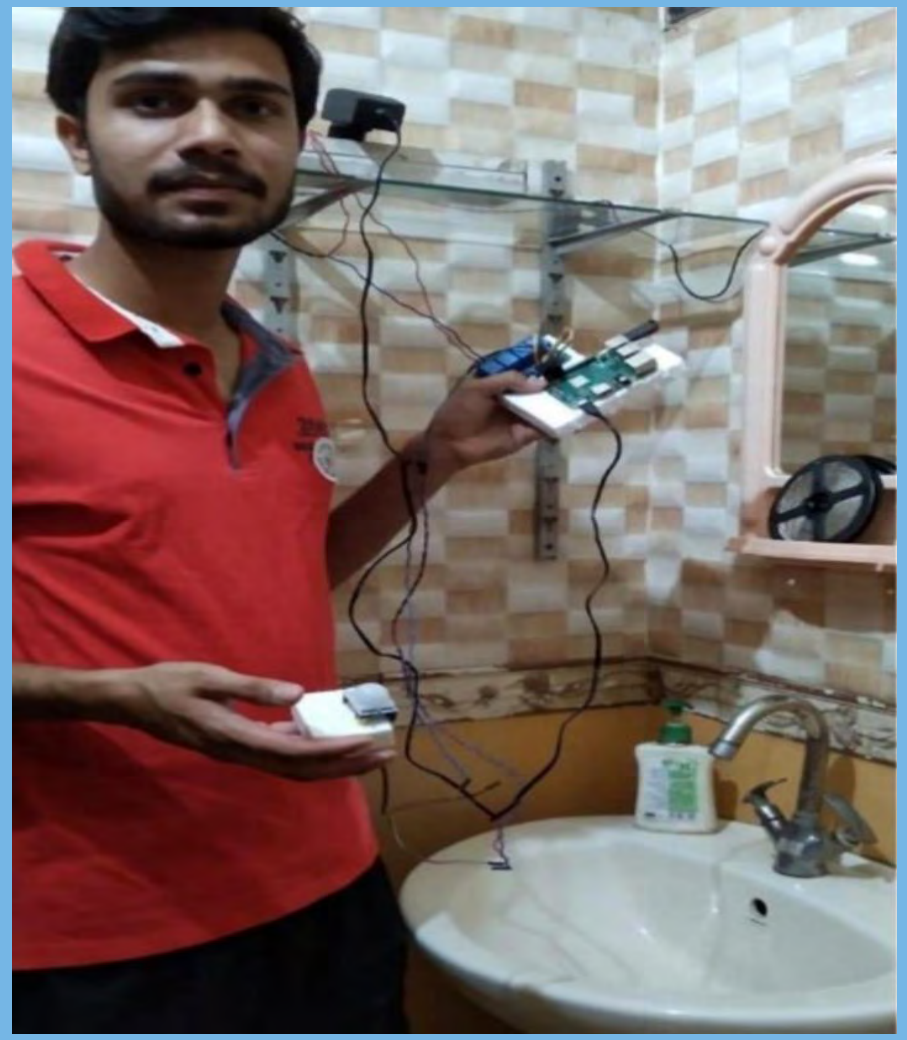
- Smart Washing basin
- Voice controlled car
- Smart hover board
- Home automation

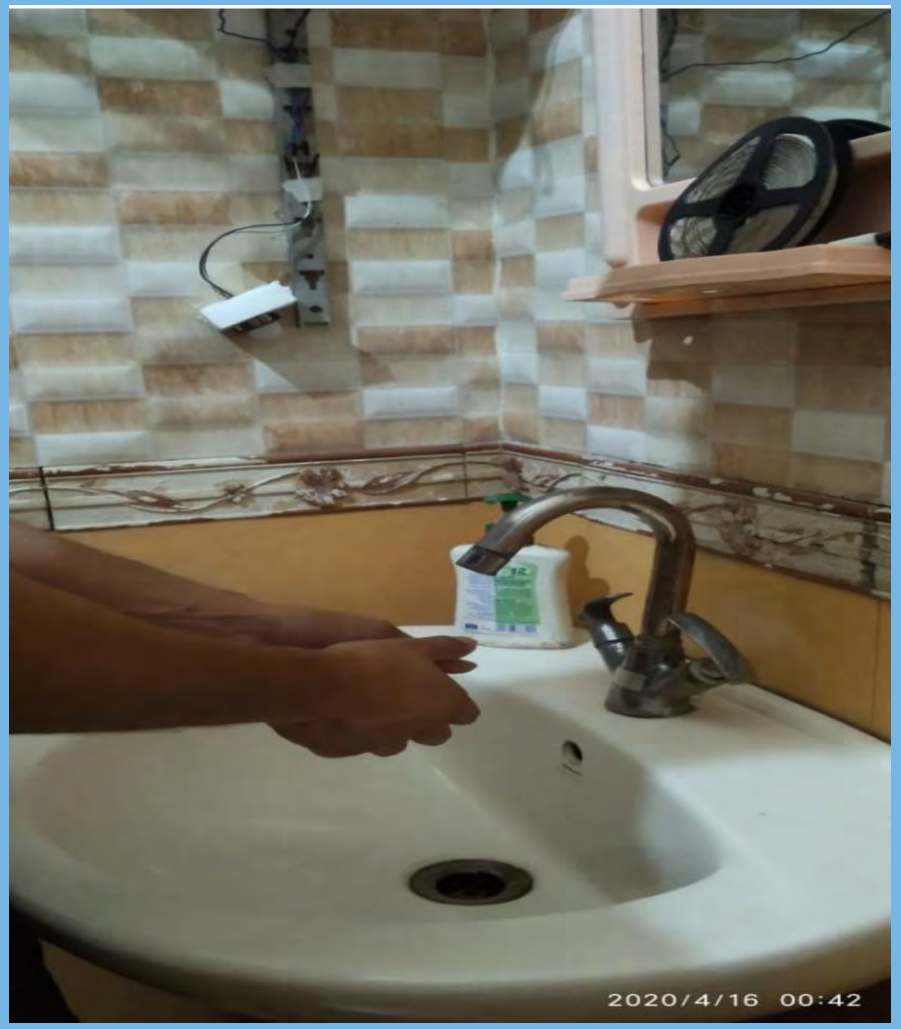
many more similar projects…….

Voice controlled car

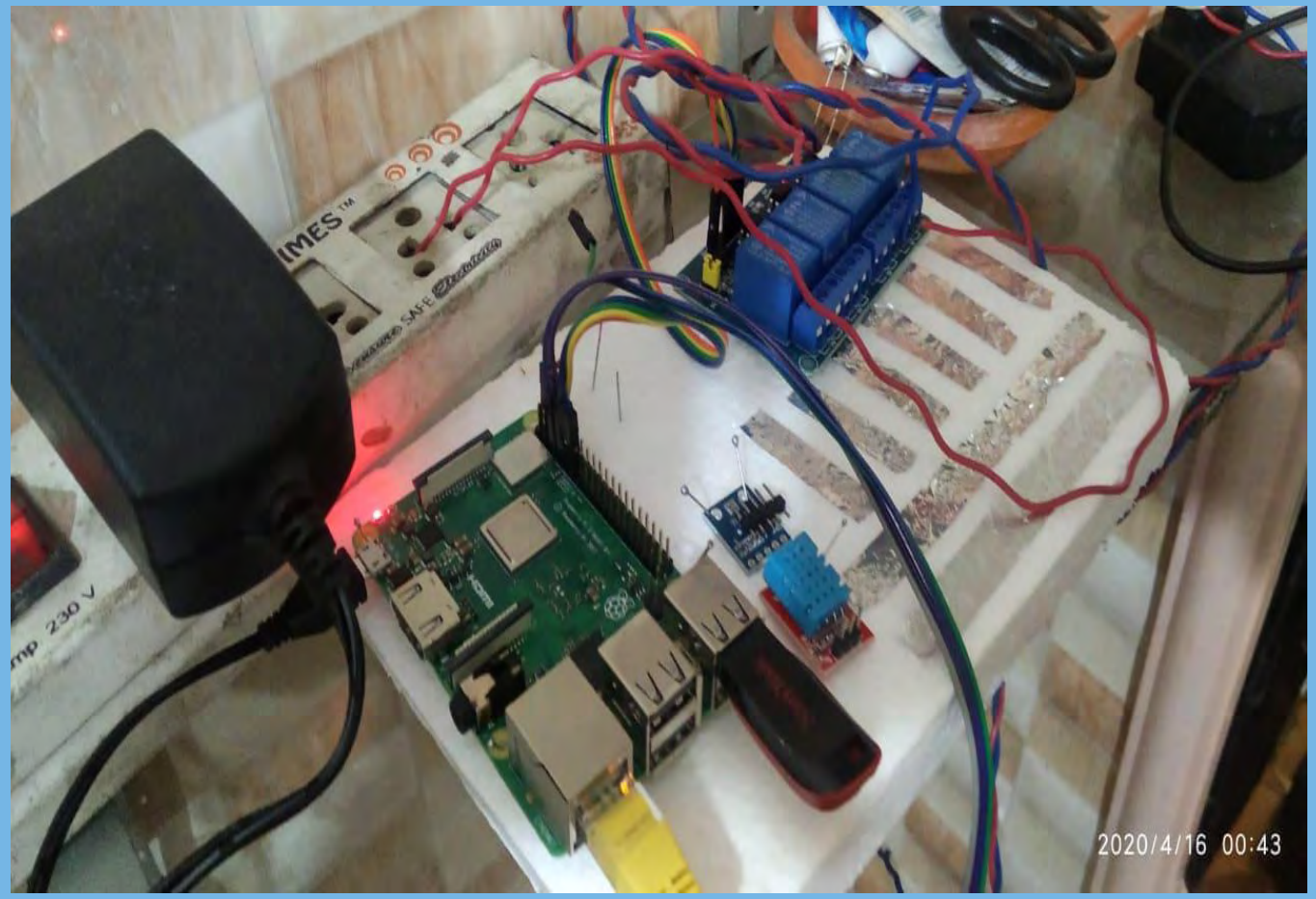


Smart Hand Washing Basin

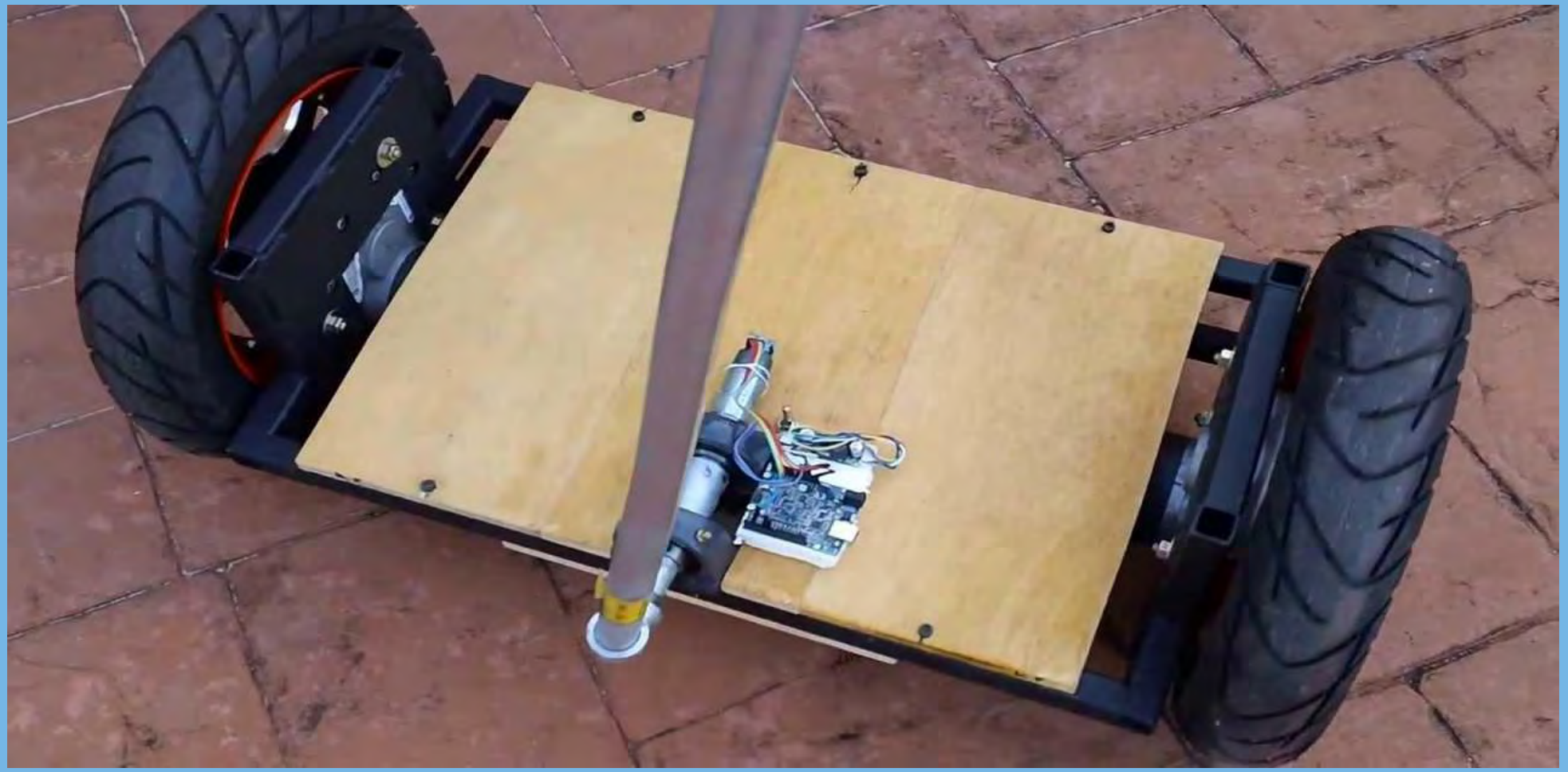




Home automation



Smart hover board



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Thank You