

PROFESSIONAL TRAINING REPORT
AT
SATHYABAMA INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)

Submitted in partial fulfillment of the requirements for the award of
Bachelor of engineering degree in

ELECTRICAL AND ELECTRONICS ENGINEERING
BY
POOVARASI.G (39140040)



DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
SCHOOL OF ELECTRICAL AND ELECTRONICS ENGINEERING

SATHYABAMA

INSTITUTE OF SCIENCE AND TECHNOLOGY

Accredited with grade "A" by NAAC
JEPPIAAR NAGAR, RAJIV GANDHI SALAI, CHENNAI-600119

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Professional training certificate.

Certificate No PS-APSSDC-INTERN.IOT-0239

**CERTIFICATE
OF INTERNSHIP**

NAME Ms Poovarasi G

COLLEGE SATHYABAMA UNIVERSITY

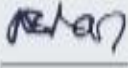
has Successfully Completed
INTERNET OF THINGS MASTER CLASS (30 DAYS)

at Pantech e Learning Pvt Ltd, Chennai

From SEP 19,2021 To OCT 18,2021


Dr. Bavi Gajulu
Chief General Manager (Technical)
APSSDC


Prof. Rama Kani Reddy
Executive Director
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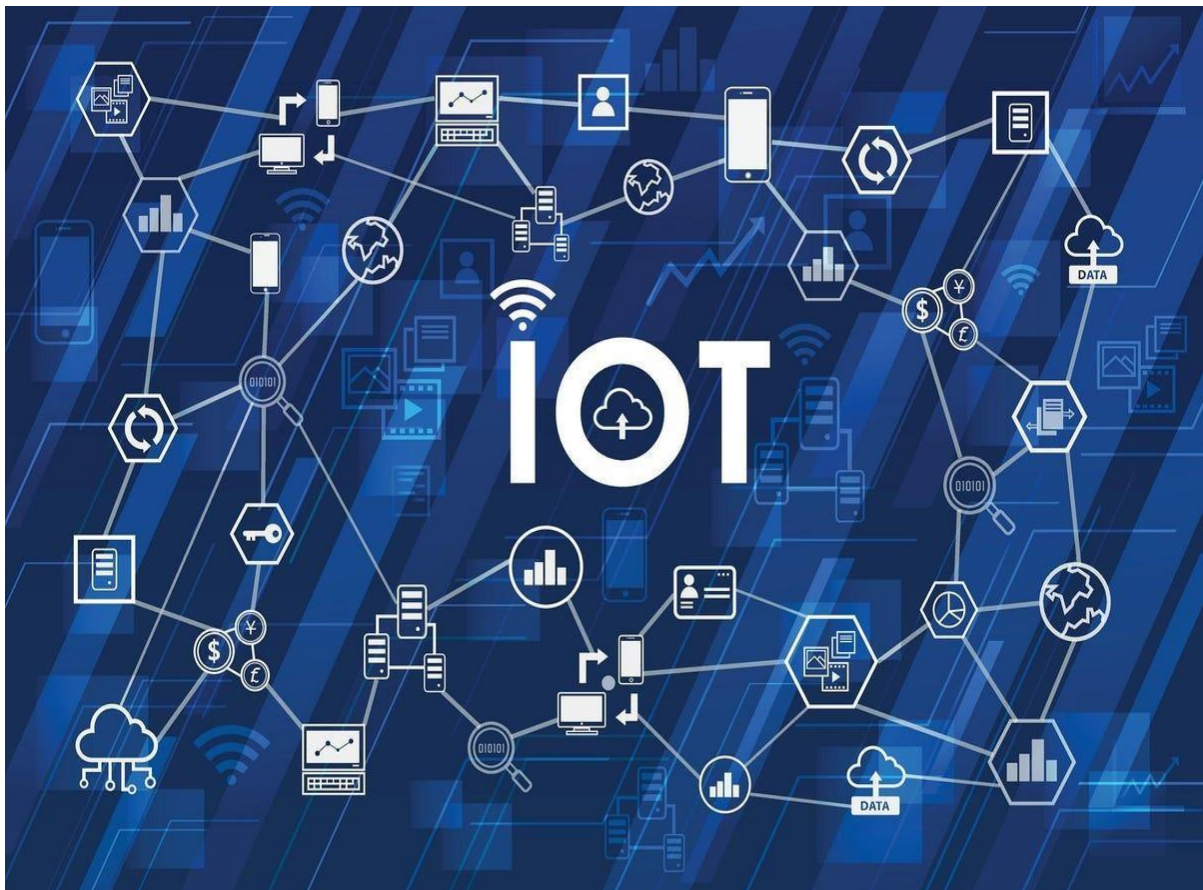

N. Rangaraj
Managing Director
APSSDC


M. Malaiappan
Director
Pantech e Learning

INTERNET OF THINGS:

What is IOT?

The Internet of Things (IOT) describes the network of physical objects—“things”—that are embedded with sensors, software, and other technologies for the purpose of connecting and exchanging data with other devices and systems over the internet. These devices range from ordinary household objects to sophisticated industrial tools. With more than 7 billion connected IOT devices today, experts are expecting this number to grow to 10 billion by 2020 and 22 billion by 2025. Oracle has a network of device partners.



Why is Internet of Things (IOT) so important?

Access to low-cost, low-power sensor technology

Affordable and reliable sensors are making IOT technology possible for more manufacturers.

Connectivity

A host of network protocols for the internet has made it easy to connect sensors to the cloud and to other “things” for efficient data transfer.

Cloud computing platforms

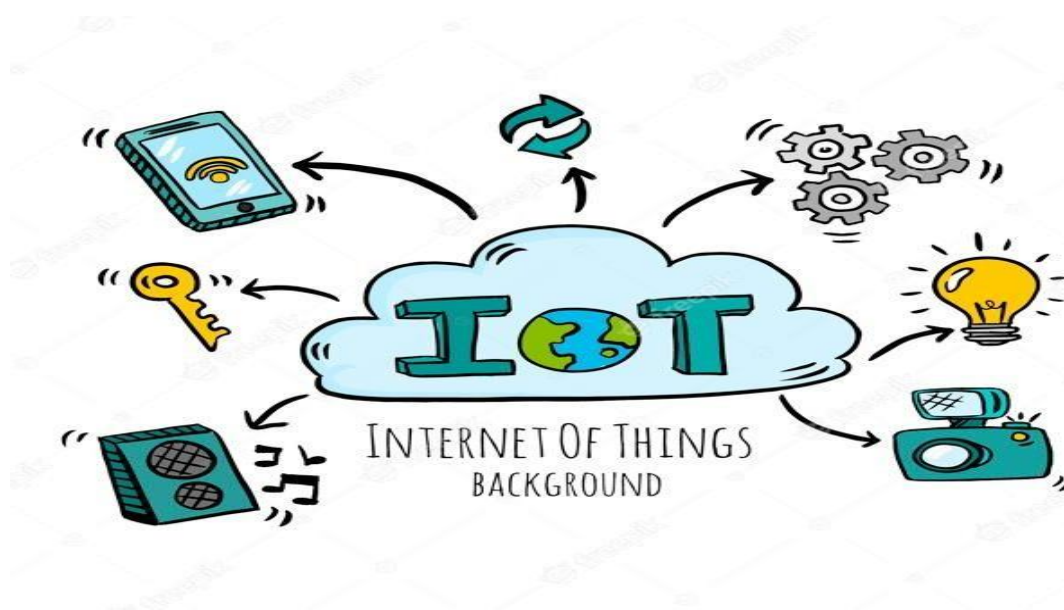
The increase in the availability of cloud platforms enables both businesses and consumers to access the infrastructure they need to scale up without actually having to manage it all.

Machine learning and analytics

With advances in machine learning and analytics, along with access to varied and vast amounts of data stored in the cloud, businesses can gather insights faster and more easily. The emergence of these allied technologies continues to push the boundaries of IOT and the data produced by IOT also feeds these technologies.

Conversational artificial intelligence (AI)

Advances in neural networks have brought natural-language processing (NLP) to IOT devices (such as digital personal assistants Alexa, Cortana, and Siri) and made them appealing, affordable, and viable for home use.



IOT applications:

IOT applications can be used in many ways to help businesses simplify, improve, automate, and control processes while providing relevant information, activity performance, and even environmental conditions that need to be monitored and controlled remotely. As a result, IOT applications can help drive new business models and revenue streams and provide the real-time data businesses need to develop products and services.

Some major applications of IOT:

1. SmartHomes
2. Smart City
3. Self-drivenCars
4. IOT RetailShops
5. Farming
6. Wearable's
7. Smart Grids
8. Industrial internet
9. Tele health
10. Smart supply chain management

Smart homes:

One of the best and the most practical applications of IOT, smart homes really take both, convenience and home security, to the next level.

Though there are different levels at which IOT is applied for smart homes, the best is the one that blends intelligent utility systems and entertainment together. For instance, your electricity meter with an IOT device giving you insights into your everyday water usage, your set-top box that allows you to record shows from remote, Automatic Illumination Systems, Advanced Locking Systems, Connected Surveillance Systems all fit into this concept of smart homes. As IOT evolves, we can be sure that most of the devices will become smarter, enabling enhanced home security.



Smart City:

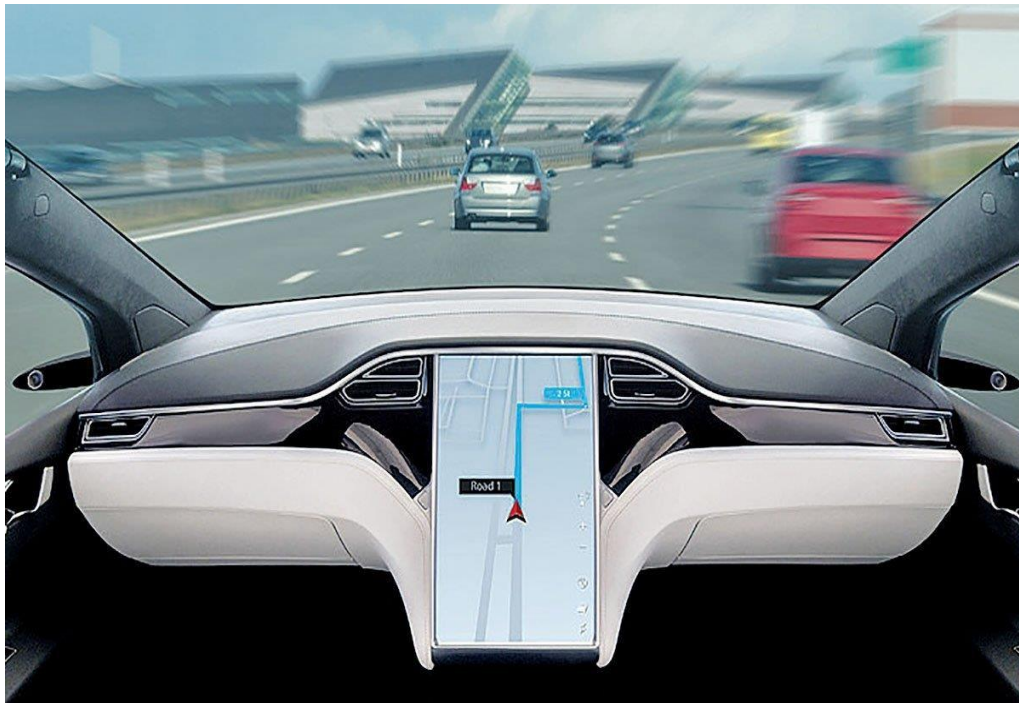
Not just internet access to people in a city but to the devices in it as well – that's what smart cities are supposed to be made of. And we can proudly say that we're going towards realizing this dream. Efforts are being made to incorporate connected technology into infrastructural requirements and some vital concerns like Traffic Management, Waste Management, Water Distribution, Electricity Management, and more. All these work towards eliminating some day-to-day challenges faced by people and bring in added convenience.



Self-driven cars:

We've seen a lot about self-driven cars. Google tried it out, Tesla tested it, and even Uber came up with a version of self-driven cars that it later shelved. Since it's human lives on the roads that we're dealing with, we need to ensure the technology has all that it takes to ensure better safety for the passenger and those on the roads.

The cars use several sensors and embedded systems connected to the Cloud and the internet to keep generating data and sending them to the Cloud for informed decision-making through Machine Learning. Though it will take a few more years for the technology to evolve completely and for countries to amend laws and policies, what we're witnessing right now is one of the best applications of IOT.



IOT Retail shops:

If you haven't already seen the video of Amazon Go – the concept store from the ecommerce giant, you should check it out right away. Perhaps this is the best use of the technology in bridging the gap between an online store and a retail store. The retail store allows you to go cashless

by deducting money from your Amazon wallet. It also adds items to your cart in real-time when you pick products from the shelves.

If you change your mind and pick up another article, the previous one gets deleted and replaces your cart with the new item. The best part of the concept store is that there is no cashier to bill your products. You don't have to stand in line but just step out after you pick up your products from shelves. If this technology is effective enough to fetch more patronage, this is sure to become a norm in the coming years.



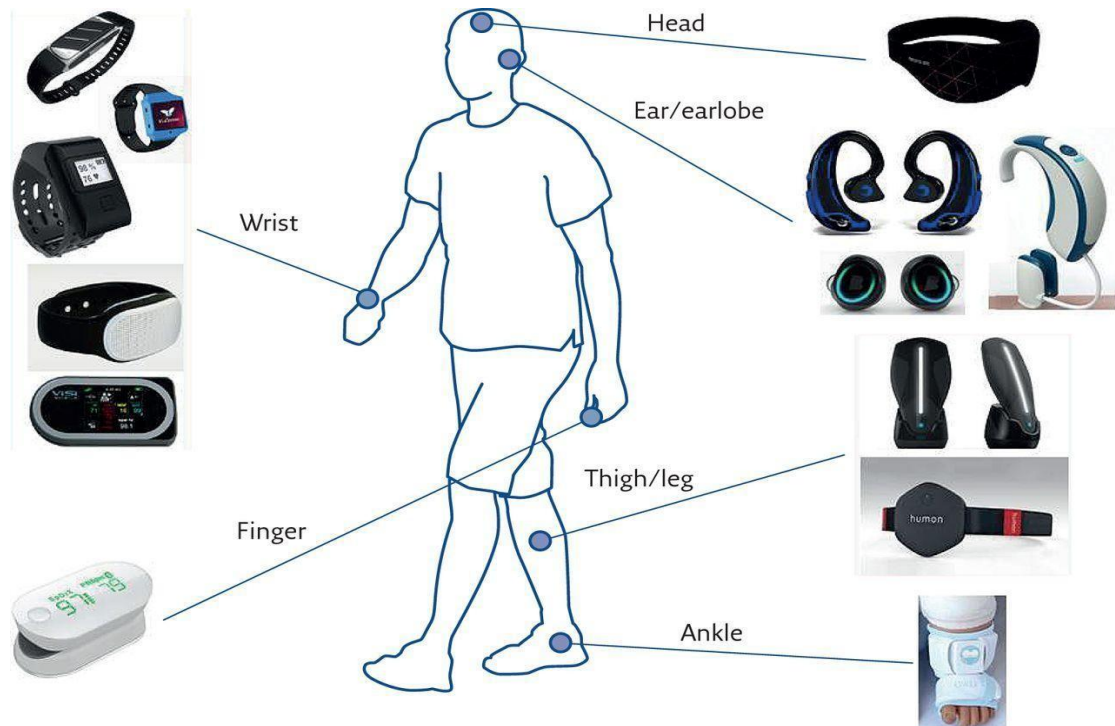
Farming:

Farming is one sector that will benefit the most from the Internet of Things. With so many developments happening on tools farmers can use for agriculture, the future is sure promising. Tools are being developed for Drip Irrigation, understanding crop patterns, Water Distribution, drones for Farm Surveillance, and more. These will allow farmers to come up with a more productive yield and take care of the concerns better.



Wearable's:

Wearable's remain a hot topic in the market, even today. These devices serve a wide range of purposes ranging from medical, wellness to fitness. Of all the IOT startups, Jawbone, a wearable's maker, is second to none in terms of funding.

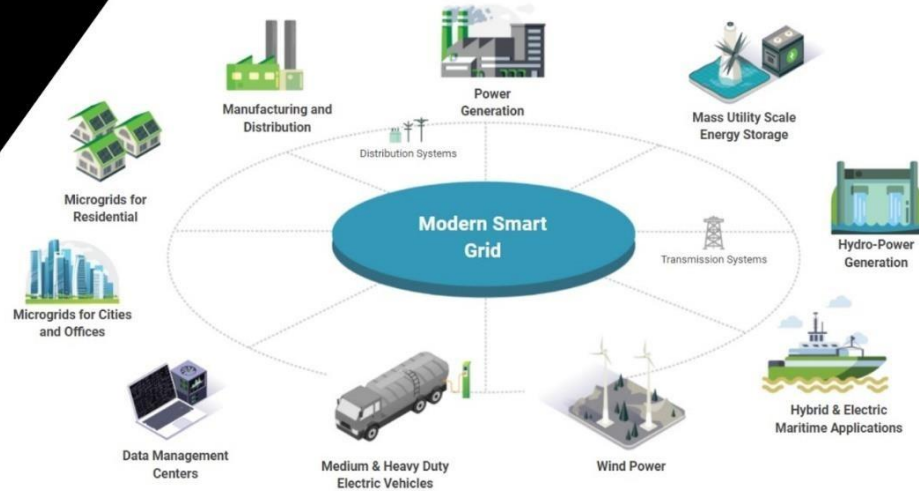


Smart grids

One of the many useful IOT examples, a smart grid, is a holistic solution that applies an extensive range of Information Technology resources that enable existing and new gridlines to reduce electricity waste and cost. A future smart grid improves the efficiency, reliability, and economics of electricity.



Modern Smart Grid



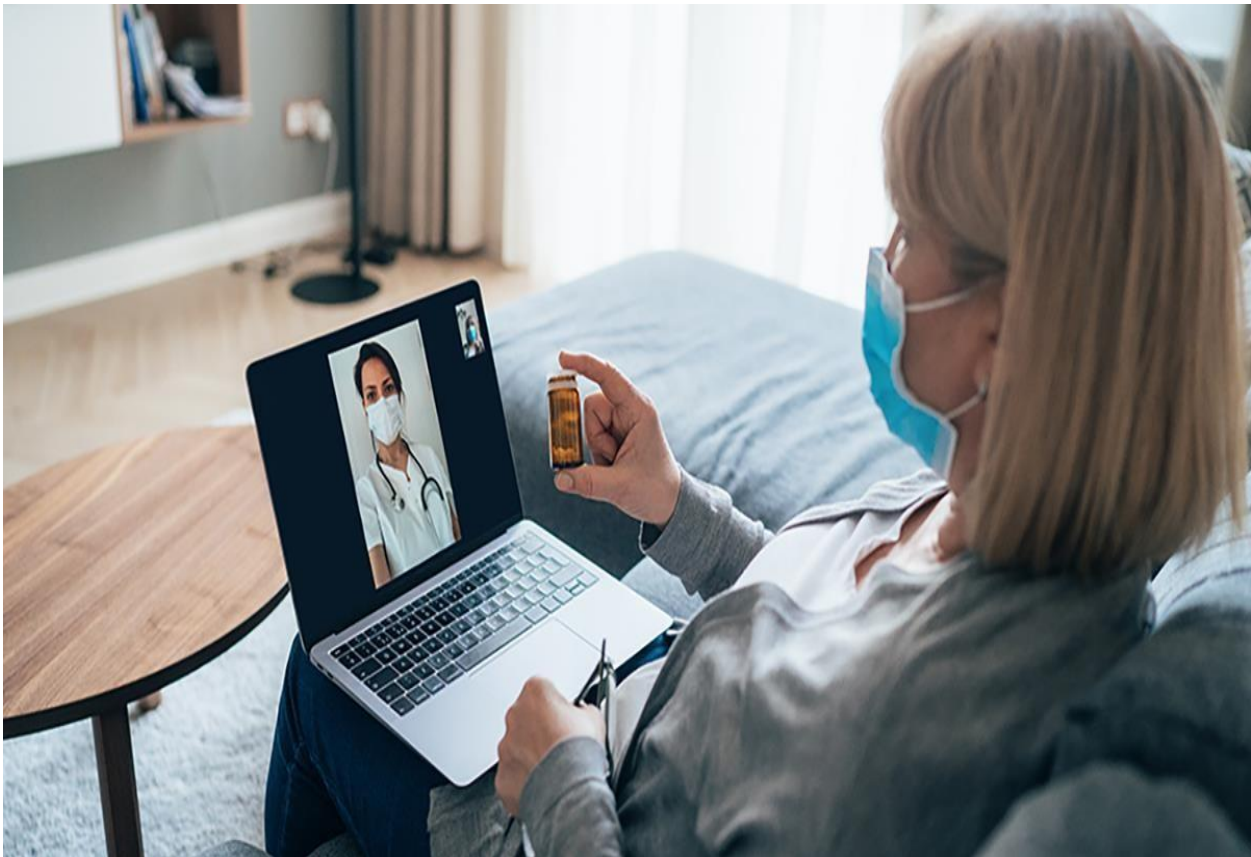
IndustrialInternet:

The Industrial Internet of Things consists of interconnected sensors, instruments, and other devices connected with computers' industrial applications like manufacturing, energy management, etc. While still being unpopular in comparison to IOT wearable's and other uses, market researches like Gartner, Cisco, etc., believe the industrial internet to have the highest overall potential.



Tele health:

Telehealth, or Telemedicine, hasn't completely flourished yet. Nonetheless, it has great future potential. IOT Examples of Telemedicine include the digital communication of Medical Imaging, Remote Medical Diagnosis & Evaluations, Video Consultations with Specialists, etc.



Smart Supply-chainManagement:

Supply-chains have stuck around in the market for a while now. A common example can be Solutions for tracking goods while they are on the road. Backed with IOT technology, they are sure to stay in the market for the long run.



What industries can benefit from IOT?

Organizations best suited for IOT are those that would benefit from using sensor devices in their business process.

Manufacturing

Manufactures can gain a competitive advantage by using production-line monitoring to enable proactive maintenance on equipment when sensors detect an impending failure. Sensors can actually measure when production output is compromised. With the help of sensor alerts, manufacturers can quickly check equipment for accuracy or remove it from production until it is repaired. This allows companies to reduce operating costs, get better uptime, and improve asset performance management.

Automotive

The automotive industry stands to realize significant advantages from the use of IOT applications. In addition to the benefits of applying IOT to production lines, sensors can detect impending equipment failure in vehicles already on the road and can alert the driver with details and recommendations. Thanks to aggregated information gathered by IOT-based applications, automotive manufacturers and suppliers can learn more about how to keep cars running and car owners informed.

Retail

IOT applications allow retail companies to manage inventory, improve customer experience, optimize supply chain, and reduce operational costs. For example, smart shelves fitted with weight sensors can collect RFID-based information and send the data to the IOT platform to automatically monitor inventory and trigger alerts if items are running low. Beacons can push targeted offers and promotions to customers to provide an engaging experience.

Healthcare

IOT asset monitoring provides multiple benefits to the healthcare industry. Doctors, nurses, and orderlies often need to know the exact location of patient-assistance assets such as wheelchairs. When a hospital's wheelchairs are equipped with IOT sensors, they can be tracked from the IOT asset-monitoring application so that anyone looking for one can quickly find the nearest available wheelchair. Many hospital assets can be tracked this way to ensure proper usage as well as financial accounting for the physical assets in each department.

General Safety Across All Industries

In addition to tracking physical assets, IOT can be used to improve worker safety. Employees in hazardous environments such as mines, oil and gas fields, and chemical and power plants, for example, need to know about the occurrence of a hazardous event that might affect them. When they are connected to IOT sensor-based applications, they can be notified of accidents or rescued from them as swiftly as possible. IOT applications are also used for wearable's that can monitor human health and environmental conditions. Not only do these types of applications help people better understand their own health, they also permit physicians to monitor patients remotely.

Business opportunities with IOT:

- Here, we've collected the major trends of the niche to help you to develop your IOT business ideas:
- Patient monitoring.
- Transparency within healthcare organizations.

- Remote operations.
- IOT healthcare soft protection.
- Smart sensors in manufacturing.
- 3D printing for better quality.
- Flexible production chains.

Microprocessor

A microprocessor is a computer processor where the data processing logic and control is included on a single integrated circuit or a small number of integrated circuits.

The microprocessor contains the arithmetic, logic, and control circuitry required to perform the functions of a computer's central processing unit.

The integrated circuit is capable of interpreting and executing program instructions and performing arithmetic operations.

The microprocessor is a multipurpose, clock-driven, register-based, digital integrated circuit that accepts binary data as input, processes it according to instructions stored in its memory, and provides results as output.

Microprocessors contain both combinational logic and sequential digital logic, and operate on numbers and symbols represented in the binary number system.

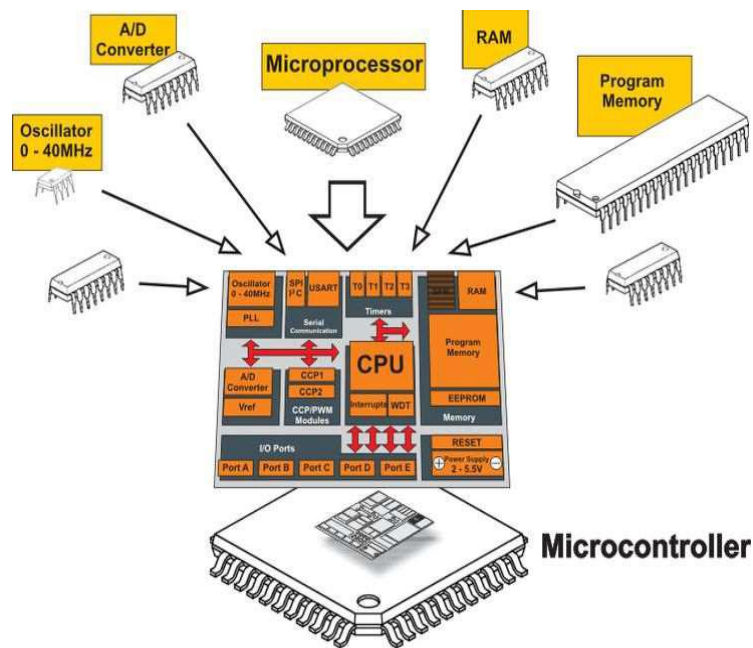
Microcontroller

A microcontroller (**MCU** for microcontroller unit) is a small computer on a single metal-oxide-semiconductor (MOS) integrated circuit (IC) chip.

A microcontroller contains one or more CPUs along with memory and programmable input/output peripherals.

Program memory in the form of ferroelectric RAM, NOR flash or OTP ROM is also often included on chip, as well as a small amount of RAM.

Microcontrollers are designed for embedded applications, in contrast to the microprocessors used in personal computers or other general purpose applications consisting of various discrete chips.



Components used

Arduino UNO

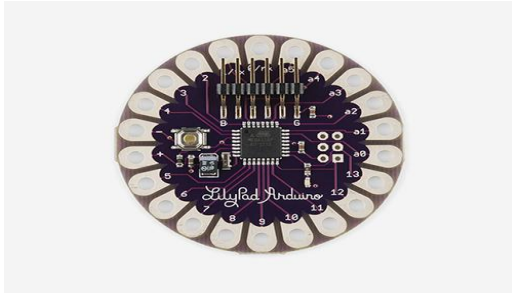
What is arduino?

A microcontroller board, contains on-board power supply, USB port to communicate with PC, and an atmel microcontroller chip. It simplifies the process of creating any control system by providing the standard board that can be programmed and connected to the system without the need to any sophisticated PCB design and implementation. It is an open source hardware any one can get the details of its design and modify it or make his own one himself.

Arduino Boards



Arduino UNO



Arduinolily pad

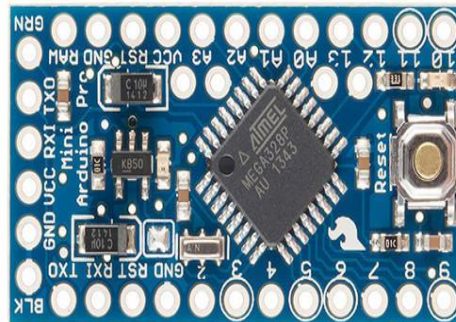


Arduino mega

Arduino BT



Arduino Nano



Arduino mini

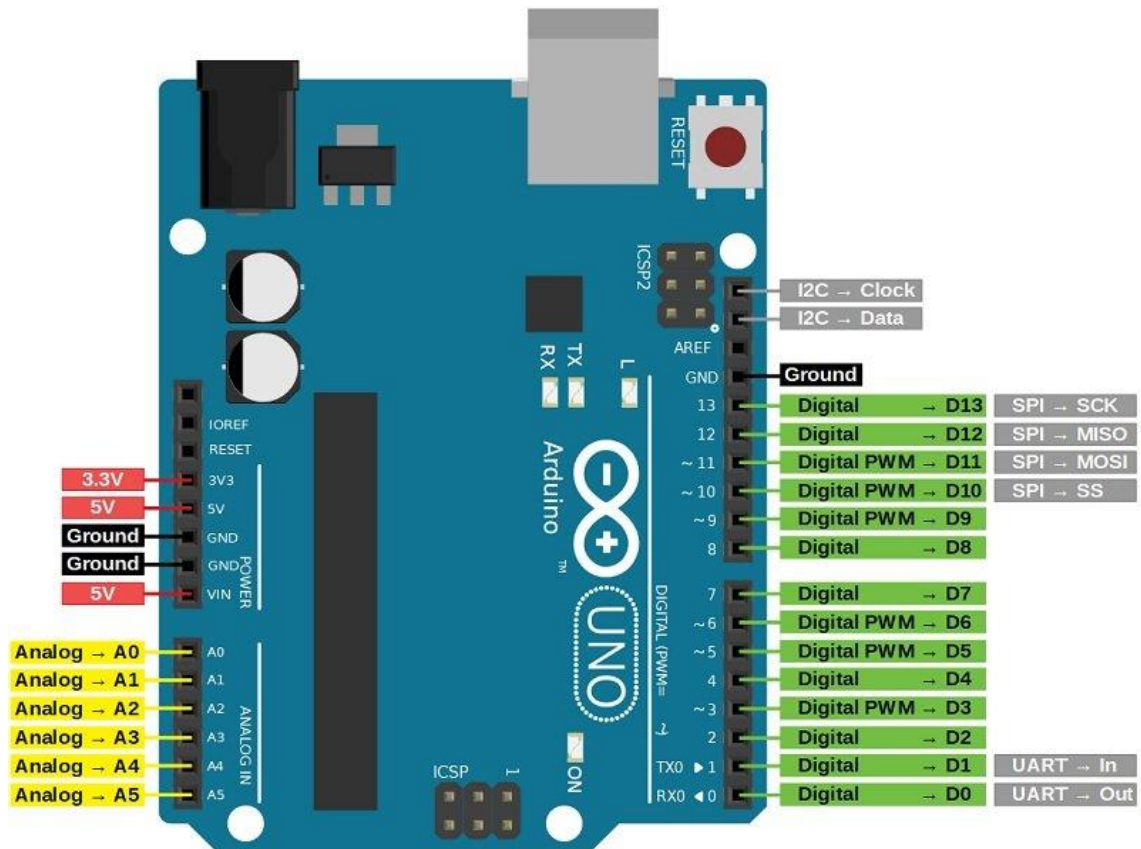
Arduino UNO:



Parameters

Parameter	Value
CBU type	8-bit AVR
Maximum CBU speed	20 MHz
performance	20MIPS at20 MHz
Flash memory	32 KB
SRAM	2 KB
EEPROM	1 KB
Package pin count	28 OR 32
Capacitive touch sensing channels	16
Maximum I/O pins	23
External interrupts	2
USB interface	NO

Pin details



Vin: This is the input voltage pin of the Arduino board used to provide input supply from an external power source.

5V: This pin of the Arduino board is used as a regulated power supply voltage and it is used to give supply to the board as well as onboard components.

3.3V: This pin of the board is used to provide a supply of 3.3V which is generated from a voltage regulator on the board

GND: This pin of the board is used to ground the Arduino board.

Reset: This pin of the board is used to reset the microcontroller. It is used to reset the microcontroller.

Analog Pins: The pins A0 to A15 are used as an analog input and it is in the range of 0-5V. The analog pins on this board can be used as a digital Input or Output pins.

Serial pins: It is used for communication between the Arduino board and a computer or other devices.

The TXD and RXD are used to transmit & receive the serial data resp. It includes serial 0, Serial 1, serial 2, Serial 3 as follows:

Serial 0: It consists of Transmitter pin number 1 and receiver pin number 0
Serial 1: It consists of Transmitter pin number 18 and receiver pin number 19
serial 2: It consists of Transmitter pin number 16 and receiver pin number 17
Serial 3: It consists of Transmitter pin number 14 and receiver pin number 15.

External Interrupts pins: This pin of the Arduino board is used to produce the External interrupt and it is done by the pin numbers 0,3,21,20,19,18.

I2C: This pin of the board is used for I2C communication.

Pin number 20 signifies Serial Data Line (SDA) and it is used for holding the data. •Pin number 21 signifies Serial Clock Line (SCL) and it is used for offering data synchronization among the devices.

SPI Pins: This is the Serial Peripheral Interface pin, it is used to maintain SPI communication with the help of the SPI library. SPI pins include:

- MISO: Pin number 50 is used as a Master In Slave Out
- MOSI: Pin number 51 is used as a Master Out Slave In
- SCK: Pin number 52 is used as a Serial Clock
- SS: Pin number 53 is used as a Slave Select

LED Pin: The board has an inbuilt LED using digital pin-13. The LED glows only when the digital pin becomes high.

AREF Pin: This is an analog reference pin of the Arduino board. It is used to provide a reference voltage from an external power supply.

AREF means Analog Reference. It allows us to feed the Arduino a reference voltage from an external power supply in order to configure the reference voltage used for analog input (i.e. the value used as the top of the input range).

For example, if we want to measure voltages with a maximum range of 3.3V, we would feed a nice smooth 3.3V into the AREF pin – perhaps from a voltage regulator IC. Then the each step of the ADC would represent 3.22 millivolts.

Software downloads:

Arduino is a computation tool for sensing and controlling signals.

It is more convenient and cost effective than using a personal computer pc.

It's an open – source system in terms of hardware and software.

You can download the integrated development environment(IDE)for your own OS form.

<https://www.arduino.cc/en/software>.

Tool bar details:

Verify:

Checks code for errors

Upload

Compiles and uploads code to the arduinoi/o board.

New

Creates a new sketch.

Open

Open sketch.

Save

Save sketch

Serial monitor

Display serial data being sent from the arduino board.

Arduino code basics:

Commands and other information are sent to LED's, motors and from sensors through **digital** and **analog** input & output pins.

Source code

TO blink an LED:

```
int led=13;

void setup()

{

  pinMode (led,Output);

}

Void loop()

{

  digitalWrite(led, High);

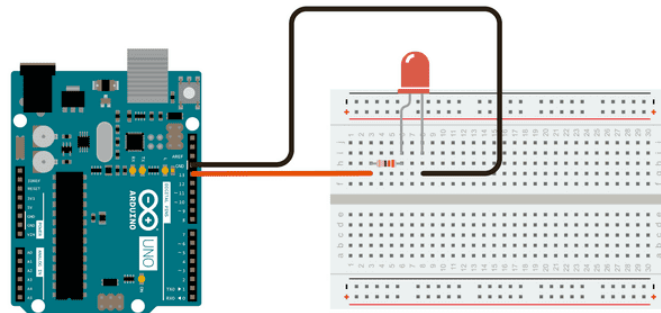
  Delay(1000);

  digitalWrite(led, Low);

  delay(1000);

}
```

Connection:



Blinking of tricolor LED:

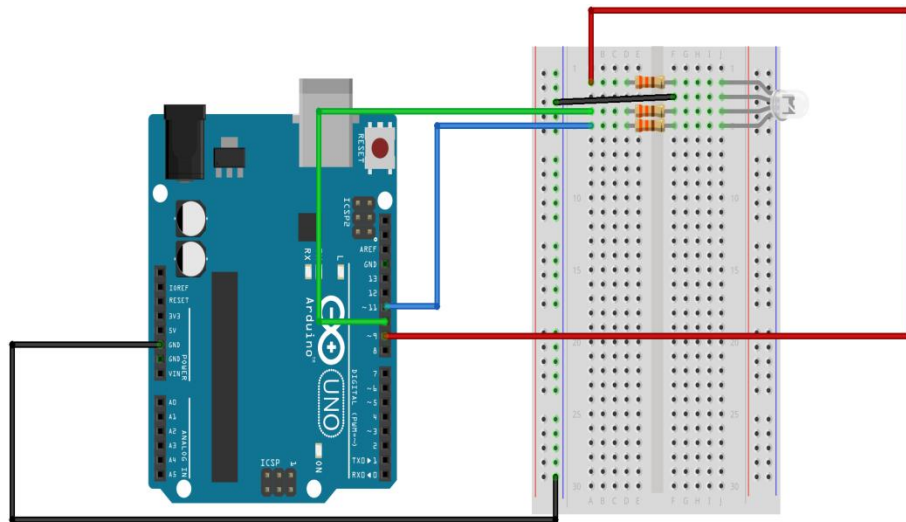
```
void setup()
{
  pinMode(7, OUTPUT);
  pinMode(6, OUTPUT);
  pinMode(5, OUTPUT);
}
```

```
void loop()
{
  digitalWrite(7, HIGH);
  delay(1000);
  digitalWrite(7, LOW);
  delay(1000);
```

```
  digitalWrite(6, HIGH);
  delay(1000);
  digitalWrite(6, LOW);
  delay(1000);
```

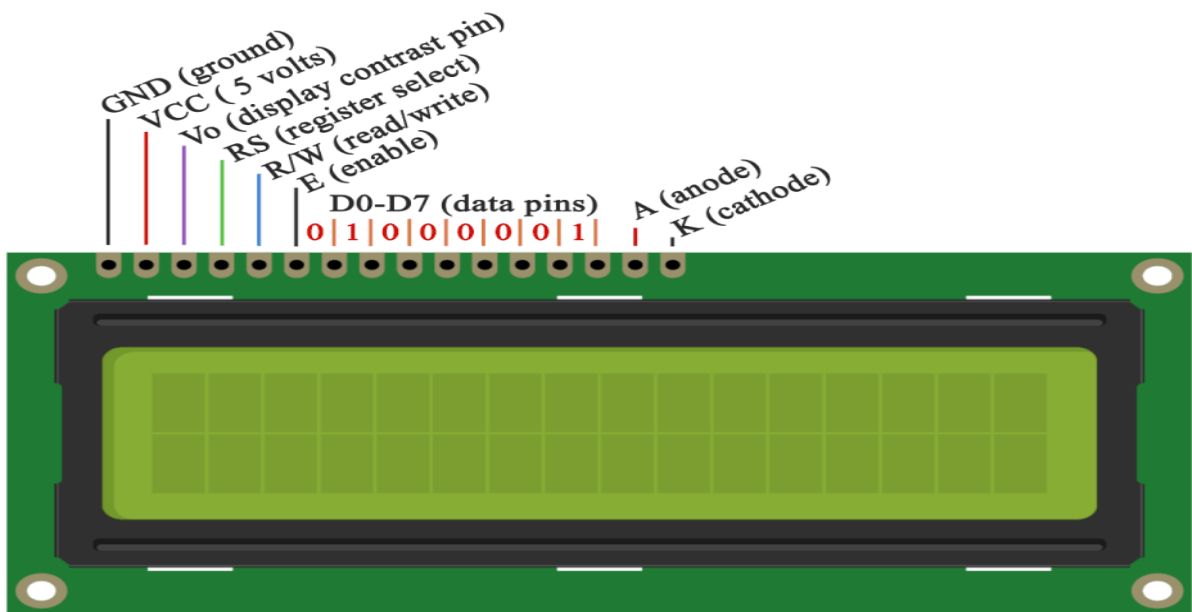
```
  digitalWrite(5, HIGH);
  delay(1000);
  digitalWrite(5, LOW);
  delay(1000);
}
```

Connection:



fritzing

LCD – Liquid Crystal Display:



Display counter using arduino:

```
#include<Liquid Crystal.h>
```

```
LiquidCrystallcd(12,11,5,4,3,2)
```

```
Void setup()
```

```
{
```

```

lcd.begin(16,2);

}

Void loop()

{

lcd.setCursor(0,0);

lcd.print("Good evening");

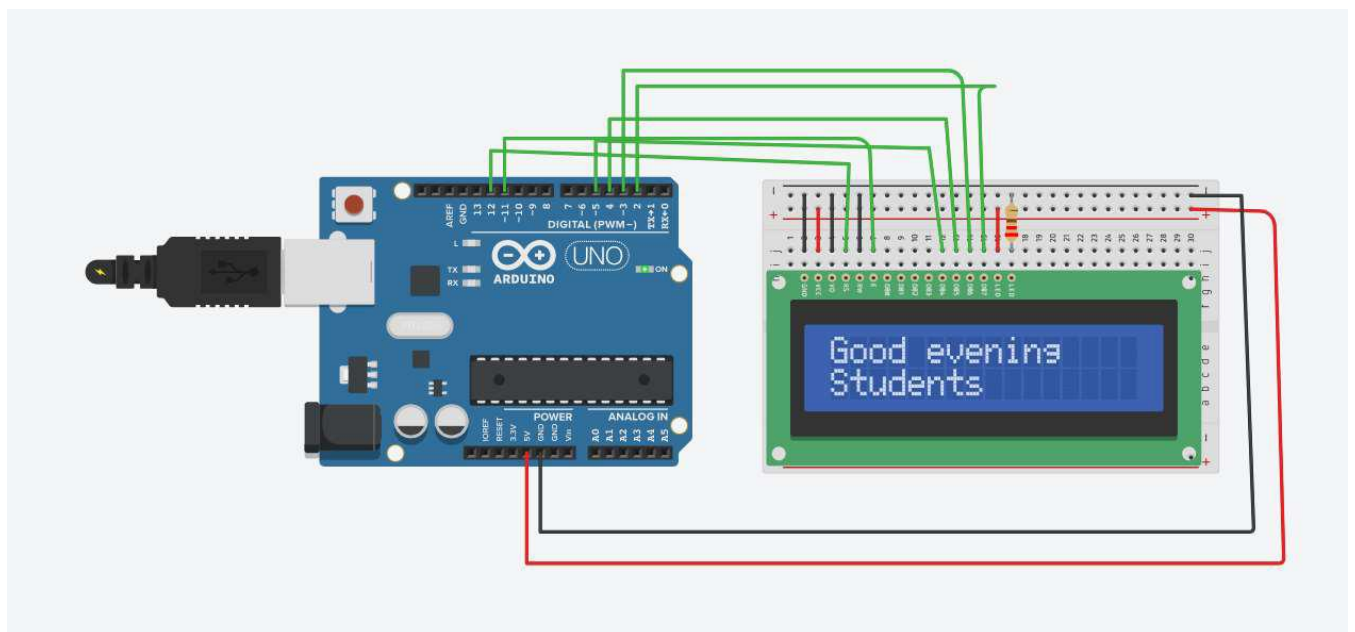
lcd.setCursor(0,1);

lcd.print("Students");

}

```

Connection and output:



Advantages of IOT:

It can assist in the smarter control of homes and cities via mobile phones. It enhances security and offers personal protection.

By automating activities, it saves us a lot of time.

Information is easily accessible, even if we are far away from our actual location, and it is updated frequently in real time.

It minimizes human effort because IOT devices connect and communicate with one another and perform a variety of tasks without the need for human intervention.

Better business opportunities.

Through marketing and business opportunities.

Disadvantages of IOT:

We lose control of our lives-our lives will be fully controlled and reliant on technology .

Hackers may gain access to the system and steal personal information. since we add so many devices to the internet, there is a risk that our information as it can be misused.

It is very difficult to plan, build, manage, and enable a broad technology to IOT framework.

With complexity of systems, there are many ways for them to fail.

Conclusion of IOT:

In conclusion, internet of things is the concept in which the virtual world of information technology connected to the real world of things. The technologies of internet of things such as RFID and sensor make our life become better and more comfortable.