Literature on

“What is an IoT?”

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What is IoT?

Image Source: https://br.mouser.com/blog/iot-past-present-future

The IoT stands for "Internet of Things", which describes the network of physical objects ("things"). These objects (devices) contain sensors, software, and other technologies to connect and exchange data with other devices and systems over the internet or other communications networks (Wi-Fi, Bluetooth, ZigBee, RF, Lora).[1][2]

As the name itself contains "Internet", many people created a false misconception that IoT means you must connect your device to the internet (having a public internet is necessary). Therefore the "Internet of Things" is a misnomer (wrongly defined). They (devices) only need to be connected to a network and be individually addressable. In simple terms, the devices need to be in any network connected to one other (Client-Client, Client - Server).[1]

These devices range from ordinary household objects to sophisticated industrial tools (Mobile phones, Smart Watches, Smart devices, Industrial devices). Today there are more than ten billion connected IoT devices. Researchers are estimating that this number shall grow to twenty-two billion by 2025.[2]

What is IIoT?

Image Source: https://www.imeche.org/news/news-article/opinion-digital-factory-offers-manufacturers-new-opportunities

The basic principle of IIoT is precisely similar to the concept of IoT. It also refers to interconnecting sensors, embedded devices, machines, and other devices in the same network. The highlighted difference is that the IIoT focuses more on industrial applications, which includes manufacturing processes, supply chain, warehouse management and energy management.[3]

The IIoT uses M2M (machine to machine) communication on a major scale. It allows the system to have interaction less communication and process, where devices communicate with each other over a wired or wireless network.[2]

Furthermore, the emerging use of cloud systems and the wide range of services of IIoT services allow them to connect to various platforms increasing the scope of data analytics, machine learning, and AI arises significantly.[3]

The IIoT enabled by technologies are:

1. Cloud computing.
2. Edge computing.
3. Big data analytics.
4. Artificial intelligence and machine learning.

Famous IoT components, modules, devices, and Sensors.

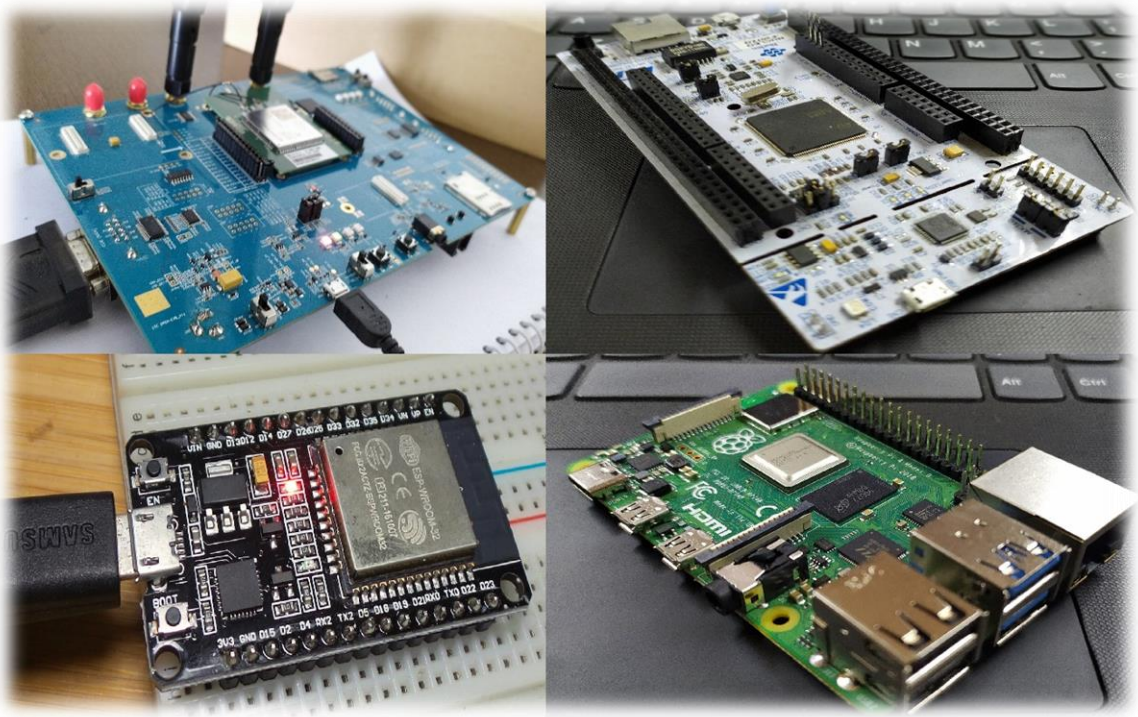


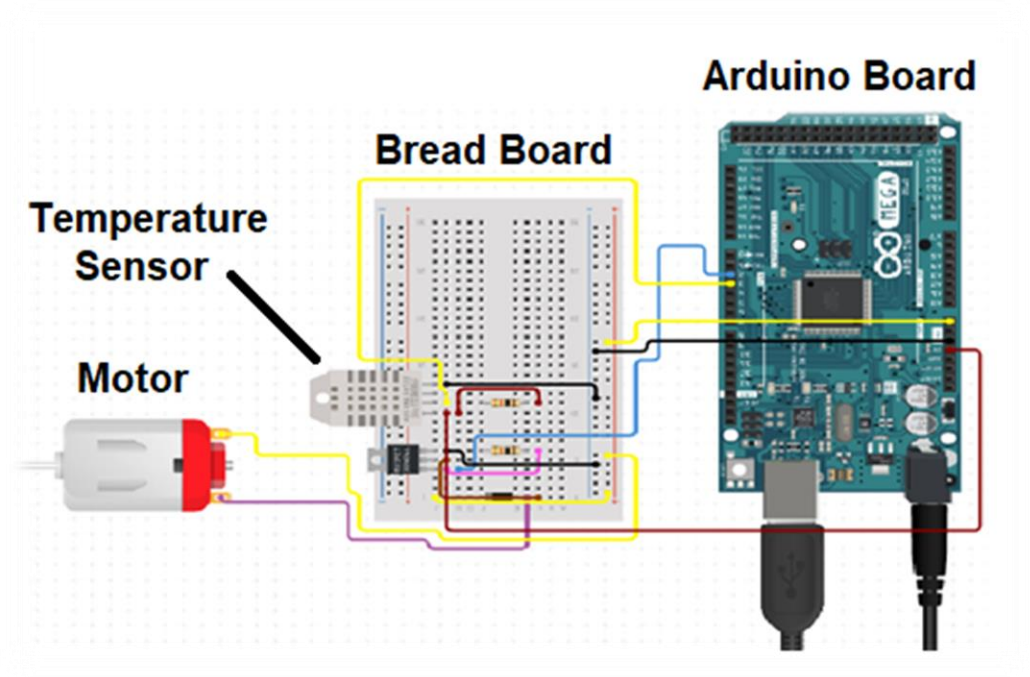
Image Source: https://leap.tardate.com/esp32/gettingstarted/ **and Aatif Shaikh's camera**

Although there are numerous IoT devices, the most common, famous, and well known are Arduino, ESP32, and Raspberry Pi. Whereas Arduinos are based on **ATMEL microcontroller**, ESP32 is SoC Module based on **Tensilica Xtensa LX6 microprocessor,** and lastly, the Raspberry Pi are an SBC (single-board computer), which are based on a **Broadcom processor**.

Arduino

Arduino is an **Open-Source Electronics Platform** based on easy-to-use hardware and software. Arduino boards can read digital and analogue inputs such as Light sensor (LDR-analogue), Temperature sensor (DHT22-digital), button pressed (Push button-digital), or you can even connect these small boards to the Internet. With the help of an Internet connection, you can now monitor (read values) remotely, or you can set the Relay (electrically operated switch), Actuator (a device that produces a motion), or DAC (Digital to analogue converter for setting a voltage), etc.

To understand it in a much simpler way, let us take an example of Temperature Control. The circuit diagram is shown in the below image.



Circuit Source: https://www.circuito.io/

In the above diagram, the Temperature Sensor (DHT22) and a Motor are connected to Arduino Board. Now with a small code, you can make it work. As you can see, we are reading the temperature on one of the digital pins of Arduino. When the temperature goes above a certain level, we can start the motor (connected to a fan) to reduce the temperature, and when the temperature is back to normal, we can stop the motor. Please refer to Pseudocode for more clarity.

```
1   //Add the Arduino libraries
2   //Initialize the hardware peripheral
3
4   /*local variable to store values*/
5   int temperature;
6   int humidity;
7
8   /*local variable to defined values*/
9   /*here 30 defines 30 degreeC*/
10  int temperature_limit = 30;
11
12  /*Start of the code*/
13  while (1)
14  {
15      /*read the temperature and humidity from
16        the sensor and store in local variable*/
17      temperature = read_temperature();
18      humidity    = read_humidity();
19
20      /*check if the temperature c*/
21      if (temperature > temperature_limit)
22         {
23              start_the_motor();
24         }
25      else
26         {
27              stop_the_motor();
28         }
29  }
```

References

1. Web -Wikipedia, https://en.wikipedia.org/wiki/Internet_of_things

2. Web -Oracle, https://www.oracle.com/in/internet-of-things/what-is-iot/

3. web -Wikipedia, https://en.wikipedia.org/wiki/Industrial_internet_of_things