

Functional blocks of an IoT ecosystem

Internet of Things (IoT) ecosystem – a broad network of connected and interdependent devices and technologies that are applied by specialists towards a specific goal, such as the creation of a smart city. Obviously, there are limitless applications to the IoT and therefore we can speak of endless coexisting IoT ecosystems. IoT ecosystem come up with a simple scheme: a **device** that collects data and sends it across the **network** to a **platform** that aggregates the data for future use by the **agent**. And so we have the key components to an IoT ecosystem: devices, networks, platforms, and agents.

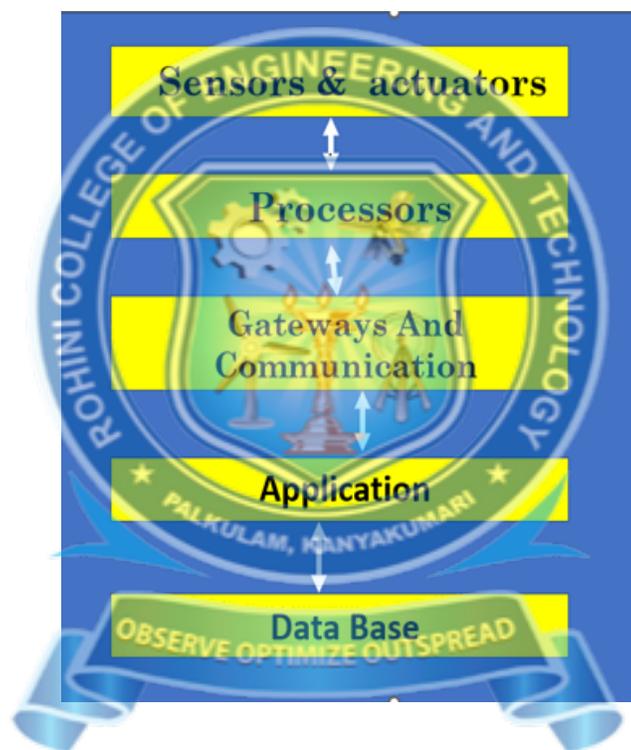


Fig.1.4 Building Blocks of the IoT system

[Ref:<https://www.drpankajdadhich.com/2022/06/building-blocks-of-iot.html>]

Five basic building blocks of the IoT system –sensors, processors, gateways, applications, and database.

1.Sensors & Actuators:

- The front end of the IoT devices. These are the so-called “Things” of the system.
- The main purpose is to collect data from its surroundings (sensors) or give out data to its surrounding (actuators).

- Uniquely identifiable devices with a unique IP address so that they can be easily identifiable over a large network.
- Able to collect real-time data. These can either be autonomous in nature or user-controlled.
- Examples of sensors are gas sensors, water quality sensors, moisture sensors, etc.

Actuators

- Both sensors and actuators are transducers, which means they're responsible for converting signals from one form to another.
- Actuators are responsible for performing actions.
- Sensors and actuators work together to remotely monitor and control physical processes or systems.
- Sensors and actuators are only endpoints that connect physically to the environment, whereas analysis of the information they collect actions in a control layer, is referred to as an IoT gateway.

2. Processors:

Processors are the brain of the IoT system. Processors are primarily real-time devices that can be readily manipulated by software. These are also in charge of data security, which includes data encryption and decryption.

- Main function is to process the data captured by the sensors.
- Extract the valuable data from the huge amount of raw data collected (intelligence to the data).
- Processors mostly work on a real-time basis and are easily controlled by applications.
- Also responsible for securing the data – perform encryption and decryption of data.
- Embedded hardware devices, microcontrollers, etc process the data

3. Gateways:

- Gateway is a device that's used for the basic analysis of data coming from connected sensors.



- Gateways are responsible for routing the processed data and sending it to proper locations for its (data) proper utilization.
- Work as decision points, sending certain control commands to actuators which, in turn, perform appropriate actions.
- Gateway helps in to and from the communication of the data. It provides network connectivity to the data. Network connectivity is essential for any IoT system to communicate. LAN, WAN, PAN, etc are examples of network gateways. Both microcomputers and microprocessors can be used as gateways for IoT applications.

4. Applications:

- Applications are essential for proper utilization of all the collected data. These are cloud-based.
- Responsible for rendering the effective meaning to the data collected. Applications are controlled by users and are a delivery point of particular services.
- Examples of applications are home automation apps, security systems, industrial control hubs, etc.

5. Data Storage:

After reaching its final destination, the sensor value is typically stored in a computer database that can easily serve other systems (hence the name "server"). Data stored on the server which may be either local or cloud and both.

