**Communication protocol in iot sensors**

The wireless communication protocol in IoT is the set of rules used to exchange data between electronic devices. **Bluetooth, ZigBee, LoRa, NBIoT, WiFi, and Thread** are the most commonly used protocols.

**MQTT (Message Queuing Telemetry Transport)**

An MQTT (Message Queuing Telemetry Transport) is a lightweight IoT data protocol. It features a [publisher-subscriber messaging model](https://aws.amazon.com/pub-sub-messaging/) and allows for simple data flow between different devices.

### CoAP (Constrained Application Protocol)

A CoAp (Constrained Application Protocol) is an application layer protocol. It’s designed to address the needs of HTTP-based IoT systems. HTTP stands for Hypertext Transfer Protocol, and it’s the foundation of data communication for the World Wide Web.

### AMQP (Advanced Message Queuing Protocol)

An Advanced Message Queuing Protocol (AMQP) is an open standard application layer protocol used for transactional messages between servers.

### DDS (Data Distribution Service)

DDS (Data Distribution Service) is another scalable IoT protocol that enables high-quality communication in IoT. Similar to the MQTT, DDS also works to a publisher-subscriber model.

### HTTP (HyperText Transfer Protocol)

We’ve briefly touched on the HTTP (HyperText Transfer Protocol) model before. As mentioned, the HTTP protocol is not preferred as an IoT standard because of its cost, battery life, huge power consumption, and weight issues.

### WebSocket

WebSocket was initially developed back in 2011 as part of the [HTML5 initiative](https://web.archive.org/web/20190529021959/https:/www.zdnet.com/article/browser-vendors-win-war-with-w3c-over-html-and-dom-standards/). Via a single TCP connection, messages can be sent between the client and the server.

### WiFi

There’s no denying that Wi-Fi is the most well-known IoT protocol on this list. However, it’s still worth explaining how the most popular IoT protocol works.

### Bluetooth

### Bluetooth BLE Sensors are low-power devices for wireless detection and transmission, set up wirelessly and powered by internal batteries. These transmit sensor-related information based on pre-set signal intervals to Bluetooth BLE

When compared to other IoT network protocols listed here, Bluetooth tends to frequency hop and has a generally shorter range.

### ZigBee

ZigBee-based networks are similar to Bluetooth in the sense that it already has a significant user base in the world of IoT.

However, it’s specifications slightly eclipse the more universally used Bluetooth. It has lower power consumption, low data-range, high security, and has a longer range of communication (ZigBee can reach 200 meters, while Bluetooth maxes out at 100 meters)

**Typical application areas include:**

* Home automation.
* Wireless sensor networks.
* Industrial control systems.
* Embedded sensing.
* Medical data collection.
* Smoke and intruder warning.
* Building automation.
* Remote wireless microphone configuration.

### Z-Wave

Z-Wave is an increasingly-popular IoT protocol. It’s a wireless, radio frequency (RF) cased communication technology that’s primarily used for IoT home applications.

### LoRaWan

LoRaWAN is a media access control (MAC) IoT protocol.

LoRaWAN allows low-powered devices to communicate directly with internet-connected applications over a long-range wireless connection. Moreover, it has the capability to be mapped to both the 2nd and 3rd layer of the OSI model.

**SMART SENSORS**

A smart sensor is **a device that takes input from the physical environment and uses built-in compute resources to perform predefined functions upon detection of specific input** and then process data before passing it on.

Sensors are one key factor in IoT success, but these are not conventional types that simply convert physical variables into electrical signals. They have needed to evolve into something more sophisticated to perform a technically and economically viable role within the IoT environment.

#### WHAT DOES THE IOT EXPECT OF ITS SENSORS?

#### Sensors have traditionally been functionally simple devices that convert physical variables into electrical signals or changes in electrical properties. While this functionality is an essential starting point, sensors need to add the following properties to perform as IoT components:

* Low cost, so they can be economically deployed in large numbers
* Physically small, to “disappear” unobtrusively into any environment
* Wireless, as a wired connection is typically not possible
* Self-identification and self-validation
* Very low power, so it can survive for years without a battery change, or manage with energy harvesting

#### SMART SENSOR: A PRACTICAL EXAMPLE

An application developed by Texas Instruments provides a practical example of a smart sensor, and how its building blocks work together to generate useful information from analog current and temperature measurement, as well as providing the intelligence for the other functions mentioned. The application uses a variant of their ultra-low-power MSP430 MCU range to build a smart fault indicator for electric power distribution networks.

**Wireless Sensor Network (WSN)** is an infrastructure-less wireless network that is deployed in a large number of wireless sensors in an ad-hoc manner that is used to monitor the system, physical or environmental conditions.

Sensor nodes are used in WSN with the onboard processor that manages and monitors the environment in a particular area. They are connected to the Base Station which acts as a processing unit in the WSN System.   
Base Station in a WSN System is connected through the Internet to share data

IoT design means that the **focus is on singular experiences and no longer** but about design principles that represent a broader ecosystem within which IoT devices function.

When designing any IoT system, there are four key factors required to produce high quality data: **Trust, Identity, Time and Chain of Custody**.

Designing an IoT solution comes with a set of totally new design challenges. Consider that IoT systems usually consist of multiple elements such as physical device sensors, actuators, and interactive devices, the network that connects these devices, as well as the data gathered and then analyzed to create a meaningful experience.

What are requirements for cloud computing?

**Cloud Computing Prerequisites**

* Programming Skills. ...
* Familiarity with Databases. ...
* Basics of Security and Privacy. ...
* Knowledge of Agile Development. ...
* Familiarity with Operating Systems. ...
* Understanding of Virtualization. ...
* Basics of Networking.

Requirement

The network that lives between the user and the private or public cloud (including content, application, and services) must be **capable of delivering an experience to** the user that makes their separation from those resources completely

**Top 10 Cloud Computing Skills: A Basic Guide**

* Cloud Security.
* Machine Learning and AI.
* Cloud migration and deployment.
* Database skills.
* DevOps.
* Serverless architecture. ...
* Programming languages. ...
* Automation.

**purpose and system management in iot**

IoT device management refers to the processes involving **the provisioning and authenticating, configuring, maintaining, monitoring and diagnosing connected devices operating** as part of an IoT environment to provide and support the whole spectrum of their functional capabilities.

What is the importance of data management in IoT?

IoT data management can **help you understand and utilize patterns that are then incorporated in the decision-making cycle to result in enhanced product design and development**.

IoT systems are the same in that they represent the integration of four distinct components: **sensors/devices, connectivity, data processing, and a user interface**.

SENSORS

A sensor is **a device that detects and responds to some type of input from the physical environment**. ... The output is generally a signal that is converted to human-readable display at the sensor location or transmitted electronically over a network for reading or further processing.

### Temperature Sensors

Temperature sensors measure the amount of heat energy in a source, allowing them to detect temperature changes and convert these changes to data.

### Humidity Sensors

These types of sensors measure the amount of water vapor in the atmosphere of air or other gases. Humidity sensors are commonly found in heating, vents and air conditioning (HVAC) systems in both industrial and residential domains.

### Pressure Sensors

A pressure sensor senses changes in gases and liquids. When the pressure changes, the sensor detects these changes, and communicates them to connected systems.

### Proximity Sensors

Proximity sensors are used for non-contact detection of objects near the sensor. These types of sensors often emit electromagnetic fields or beams of radiation such as infrared.

### Level Sensors

Level sensors are used to detect the level of substances including liquids, powders and granular materials. Many industries including oil manufacturing, water treatment and beverage and food manufacturing factories use level sensors.

### Accelerometers

Accelerometers detect an object’s acceleration i.e. the rate of change of the object’s velocity with respect to time. Accelerometers can also detect changes to gravity.

### Gyroscope

Gyroscope sensors measure the angular rate or velocity, often defined as a measurement of speed and rotation around an axis. Use cases include automotive, such as car navigation and electronic stability control (anti-skid) systems

### Gas Sensors

These types of sensors monitor and detect changes in air quality, including the presence of toxic, combustible or hazardous gasses. Industries using gas sensors include mining, oil and gas, chemical research andmanufacturing.

### 9. Infrared Sensors

These types of sensors sense characteristics in their surroundings by either emitting or detecting infrared radiation. They can also measure the heat emitted by objects. Infrared sensors are used in a variety of different IoT projects including healthcare as they simplify the monitoring of blood flow and blood pressure.

### Optical Sensors

Optical sensors convert rays of light into electrical signals. There are many applications and use cases for optical sensors.

**BLUETOOTH VS WI-FI**

Bluetooth allows for short-range data transfer between devices. As an example, it is commonly employed in headsets for mobile phones, enabling hands-free phone use. Wi-Fi, on the other hand, allows devices to connect to the [Internet](https://www.britannica.com/technology/Internet). Bluetooth limits the number of devices that can connect at any one time, whereas Wi-Fi is open to more devices and more users. In addition, Bluetooth, because it requires only an adapter on each connecting device, tends to be simpler to use and needs less power than Wi-Fi, although this is achieved at the expense of range and speed of data transfer, in which Wi-Fi typically exceeds Bluetooth’s capabilities.

**IOT levels and deployment**

IoT deployment is expanding out from consumer-based applications such as **smart home devices** and wearables to applications in the areas of public safety, emergency response, industrial automation, autonomous vehicles, and the Internet of Medical Things (IoMT).