

## RFID

**Radio Frequency Identification (RFID)** is a form of wireless communication that incorporates the use of electromagnetic or electrostatic coupling in the radio frequency portion of the electromagnetic spectrum to uniquely identify an object, animal or person. It uses radio frequency to search, identify, track and communicate with items and people. It is a method that is used to track or identify an object by radio transmission over the web. Data digitally encoded in an RFID tag which might be read by the reader. This device works as a tag or label during which data read from tags that are stored in the database through the reader as compared to traditional barcodes and QR codes. It is often read outside the line of sight either passive or active RFID.



### Kinds of RFID :

There are many kinds of RFID, each with different properties, but perhaps the most fascinating aspect of RFID technology is that most RFID tags have neither an electric plug nor a battery. Instead, all of the energy needed to operate them is supplied in the form of radio waves by RFID readers. This technology is called passive RFID to distinguish it from the (less common) active RFID in which there is a power source on the tag.

**UHF RFID ( Ultra-High Frequency RFID )**. It is used on shipping pallets and some driver's licenses. Readers send signals in the 902-928 MHz band. Tags communicate at distances of several meters by changing the way they reflect the reader signals; the reader is able to pick up these reflections. This way of operating is called backscatter.

**HF RFID (High-Frequency RFID)**. It operates at 13.56 MHz and is likely to be in your passport, credit cards, books, and noncontact payment systems. HF RFID has a short-range, typically a meter or less because the physical mechanism is based on induction rather than backscatter.

There are also other forms of RFID using other frequencies, such as LF RFID (Low-Frequency RFID), which was developed before HF RFID and used for animal tracking

### There are two types of RFID :

#### 1. Passive RFID –

Passive RFID tags do not have their own power source. It uses power from the reader. In this device, RF tags are not attached by a power supply and passive RF tags store their power. When it is emitted from active antennas and the RF tags are used specific frequency like 125-134 KHz as low frequency, 13.56 MHz as a high frequency and 856 MHz to 960 MHz as ultra-high frequency.

#### 2. Active RFID –

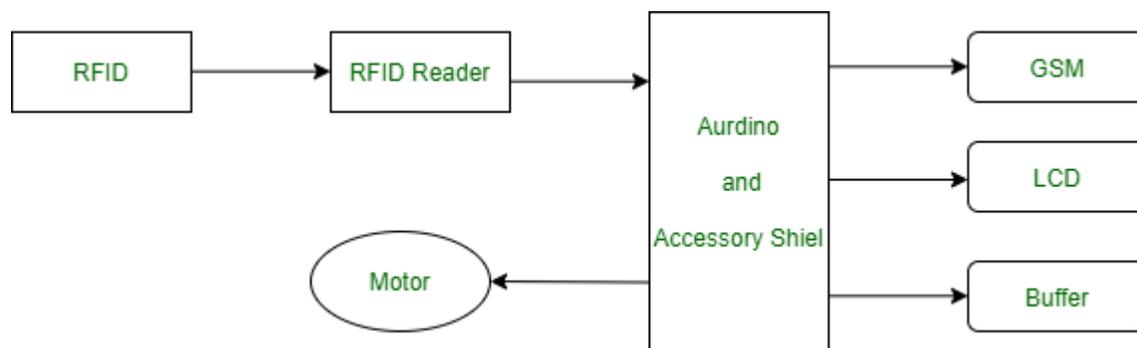
In this device, RF tags are attached by a power supply that emits a signal and there is an antenna

which receives the data. means, active tag uses a power source like battery. It has it's own power source, does not require power from source/reader.

### Working Principle of RFID :

Generally, RFID uses radio waves to perform AIDC function. AIDC stands for Automatic Identification and Data Capture technology which performs object identification and collection and mapping of the data.

An antenna is an device which converts power into radio waves which are used for communication between reader and tag. RFID readers retrieve the information from RFID tag which detects the tag and reads or writes the data into the tag. It may include one processor, package, storage and transmitter and receiver unit.



### Working of RFID System :

Every RFID system consists of three components: a scanning antenna, a transceiver and a transponder. When the scanning antenna and transceiver are combined, they are referred to as an RFID reader or interrogator. There are two types of RFID readers — fixed readers and mobile readers. The RFID reader is a network-connected device that can be portable or permanently attached. It uses radio waves to transmit signals that activate the tag. Once activated, the tag sends a wave back to the antenna, where it is translated into data.

The transponder is in the RFID tag itself. The read range for RFID tags varies based on factors including the type of tag, type of reader, RFID frequency and interference in the surrounding environment or from other RFID tags and readers. Tags that have a stronger power source also have a longer read range.

### Features of RFID :

- An RFID tag consists of two-part which is an microcircuit and an antenna.
- This tag is covered by protective material which acts as a shield against the outer environment effect.
- This tag may active or passive in which we mainly and widely used passive RFID.

### Application of RFID :

- It utilized in tracking shipping containers, trucks and railroad, cars.
- It uses in Asset tracking.
- It utilized in credit-card shaped for access application.
- It uses in Personnel tracking.

- Controlling access to restricted areas.
- It uses ID badging.
- Supply chain management.
- Counterfeit prevention (e.g., in the pharmaceutical industry).

**Advantages of RFID :**

- It provides data access and real-time information without taking too much time.
- RFID tags follow the instruction and store a large amount of information.
- The RFID system is non-line of sight nature of the technology.
- It improves the Efficiency, traceability of production.
- In RFID hundred of tags read in a short time.

**Disadvantages of RFID :**

- It takes longer to program RFID Devices.
- RFID intercepted easily even it is Encrypted.
- In an RFID system, there are two or three layers of ordinary household foil to dam the radio wave.
- There is privacy concern about RFID devices anybody can access information about anything.
- Active RFID can costlier due to battery.