

# IoT Based RFID Gate Automation System

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**Abstract**-Our project deals with a secure RFID gate system that uses IoT technology for better protection. IoT enables the use of internet in connecting different devices that are helpful in our day to day life. By implementing this technology in a gateway it enhances the system by providing more security. This type of gate can be used in large organizations like Industries, Military or Defense area, Apartments, etc. The system consists of RFID reader and tag, Raspberry pi (Processor & server), Motor (230V AC), DPDT Relay, IR Sensor and a slide gate. The system also uses Python as it is fast and more efficient. A DPDT Relay is used so that large gates that need high voltage can be operated. When an unauthorised vehicle approaches the gate he/she needs to inform the person they want to meet so that the person inside can login to the website and click the OPEN button to open the gate. An IR sensor is also placed near the gate so that it prevents accident due to collision of the gate.

**Keywords**:- IoT, RFID gate, Webserver, Relay.

## 1. INTRODUCTION

Every large organizations like apartments, industries, military area etc are continuously accessed by the members of the organisation or other people in need of them. These large buildings are also a storehouse of various data that are confidential that can be controlled and given access to only authorised members of the respective authority, hence they must be well secured. Safety of an organisation mainly depends on its Gate security system because anyone who enters the industry or apartment need to pass through these gates. So they must be monitored. For this reason the entry and exit of all the vehicles to the area are to be watched by the concerned person.

In the present system for example in an apartment a watch man is kept all day long, he/she needs to verify every single vehicle entering the premises. Our project focuses on an unmanned gate security system that uses an RFID. RFID automated gates are not a common thing that we see around especially in apartments etc. Here in this project we bring to you a gate that is fully automated and can be controlled and accessed by the owner from anywhere around the globe.

The vehicle of every authorised personnel of an organization is equipped with RFID tags. When these vehicles come near the gate the RFID tag is recognised by the reader and processed by a Raspberry pi, which sends a signal to the motor and the gate is automatically opened. An IR sensor is also used in the circuit to prevent accidents. When an unauthorised person wants to enter the place he must intimate it to the person he wants to meet inside in this way he sends an OTP to the person outside which he uses as a password to open the gate.

The main purpose of this system is to provide a gate that can be controlled by the owner from anywhere around the world using IOT (Internet of things). The raspberry pi is itself a server that is used for this purpose. A webpage is created and then the owner can have access to all the in and out vehicles. Similarly, in industries the manager or headperson will be able to know if anyone comes or goes out of the area.

## 2. EXISTING SYSTEM

There are various kinds of existing gates slide gates, swing gates, barrier gates etc. These are the commonly used types apart from these there are hydraulic gates etc. They are controlled mostly manually. Later came the automated systems that use microcontrollers and RFID and opens when a vehicle with a known tag enters. But this system consists of a microcontroller a pc with server. Which is indeed a costly circuit for a gate. Due to this reason they are not very affordable and are not used commonly.

## 3. PROPOSED METHODOLOGY

The main aim of this type of a gate system is that it uses the RFID system along with IOT which is the future of electronic communication. Here we also replace the microcontrollers earlier used with a raspberry pi 2 which is a mini processor that is both a microcontroller as well as a server. The vehicle that needs to be authorised is given a RFID tag with a unique number. Now when the vehicle reaches near the gate RFID reader reads the code, and send a signal to raspberry pi which checks for the corresponding details of the unique number and if it matches with the saved data in the database then it again sends a

message to motor which opens the gate. The 230V AC motor is programmed such that it opens the gate for a particular time and then closes, but when the vehicle pauses in between the gate for more than the required time then the IR sensor acts immediately which detects a block in its way and keeps the gate open until the vehicle crosses. The IN and OUT time of every vehicle that enters the area is saved in a database and also a webserver which helps us to access those details wherever we are using IOT.

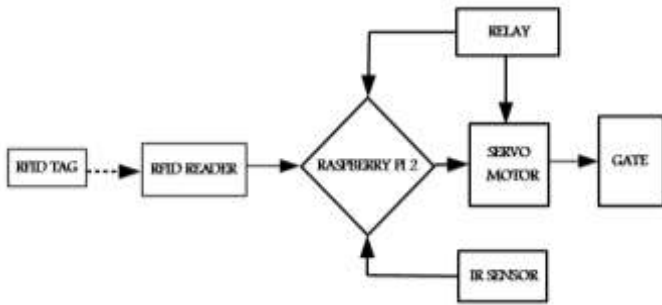


Fig 1.1 Block diagram.

#### 4. IOT (Internet Of Things)

The Internet of Things (IoT) is the network of physical objects—devices, vehicles, buildings and other items—embedded with electronics, software, sensors, and network connectivity that enables these objects to collect and exchange data. When IoT is used in the automation of

gate it enables a more secure and highly reliable gateway.

IoT is more than just a Machine to Machine communication, it helps us in keeping track of all the ENTRY and EXIT details of the area with the help of Internet.

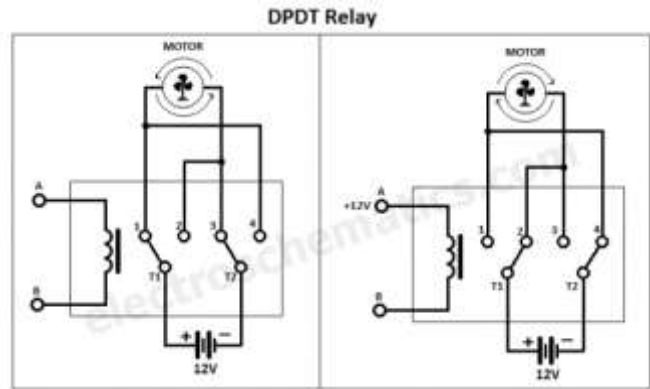
#### 5. RFID Reader & RFID Tag

An RFID reader, also known as an interrogator, is a device that provides the connection between the tag data and the enterprise system software that needs the information. The reader communicates with tags that are within its field of operation, performing any number of tasks including simple continuous inventorying, filtering, writing to selected tags, etc. An RFID tag is comprised of an integrated circuit attached to an antenna. The tag has a unique serial number, a tag is placed in the authorised vehicle so that only the authorised vehicles are detected by the RFID reader. The tag is a sort of key for the vehicle to enter an area with ease. When an

unauthorised vehicle reaches near the gate it does not open.

#### 6. DPDT RELAY

A relay is a large mechanical switch. A type of relay that can handle the high power required to directly control an electric motor or other loads is called a contactor. The DPDT relay (Double Pole



Double Throw) is quite interesting and can be used in various scenarios, including for changing the direction of a motor as you can see in the picture below.

Fig 1.2 DPDT Relay

It has 2 terminals and 4 connectors and you can look at the DPDT relay as the equivalent of 2 Single Pole Double Throw SPDT relay.

As you can see in the schematic the 12V battery (or use other voltages) is connected with the plus at terminal T1 and minus at terminal T2. The contact 1 and 4 are connected together as 2 and 3 are too.

Without voltage applied to the coil the battery plus is connected to contact 1 (and 4) and minus to 3 (and 2) therefore the motor is turning in one direction (let's say clockwise). When voltage is applied to the coil then the relay switches and now T1 (plus) is connected to contact 2 (and 3) and T2 (minus) is connected to 4 (and 1) therefore the motor is changing the direction of rotation.

#### 7. RASPBERRY PI

The Raspberry Pi is a low cost, credit-card sized computer that plugs into a computer monitor or TV, and uses a standard keyboard and mouse. It is a capable little device that enables people of all ages to explore computing, and to learn how to program in languages like Scratch and Python.

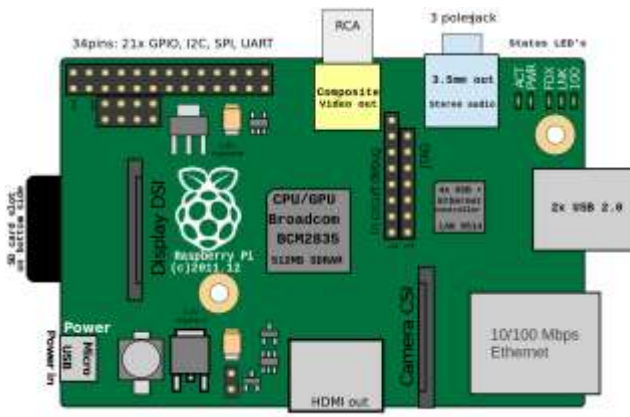


Fig 1.3 Raspberry pi Model

One powerful feature of the Raspberry Pi is the row of GPIO (general purpose input/output) pins along the edge of the board, next to the yellow video out socket. There are 40 pins. These pins are a physical interface between the Pi and the outside world. At the simplest level, you can think of them as switches that you can turn on or off (input) or that the Pi can turn on or off (output). Seventeen of the 26 pins are GPIO pins; the others are power or ground pins.

### 8. Advantages of IoT based gate system

- 1) More reliable.
- 2) Can be monitored from anywhere around the world.
- 3) Low cost.
- 4) Simple Circuit.

### 9. Conclusion and Future work

Our project mainly reviewed the research and development work for RFID based gate automation system with the help of IOT technology. This kind of a system can provide you with a reliable gateway with good monitoring. These types of gates can be mainly used in Industrial areas, Military areas and apartments as these places need more security.

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