

# **A Project Report On RFID – BASED SECURITY SYSTEM**

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NEEMRANA, RAJASTHAN – 301705**

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**A  
Project Report  
On  
RFID – BASED SECURITY SYSTEM**

**In partial fulfillment of requirements for the course of  
Digital Logic and Circuit (EL 101)  
In the Degree of  
Bachelor of Technology (Computer Science and  
Engineering)**

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## **CERTIFICATE**

This is to certify that the project entitled “RFID Based Security System” has been carried out by the team under my guidance in partial fulfillment of the Digital Logic and Circuit (EL 101) in NU during the academic year 2017–2018 (Semester–3).

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Date: November 23, 2017

Place: Neemrana

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(Mr. Arghya Guchhait)

## **ACKNOWLEDGEMENT**

This is an opportunity to humbly express our thankfulness to all those people concerned with our project entitled “Voice controlled automation & Security System”.

At the time of complication of this project, we would like to thank everyone who made a great effort to make this possible. Our project wouldn't exist without help of our project leaders. Trying to cover next to impossible then also we have bought all facts in the application with the help of our guides.

I express very sincere thanks to our college faculties for their guidance throughout preparation of project. Their valuable guidance has proved to be a key to our success In overcoming challenges we faced during this project. At last, we would like to thank all the members related to this project for their kind co-operation and help during the project. Again as the law of nature “No One Is PERFECT”, I will be very glad to know my mistakes and also if any suggestions are there.

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# RFID BASED SECURITY SYSTEM



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## **ABSTRACT**

The security system is basically an embedded one. Embedded stands for hardware controlled by software. Here, the software using a microcontroller controls all the hardware components. The microcontroller plays an important role in the system.

The main objective of the system is to uniquely identify and to make security for a person. This requires a unique product, which has the capability of distinguishing different person. This is possible by the new emerging technology RFID (Radio Frequency Identification). The main parts of an RFID system are RFID tag (with unique ID number) and RFID reader (for reading the RFID tag). In this system, RFID tag and RFID reader used are operating at 125KHz. The microcontroller internal memory is used for storing the details. The PC can be used for restoring all the details of security made.

This report provides a clear picture of hardware and software used in the system. It also provides an overall view with detailed discussion of the operation of the system.

## Introduction

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### **Introduction:**

Most educational institutions administrators are concerned about student security. The conventional method allowing access to students inside a college/educational campus is by showing photo I-Card to security guard is very time consuming and insecure, hence inefficient.

Radio Frequency Identification (RFID) based security system is one of the solutions to address this problem. This system can be used to allow access for student in school, college, and university. It also can be used to take attendance for workers in working places. Its ability to uniquely identify each person based on their RFID tag type of ID card make the process of allowing security access easier, faster and secure as compared to conventional method.

Student or workers only need to place their ID card on the reader and they will be allowed to enter the campus. And if any invalid card is shown then the buzzer is turned on.

## Feasibility

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### **2.1 Financial feasibility:**

The resources used in this project are quite feasible financially.

Components list:

- Resisters
- LED
- RFID Module
- Arduino
- Servo Motor
- Wooden Door
- Hinge
- Latch
- RFID Tag

The list of components given above shows that all the components are cheap and feasible. The company will not have any problem in using this simple project circuit.

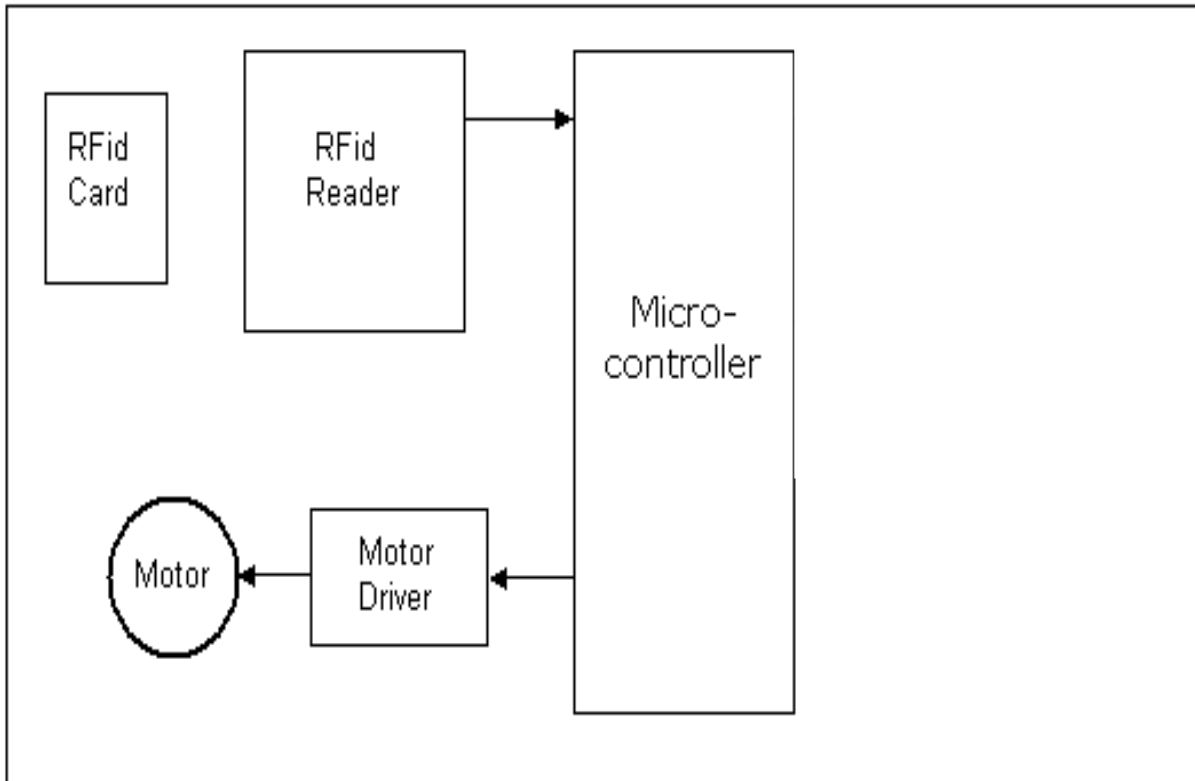


## Block Diagram of The Project

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### Construction

#### Block Diagram:-



#### History of RFID:

In a very interesting article, the San Jose Mercury News tells us about Charles Walton, the man behind the radio frequency identification technology (RFID). Since his first patent about it in 1973, Walton, now 83 years old, collected about \$3 million from royalties coming from his patents. Unfortunately for him, his latest patent about RFID expired in the mid-1990s. So he will not make any money from the billions of RFID tags that will appear in the years to come. But he continues to invent and his latest patent about a proximity card with incorporated PIN code protection was granted in June 2004.

## **What is RFID.**

RFID is short for Radio Frequency Identification. Generally, a RFID system consists of 2 parts. A Reader, and one or more Transponders, also known as Tags. RFID systems evolved from barcode labels as a means to automatically identify and track products and people. You will be generally familiar with RFID systems as seen in:

## **Access Control**

RFID Readers placed at entrances that require a person to pass their proximity card (RF tag) to be read before the access can be made.

## **Contact less Payment Systems**

RFID tags used to carry payment information. RFIDs are particular suited to electronic Toll collection system. Tags attached to vehicles, or carried by people transmit payment information to a fix reader attached to a Toll station. Payments are then routinely deducted from a users account, or information is changed directly on the RFID tag.

## **Product Tracking and Inventory Control**

RFID systems are commonly used to track and record the movement of ordinary items such as library books, clothes, factory pallets, electrical goods and numerous items.

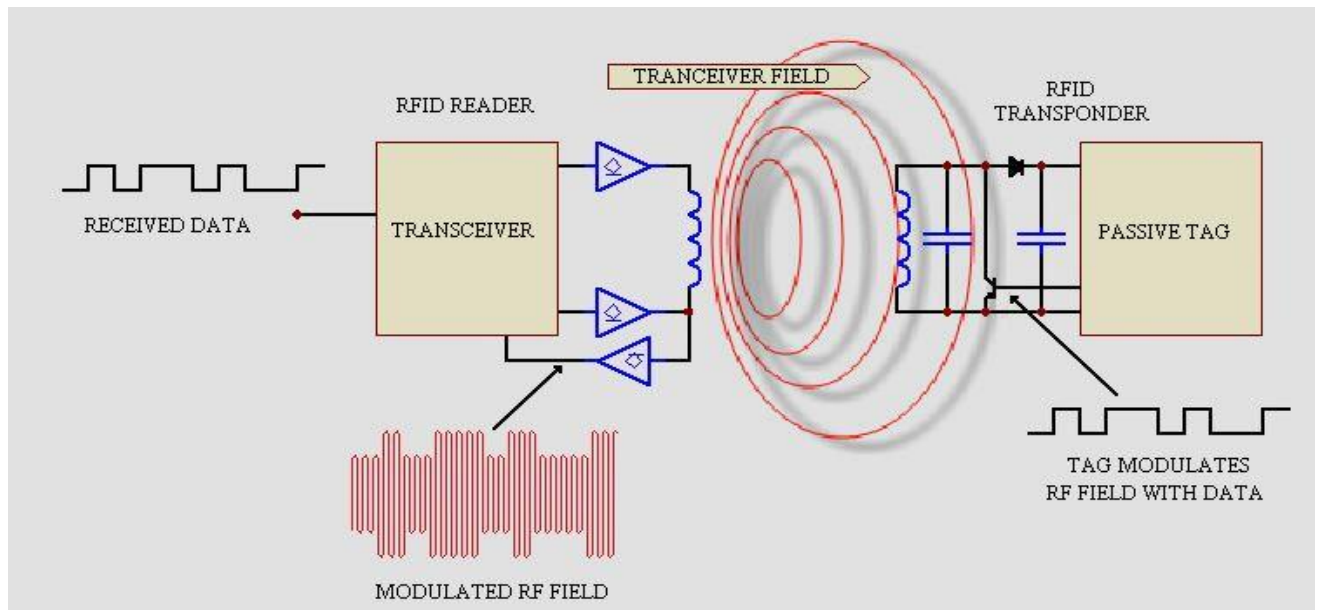
## **How do RFIDs work**

Shown below is a typical RFID system. In every RFID system the transponder Tags contain information. This information can be as little as a single binary bit, or be a large array of bits representing such things as an identity code, personal medical information, or literally any type of information that can be stored in

digital

binary

format.



Shown is a RFID transceiver that communicates with a passive Tag. Passive tags have no power source of their own and instead derive power from the incident electromagnetic field.

Commonly the heart of each tag is a microchip. When the Tag enters the generated RF field it can draw enough power from the field to access its internal memory and transmit its stored information.

When the transponder Tag draws power in this way the resultant interaction of the RF fields causes the voltage at the transceiver antenna to drop in value. This effect is utilized by the Tag to communicate its information to the reader. The Tag is able to control the amount of power drawn from the field and by doing so it can modulate the voltage sensed at the Transceiver according to the bit pattern it wishes to transmit.

## **COMPONENTS OF RFID**

A basic RFID system consist of three components:

- An antenna or coil
- A transceiver (with decoder)
- A transponder (RF tag) electronically programmed with unique information

These are described below:

### **1. ANTENNA**

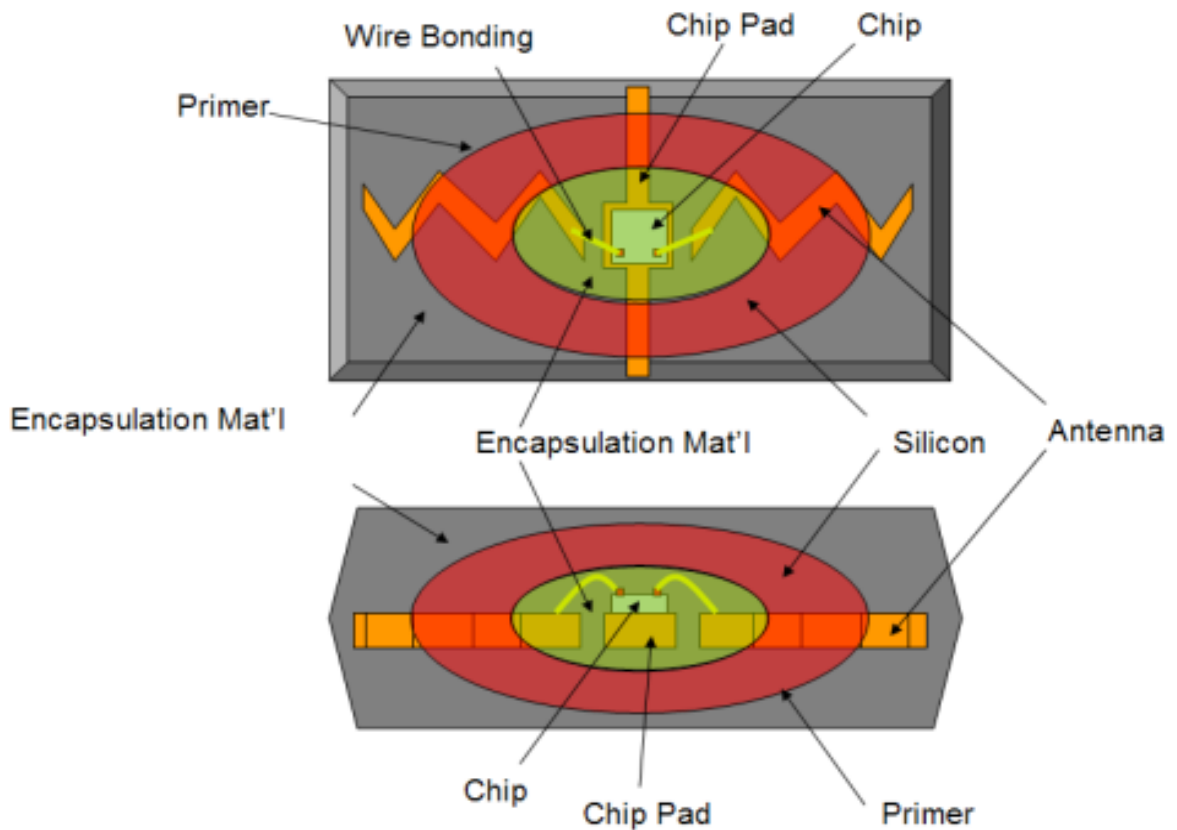
The antenna emits radio signals to activate the tag and read and write data to it. Antennas are the conduits between the tag and the transceiver, which controls the system's data acquisition and communication.

Antennas are available in a variety of shapes and sizes; they can be built into a door frame to receive tag data from persons or things passing through the door, or mounted on an interstate tollbooth to monitor traffic passing by on a freeway.

The electromagnetic field produced by an antenna can be constantly present when multiple tags are expected continually. If constant interrogation is not required, a sensor device can activate the field.

Often the antenna is packaged with the transceiver and decoder to become a reader (a.k.a. interrogator), which can be configured either as a handheld or a fixed-mount device. The reader emits radio waves in ranges of anywhere from one inch to 100 feet or more, depending upon its power output and the radio frequency used.

When an RFID tag passes through the electromagnetic zone, it detects the reader's activation signal. The reader decodes the data encoded in the tag's integrated circuit (silicon chip) and the data is passed to the host computer for processing.



## 2. TAGS (Transponders)

An RFID tag is comprised of a microchip containing identifying information and an antenna that transmits this data wirelessly to a reader. At its most basic, the chip will contain a serialized identifier, or license plate number, that uniquely identifies that item, similar to the way many bar codes are used today.

A key difference, however is that RFID tags have a higher data capacity than their bar code counterparts. This increases the options for the type of information that can be encoded on the tag, including the manufacturer, batch or

lot number, weight, ownership, destination and history (such as the temperature range to which an item has been exposed).

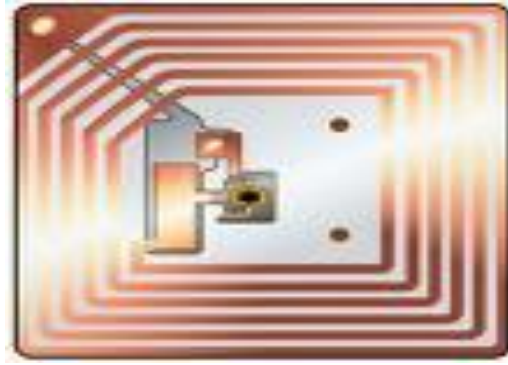
In fact, an unlimited list of other types of information can be stored on RFID tags, depending on application needs. An RFID tag can be placed on individual items, cases or pallets for identification purposes, as well as on fixed assets such as trailers, containers, totes, etc.

**Tags come in a variety of types, with a variety of capabilities. Key variables include: "Read-only" versus "read-write"**

There are three options in terms of how data can be encoded on tags: (1) Read-only tags contain data such as a serialized tracking number, which is pre-written onto them by the tag manufacturer or distributor. These are generally the least expensive tags because they cannot have any additional information included as they move throughout the supply chain.

Any updates to that information would have to be maintained in the application software that tracks SKU movement and activity. (2) "Write once" tags enable a user to write data to the tag one time in production or distribution processes. Again, this may include a serial number, but perhaps other data such as a lot or batch number. (3) Full "read-write" tags allow new data to be written to the tag as needed—and even written over the original data.

Examples for the latter capability might include the time and date of ownership transfer or updating the repair history of a fixed asset. While these are the most costly of the three tag types and are not practical for tracking inexpensive items, future standards for electronic product codes (EPC) appear to be headed in this direction.

**RFID TAGS**

### **Data capacity**

The amount of data storage on a tag can vary, ranging from 16 bits on the low end to as much as several thousand bits on the high end. Of course, the greater the storage capacity, the higher the price per tag.

### **Form factor**

The tag and antenna structure can come in a variety of physical form factors and can either be self-contained or embedded as part of a traditional label structure (i.e., the tag is inside what looks like a regular bar code label—this is termed a 'Smart Label') companies must choose the appropriate form factors for the tag very carefully and should expect to use multiple form factors to suit the tagging needs of different physical products and units of measure.

For example, a pallet may have an RFID tag fitted only to an area of protected placement on the pallet itself. On the other hand, cartons on the pallet have RFID tags inside bar code labels that also provide operators human-readable information and a back-up should the tag fail or pass through non RFID-capable supply chain links.

## **Passive versus active**

“Passive” tags have no battery and "broadcast" their data only when energized by a reader. That means they must be actively polled to send information. "Active" tags are capable of broadcasting their data using their own battery power.

In general, this means that the read ranges are much greater for active tags than they are for passive tags—perhaps a read range of 100 feet or more, versus 15 feet or less for most passive tags. The extra capability and read ranges of active tags, however, come with a cost; they are several times more expensive than passive tags.

Today, active tags are much more likely to be used for high-value items or fixed assets such as trailers, where the cost is minimal compared to item value, and very long read ranges are required. Most traditional supply chain applications, such as the RFID-based tracking and compliance programs emerging in the consumer goods retail chain, will use the less expensive passive tags.

## **Frequencies**

Like all wireless communications, there are a variety of frequencies or spectra through which RFID tags can communicate with readers. Again, there are trade-offs among cost, performance and application requirements. For instance, low-frequency tags are cheaper than ultra high-frequency (UHF) tags, use less power and are better able to penetrate non-metallic substances.

They are ideal for scanning objects with high water content, such as fruit, at close range. UHF frequencies typically offer better range and can transfer data faster. But they use more power and are less likely to pass through some materials. UHF tags are typically best suited for use with or near wood, paper,



cardboard or clothing products. Compared to low-frequency tags, UHF tags might be better for scanning boxes of goods as they pass through a bay door into a warehouse.

While the tag requirements for compliance mandates may be narrowly defined, it is likely that a variety of tag types will be required to solve specific operational issues. You will want to work with a company that is very knowledgeable in tag and reader technology to appropriately identify the right mix of RFID technology for your environment and applications.

### **EPC Tags**

EPC refers to "electronic product code," an emerging specification for RFID tags, readers and business applications first developed at the Auto-ID Center at the Massachusetts Institute of Technology. This organization has provided significant intellectual leadership toward the use and application of RFID technology.

EPC represents a specific approach to item identification, including an emerging standard for the tags themselves, including both the data content of the tag and open wireless communication protocols. In a sense, the EPC movement is combining the data standards embodied in certain bar code specifications, such as the UPC or UCC-128 bar code standards, with the wireless data communication standards that have been developed by ANSI and other groups.

### **3. RF Transceiver:**

The RF transceiver is the source of the RF energy used to activate and power the passive RFID tags. The RF transceiver may be enclosed in the same cabinet as the reader or it may be a separate piece of equipment. When provided as a

separate piece of equipment, the transceiver is commonly referred to as an RF module.

The RF transceiver controls and modulates the radio frequencies that the antenna transmits and receives. The transceiver filters and amplifies the backscatter signal from a passive RFID tag.

### **Typical Applications for RFID**

- Automatic Vehicle identification
- Inventory Management
- Work-in-Process
- Container/ Yard Management
- Document/Jewellery tracking
- Patient Monitoring

## Advantages and limitations

### **Advantages of RFID over bar coding:**

1. No "line of sight" requirements: Bar code reads can sometimes be limited or problematic due to the need to have a direct "line of sight" between a scanner and a bar code. RFID tags can be read through materials without line of sight.
2. More automated reading: RFID tags can be read automatically when a tagged product comes past or near a reader, reducing the labor required to scan product and allowing more proactive, real-time tracking.
3. Improved read rates: RFID tags ultimately offer the promise of higher read rates than bar codes, especially in high-speed operations such as carton sortation.
4. Greater data capacity: RFID tags can be easily encoded with item details such as lot and batch, weight, etc.
5. "Write" capabilities: Because RFID tags can be rewritten with new data as supply chain activities are completed, tagged products carry updated information as they move throughout the supply chain.

## **Common Problems with RFID**

Some common problems with RFID are reader collision and tag collision. Reader collision occurs when the signals from two or more readers overlap. The tag is unable to respond to simultaneous queries. Systems must be carefully set up to avoid this problem. Tag collision occurs when many tags are present in a small area; but since the read time is very fast, it is easier for vendors to develop systems that ensure that tags respond one at a time. See Problems with RFID for more details.

## **Conclusion and Bibliography**

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### **CONCLUSION:**

Thus, there are various applications of this project at different-different places. This project is also cheap and can be used on large scale. One more is by adding different types of controllers like ATMEL(AT89C51/52) etc. and also replacing latest RFID module and some compatible component we can use some different applications at low cost.

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