

## Automated Smart Cabin

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### ABSTRACT

With the rising demand for security and energy conservation, framework with high reliability and fast reaction frameworks are real need for industries. Radio frequency is the suitable technology for short distance wireless communication. In this project, a wireless transmitter and receiver system using RF modules (RF Transmitter and RF Receiver) is implemented. RF Transmitter and Receivers is a (usually) small electronic device used to transmit and/or receive radio signals between two devices. The Transmitter sends a signal which is to be received by the Receiver to which further mechanism of security and energy conservation is connected.

Keywords— Rf transmitter and receiver, Relay, Servo motor, Door access control, Battery

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## I. INTRODUCTION

Security systems play an important role to prevent unauthorized personnel entry into a secured environment, which may include physical and intellectual property. Communication over Radio Frequency has many advantages as it doesn't require a line of sight connection between the transmitter and receiver as in case of infrared communication[1]. Conventional locks can be easily hacked by unwanted people thereby allowing unauthorized personnel into secured premises. Access Control System recognizes authenticates and authorizes entry of a person to enter into the premise thereby giving complete protection ensuring security with the system. Many access control systems use network for communication purpose and information is communicated through these networks[1]. On account of these perils, it is basic to have a type of individual recognizable proof (ID) to get to one's own specific data. Security get to framework is

exceptionally helpful to use at home, office and business structures. Every one of these years, different frameworks are acquainted with track the individual's development. Energy conservation has become a global phenomenon these days and you will know the significance it has acquired because we as a nation have a separate day dedicated to remind everyone how important it is to save energy. The basic idea behind energy conservation is to reduce the consumption of energy. So, even if you cannot reduce the usage of energy run appliances completely, shift to those which are more energy efficient. We are implementing smart relay which cuts the supply when the user is not around.

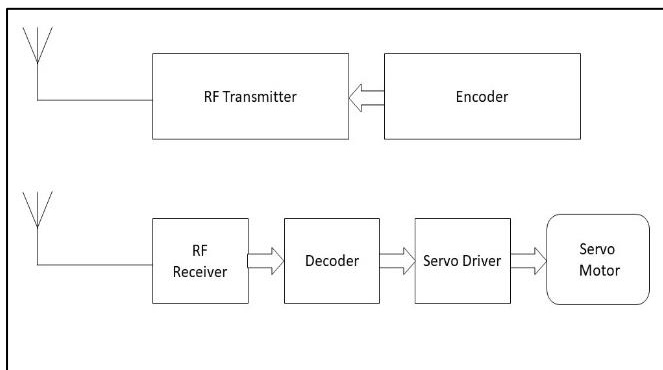
## II. Objective

Providing automation to doors and electric appliances using RF technology to achieve preferable security and for conservation of electrical energy.

### III. Methodology

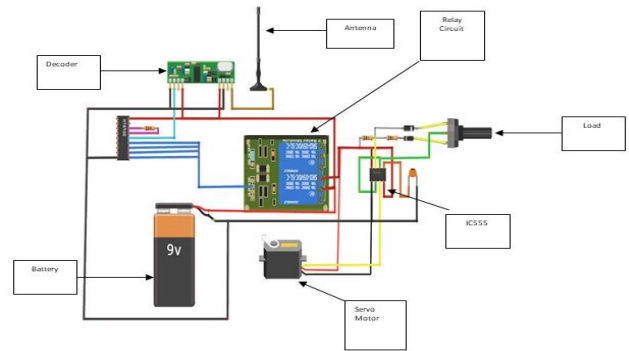
As we now know the importance of security and energy conservation let's discuss the working and technology we are using in our framework. RF transmitter and receiver is the backbone of our framework[1]. RF stands for 'Radio Frequency' as the name suggests this is a wireless communication technology which uses radio frequency as a medium to transfer data in a particular range which depends on different modules. The Transmitter sends signal to the receiver when the receiver is in the range it receives the signal and send it to the microcontroller which then sends signal to the Servo motor and relay. We're using servomotor to unlock the Door of the cabin and relay to open and close the circuit.

#### Block Diagram

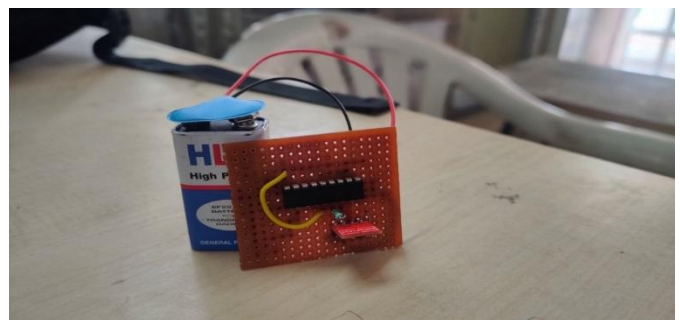


The Transmitter sends signal to the receiver when the transmitter is in the range, receiver receives the signal and send it to the microcontroller which then sends signal to the Servo motor and relay. A servomotor (or servo motor) is a rotary actuator or linear actuator that allows for precise control of angular or linear position, velocity and acceleration. We're using servomotor to unlock the Door of the cabin and relay to open and close the circuit.

#### Circuit Diagram



#### Hardware



#### 1. RF Transmitter and encoder

The RF transmitter receives serial data and transmits it wirelessly through its RF antenna. RF receiver receives the transmitted data and it is operating at the same frequency as that of the transmitter.

The transmitter draws no power when transmitting logic zero while fully suppressing the carrier frequency thus consume significantly low power in battery operation. When logic one is sent carrier is fully on to about 4.5mA with a 3volts power supply. The data is sent serially from the transmitter which is received by

the tuned receiver. Transmitter and the receiver are duly interfaced to two microcontrollers for data transfer.

RF signals travel in the transmitter and receiver even when there is an obstruction. It operates at a specific frequency of 433MHz.

An RF module (short for radio-frequency module) is a (usually) small electronic device used to transmit and/or receive radio signals between two devices. In an embedded system it is often desirable to communicate with another device wirelessly. This wireless communication may be accomplished through optical communication or through radio-frequency (RF) communication. For many applications, the medium of choice is RF since it does not require line of sight. RF communications incorporate a transmitter and a receiver. They are of various types and ranges. Some can transmit up to 500 feet. RF modules are typically fabricated using RF CMOS technology.

## 2. RF Receiver and Decoder

HT12D is a **2 12 series decoder**, most commonly used in remote control applications. By using the HT12E encoder and HT12D decoder, we can transmit 12 bits of parallel data serially. HT12D converts serial data to its input to 12 bit parallel data. These 12 bit parallel data is divided in to 8 address bits and 4 data bits.

## 3. Relay

A relay is an electrically operated switch. It consists of a set of input terminals for a single or multiple control signals, and a set of operating contact terminals. The switch may have any number of contacts in multiple contact forms, such as make contacts, break contacts, or combinations thereof.

Relays are used where it is necessary to control a circuit by an independent low-power signal, or where several circuits must be controlled by one signal. Relays were first used in long-distance telegraph circuits as signal repeaters: they refresh the signal coming in from one circuit by transmitting it on

another circuit. Relays were used extensively in telephone exchanges and early computers to perform logical operations.

## 4. Servo Motor

A servomotor (or servo motor) is a rotary actuator or linear actuator that allows for precise control of angular or linear position, velocity and acceleration.[1] It consists of a suitable motor coupled to a sensor for position feedback. It also requires a relatively sophisticated controller, often a dedicated module designed specifically for use with servomotors.

Servomotors are not a specific class of motor, although the term servomotor is often used to refer to a motor suitable for use in a closed-loop control system.

### Component Ratings

Components	Ratings
RF Transmitter and receiver	Launch distance: 20-200 meters, Operating Voltage:3.5V-12V
Servo Motor	Operating Voltage: 3.0V-7.2V
DC Battery	9V
Resistor	12ohm
Capacitor	50V
555 Timer IC	4.5V-14V
Encoder(Tx) and Decoder(RX)	1.8V-5.5V
Relay x 2	12V

### Advantages

- Very less power is required for the circuit.
- Significantly reliable Framework.
- Less maintenance.
- Energy Conservation.

### Disadvantages

- The Transmitter end requires a portable battery.
- Battery needs to be changed.

### Applications

- It can be used in bank cabins and office cabins where high security is required.
- Garage door and Car door controllers.

### IV. Conclusion

In this paper, The automated door lock system is implemented using RF transmitter and receiver. This framework is less expensive compared to other wireless technologies and easy to implement so that even smallscale offices can get high security as well as help in conserving less Electricity. The model is feasible to implement in real world scenarios. The application of this system are they can be used in offices, cabins and banks, etc.

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