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Secure Home Using Magnetic Reed Switch

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Abstract *— Smart phones and tablets nowadays are becoming increasingly dominant, smart home technology is becoming easier to use and also more affordable. This paper generally relates to developing a smart home with greater scalability, operability, intelligence, cost effective, reliability and security. In the current market scenario, a lot of smart home devices are available like smart plugs, smart switches that are generally operated through Alex or amazons echo. But most of the products in the market are way too costly. In this paper, we would discuss the security features and will be using some common cheap chips to overall reduce the cost and simultaneously provide a highly scalable, user friendly system that automates a house in all aspects.*

I. INTRODUCTION

Home Security systems are importing in present now a day's society, where crime is increasing. With the technological advancements we had achieved in the recent years, homeowners don't to worry about home security while getting off his/her home. Modern home security systems provide security from burglars, fire, smoke etc. They also provide notification to the homeowner.

A GSM based home security alert system is designed using Arduino, PIR motion detection sensor and a GSM module. PIR sensor is detecting motion by sensing. The range of the PIR sensor is 4-7 meters or 28-33 feet. It will send a notification within 20-60 seconds. PIR sensor detects any motion output of the sensor is high like (1), otherwise it will be low like (0). The total process will run or detected by the Arduino.

II. LITERATURE SURVEY

This paper was written to implement a secure home system using magnetic reed switch with enhanced authorization and secure practice, different technology using present nowadays.

This work was done by keeping in mind the various secure home systems using magnetic reed switch like access controller (AC) based secure home system, context aware secure home system, Bluetooth based secure home system, short messaging service based secure home system, global system for mobile communication or mobile based secure home system and internet based secure home system. The work was concluded by giving future directions secure home using magnetic reed switch research.

We are implementing an Internet based secure home using magnetic reed switch as it is always a popular choice among researchers. The internet is easily scalable and easily accessible when it comes to access and use.

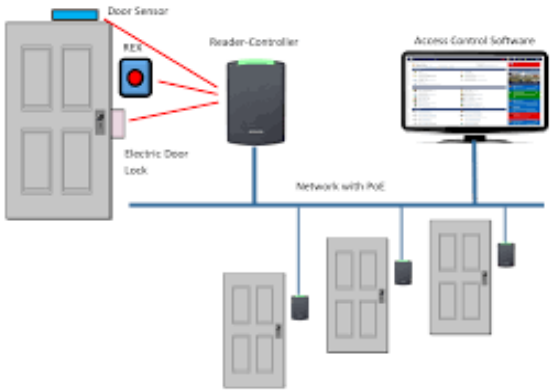
III. STUDY OF DIFFERENT SYSTEM

A. Access Control based Secure System

Access Control System is the electronic systems designed to control network. Access Control System will give the security within the system.

Access Control System is providing security by given flexible control. Access Control Systems are most common used system in electric door control using sensors. The main aim of this Access Control System is using security purposes only.

Locks and login credentials are two main analogous mechanisms of access control system.



B. Bluetooth based Secure System

Smartphone's (Android or IOS) are made life easier than ever. They are always in the pocket. The Smartphone's are designing to develop services and solve the solutions are the mobile domain

Bluetooth is short ranged wireless technology, is generally used to communication between different

device for transforming the data or information. The range of this Bluetooth is 10-12 meters.

Bluetooth is controlling different applications and devices using an Android device with the help of Bluetooth System.

C. Wi-Fi Based Secure System

Wireless-Fidelity which is popularly known as wifi

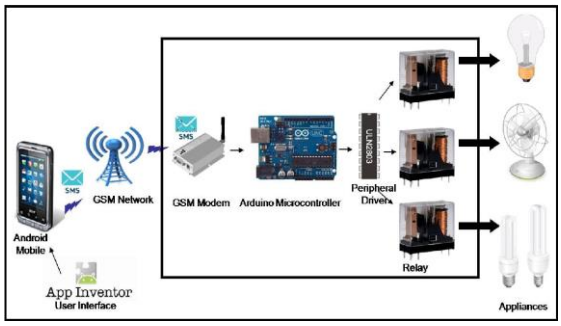
User radio waves for the transmission of data. It provides high speed internets and network connections. It is a wireless medium for communicating to different location in the house and connecting different devices. It can be used in verity of specification which varies with the purpose.

Equipment can be placed anywhere. No unnecessary cores are required in your home. There is no need for additional Ethernet output and it also provides a wide range and is more efficient. Wi-Fi is a popular choice among people.

D. Mobile Based Secure System

Mobile based secure system are striking to companies because of the fame of mobile phones and GSM. The work of A.Alheraish proposed a smart home system using SMS. This system detects the illegitimate invasions at home and allows only legitimate users to alter the passkey for the gate.

The work of U.SAEED also proposes an SMS-based home automation system. In this system an android application made to run on the users mobile phone.



IV. IMPLEMENTATION

For the implementation, .firstly we installed Ubuntu Server using a virtual machine on our local Laptop using VMware software and update the packages on Ubuntu and install Python3 pip3. Next we downloaded Bolt Python Library on Ubuntu using pip as it provides an easy to use interface of the Bolt Cloud API's. After that we created an account on the 'IoT cloud services (Bolt cloud)' and downloaded the mobile app called 'Bolt' from Google play store as we developed the project in Bolt Cloud account and tested Arduino successfully. This app is used to activate the Wi-Fi module.

Secondly we linked the micro controller module to the cloud and setup the circuit connection with the door sensor to the Wi-Fi module.

To receive alert notifications we used third-party services. For that created accounts on Twilio(a third-party SMS functionality provider), Mailgun (an Email automation service) and Telegram (Created a Telegram channel and a Telegram bot, then add the bot to channel. The messages are sent to channel via bot) in order to receive alerts from Messages, Mail and Telegram applications respectively.

A. Components Required

- ESP8266 Wi-Fi Module
- Magnetic Reed Switch
- Bread board
- Jumper wires
- USB cable for power supply
- Magnets
- LED lights
- Resisters

B. Magnetic Reed Switch

The magnetic reed switch is an electrical switch controlled by magnetic field.

A magnetic reed switch has two electrical contacts like open and close in it, these were made from a ferromagnetic material (that means something as easy to magnetize as iron), glaze with a hardwearing metal such as rhodium or ruthenium (to give them a long life as they switch on and off), and sealed inside a thin glass envelope filled with an uncreative gas (typically nitrogen) to keep them free of dust and dirt. Sometimes the glass has an outer casing of plastic for even greater protection. Generally both contacts move

(not just one) and they make a flat, parallel area of contact with one another (rather than simply touching at a point), because that helps to extend the life and reliability of the switch.

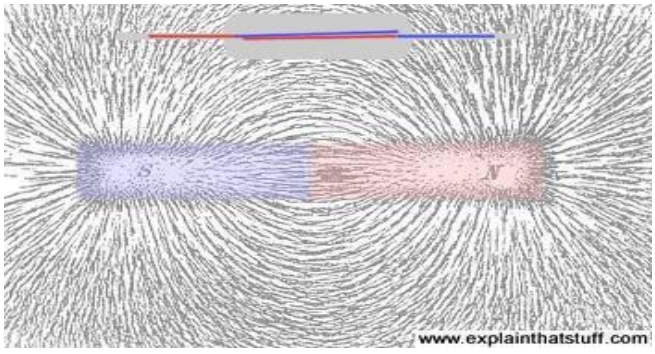
Magnetic Reed switches were made in two main varieties called normally open (normally switched off) and normally closed (normally switched on). The key to understand how they work is to realize that they don't just work as an electrical bridge but as a magnetic one.

Normally open Reed Switch

Normally closed Reed Switch

For this project we used normally open Reed Switch.

Magnetic reed switch doesnot simply switch on when a magnet moves up close and off when it moves away (in the case of a normally open/off switch): they will typically switch on and off several times as the magnet moves by, creating multiple on and off zones. They'll also respond differently according to the orientation of the magnet (whether it's parallel to the switch or perpendicular), what shape it is (because, as we all learned in school, different shaped magnets create different magnetic field patterns all around them), and how it moves past.



Magnet poles

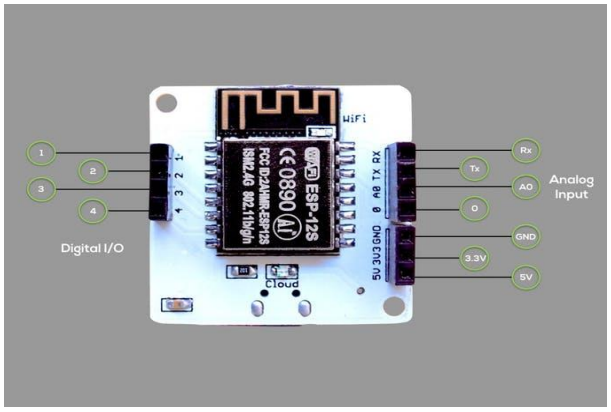
C. Bolt IoT Wi-Fi module:

Bolt Wi-Fi module started with IoT easy and faster. The ESP8266 (ESP32) is a Wi-Fi module to carries all the connections.

ESP8266 sensor data will connect to IP packets and send to Wi-Fi network. Bolt IoT having 1 Analog to Digital Converter (ADC) pin. And 5 General Purpose Input and Output (GPIO) pins.ESP8266 is low cost Wi-Fi module of microchip.

The main use of this Bolt IoT is to use machine learning over GUI, 80% code reduction, 10X faster deployment time and connects to bolt cloud out of the box.

The Bolt IoT platform is one such board, and we had one on the bench and took it for a test drive.



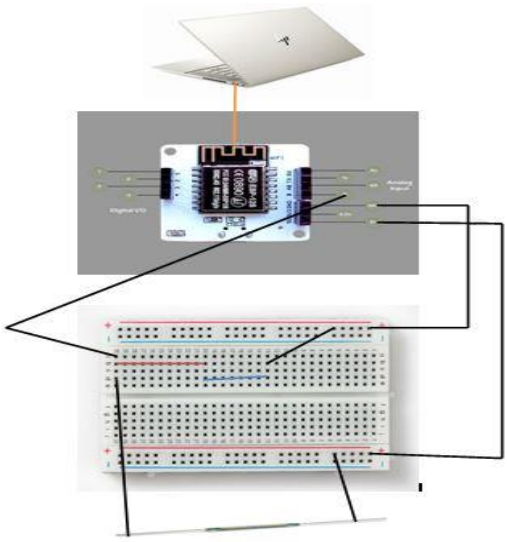
ESP8266 Wi-Fi module

D. Circuit Composition

The Wi-Fi module is powered up by an external 5V battery or can be connected to through the mobile charging cable with a 5V adapter. One end of magnetic reed switch is connected to 3.3V pin of Wi-Fi module to supply positive power to the breadboard and another end connected to GPIO pin (General Purpose Input/ Output – 0/ 1/ 2/ 3/ 4). Negative power will connect to ground. We used LED light to check whether the reed switch is working or not and used resisters for controlling power supply. When the magnet comes closer to the reed switch, it means door has been closed. Otherwise door was opened. We can receive notification for third party services like twilio, mailgun and telegram bot services in your device.

The lines in the circuit diagram indicates :

- Black color :- Jumper Wires
- Red color :- Resisters
- Blue color :- LED lights
- Orange color :- Cable



Circuit Diagram

V. CONCLUSION

In this project bolt cloud and other third party services are used to send the alert messages by capturing the door movement through connecting magnetic reed switch door sensor to the bolt Wi-Fi module. The door sensor is fixed on to the door frame and the magnet is fixed on to the door, the sensor gets active when the door movement takes place and the alert message is send to the user by using third party services.

At first the movement data is captured through bolt Wi-Fi module to the cloud, from the cloud it is taken and send to the third party services called Twilio, Mailgun and Telegram bot to send the alert messages to the registered user. This project uses simple mechanism and uses fewer prices to build and setup the security system.

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