



IOT Based Gate Access System

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ABSTRACT

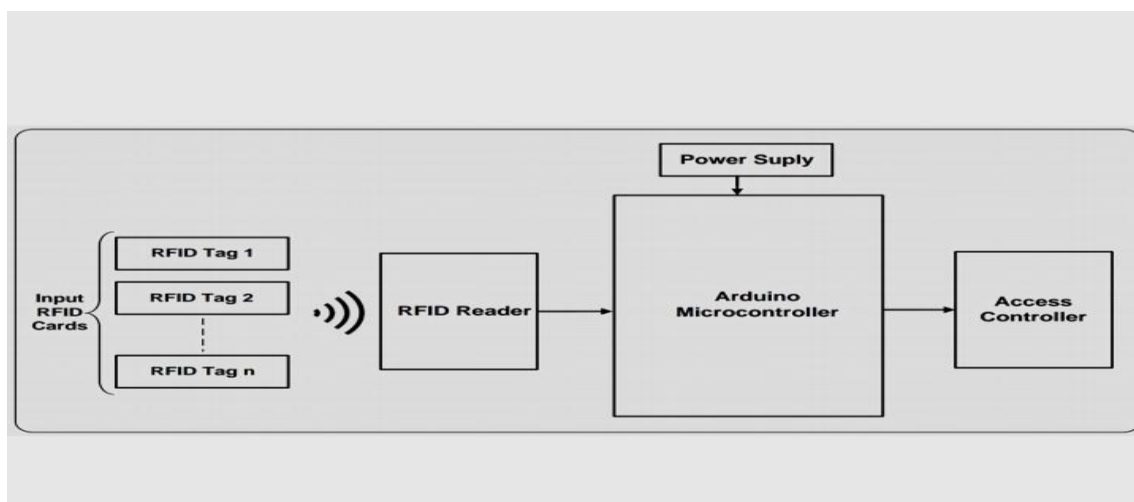
wireless security applications have rapidly increased due to the dramatic improvement of modern technologies. Many access control system were designed and/or implemented based on different types of wireless communication technologies by different people. Radio frequency identification (RFID) is a contactless technology that is widely used in several industries for tasks like access control system, book tracking in libraries, tollgate system, supply chain management, and so on. In this paper, automatic RFID-based access control system using Arduino was designed. The system combines RFID technology and Arduino to accomplish the required task. When the RFID reader installed at the entrance detects an RFID tag, the system captures the user unique identifier (UID) and compares it with the stored UID for a match. If the user UID captured match with any of the stored UID, access is granted; otherwise access is denied. The results clearly show that the system is cheap, effective, and a reliable means of granting or denying access in a secured environment. Keywords: arduino, RFID Access Control, Arduino IDE, UID, Sensors.

Keywords: - RFID reader, Arduino Microcontroller, Access controller, power supply, RFID card.

Introduction:-

The several automatic access control technologies including barcode, magnetic strip and radio frequency identification (RFID) applied in security system. Radio frequency identification (RFID) is an emerging technology and one of the most rapidly growing segments of today's access control. RFID technology, offers superior performance over other automatic identification systems and is used in many areas such as public transport, ticketing, animal identification, electronic immobilization, industrial automation, access control, people tracking, inventory detection and many more. Two different ways access control system can be accomplished. Use of keys which is old method and by use of RFID technology. This paper discusses the design of an automatic access control system using Arduino microcontroller and RFID system. The aim is granting access to authorized personnel and denying access to unauthorized personnel by using RFID technology instead of keys. Each person is issued an authorized tag, which can be used for swiping in front of the RFID reader to have access to a secured environment.

Block Diagram :-



Block Diagram No.1

Working :-

The access control system block diagram using Arduino and RFID. The system has three separate parts, an RFID reader, a microcontroller, and an access controller. The RFID reader reads the RFID tags and the microcontroller accept the data from the reader process it and use the result to either grant or deny access to the user using access controller. The project can be enhanced by connecting an LCD display to display if access is granted or denied instead of serial monitor.

When RFID tag placed on the RFID reader as it read the data and through reader its code send to the controller which access with the controller match and receives code with store code if the code is same then the security system is authorized to use and access the data. Change the tag ID in Access Control into sketch with the ID you have noted down earlier and then connect arduino board with PC, upload the sketch into the board. After access control system the information is display on LCD and if the information is not correct the alarm will start ringing. If uploading is doing well, you will see the glowing of LED.

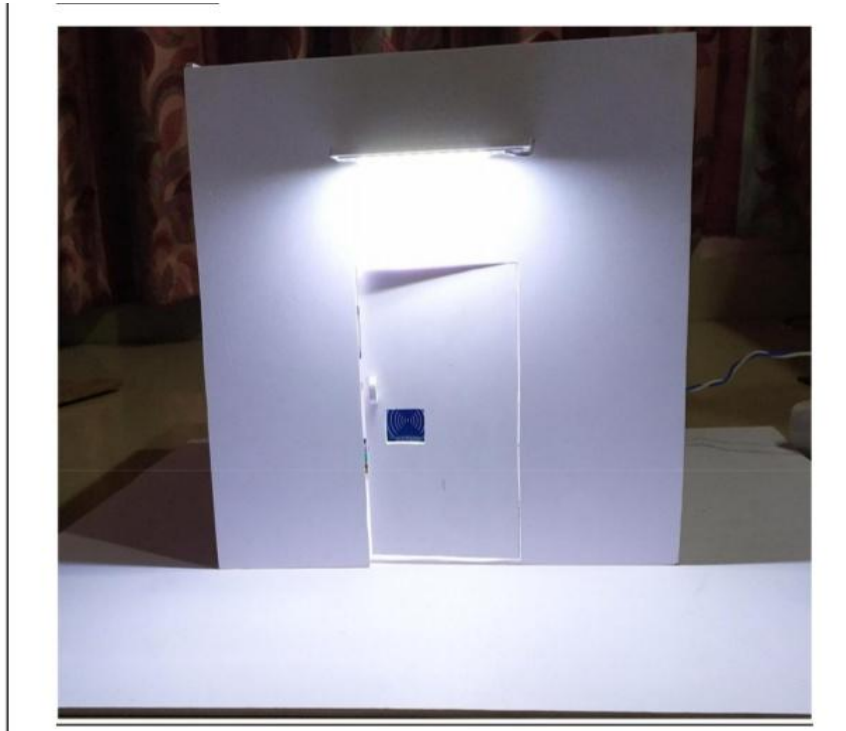


Figure No. 2 Model

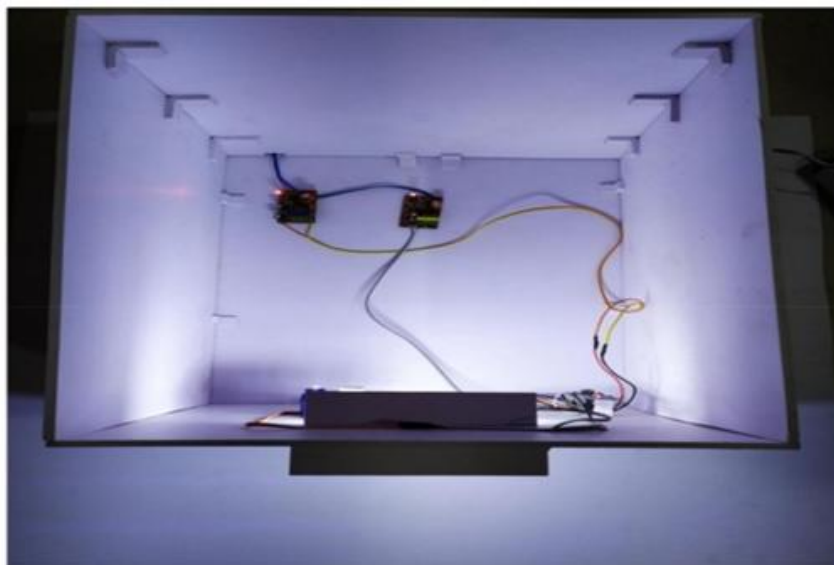


Figure No. 2 Model

Hardware requirement :-

- RFID Reader
- RFID Tag
- RFID Card
- Aurduino Microcontroller
- DC Motor
- LED Display

Advantages :

- Since there is no exposed card slot, RFID locks are generally waterproof. They also provide easier, better access control than key locks or traditional locks, for example.
- Technology Advantages of RFID Lock
- Data on keycards is secure because it takes specialized equipment to read it. This maintains the lock system security.

Future Scope :

- It depends upon how original one could be to enhance the use of this project. But for us this project is practical for future uses such as Smart cart can be interfaced with wireless technologies to make it completely portable in the near future. Payment of bills using mobile can be implemented.
- A low cost RFID scanner can be manufactured and used which can scan multiple tags (products) simultaneously for faster processing and lesser resources. Automatic scanning & availability of products.

Applications :

Access control system was analyzed using the following criteria: cost, energy consumption, speed, user satisfaction, and stability. The bar chart that there are significant enhancements in access. The control system using Arduino and RFID technology enhancements come in the area of cost, energy consumption, speed, and stability. Other access control systems have high energy consumption rate which is a great problem in Nigeria where energy is very expensive, while the users of the system have equal satisfaction in both systems.

RFID tags :

An RFID tag is a smooth card of credit-card size (Fig. 3), which is read by an RFID reader. It works at 125kHz and comes with a unique 32-bit ID. Normally, each tag has a unique ID number which cannot be changed. We can find out its unique ID through software. EM 18 reader: We had used EM-18 RFID reader module which operates at 125kHz. The module comes with an on chip antenna and can be powered with a 5V power supply. The transmit pin of the module is connected to receive pin of Arduino UNO board. Its basic use is to provide authorized access as this module can only provide access when we are having an access card or tag if there is any unauthorized person trying to break the security system then this would make the system trigger the alarm.

ARDUINO UNO BOARD:

It is an open source electronics prototyping platform based on bendable, easy-to-employ hardware and software. It is proposed for artists, designer, hobbyists & anyone interested in generating various design for objects or environmental purpose. Arduino UNO is a board based on ATmega328 microcontroller. It consists of 14 digital input/output pins, six analogue inputs, a USB link for programming the on-board microcontroller, power jack, an ICSP header & a reset button. It is work due to 16MHz crystal oscillator & contains everything needed to support the microcontroller. It is easier to use as the user simply needs to connect it to a computer with a USB cable or power it with an AC-to-DC

Relay:

We are using 12 volt relay. Relay driver circuit is used to turn on the relay. Using this relay user can control any AC or DC device.

Buzzer:

We are using piezoelectric buzzer. This is a warning / indication that invalid attempt is done to gain access to system.

DC motor:

It will be used to show demonstration of door or gate opening.

LCD Display:

16 by 2 Liquid Crystal Display (LCD) will be used in this project. It displays on 2 lines each containing 16 characters. LCD display has total 16 pins for interface with processor. RS is instruction or data select line. This pin is kept high or low by microcontroller to indicate command instruction or data bytes on data bus db0-db7. Special feature of this LCD module is it allows reading of data bytes stored in RAM. Pin no. 5 i.e. R/W is used for deciding read operation or write operation. Graphic display has RAM memory for storing characters codes to be displayed on LCD.

Conclusion :-

- In this paper, a prototype of automatic access control system for use in an environment is presented. The system uses radio frequency identification (RFID) with Arduino technology to differentiate between authorized and unauthorized users.
- The RFID reader reads RFID tag issued to the user and matches it with stored UID on the Microcontroller. On a successful match, the microcontroller grants access or deny access if no match was found. An automatic access control system using Arduino and RFID has been prototyped and functioned as desired.
- The system can be installed at the entrance of a secured environment to prevent an unauthorized individual access to the environment.

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