RFID DOOR LOCK SYSTEM

Akanksha Soni[1],Anjali Kumari[2],Garima Solanki[3],Fiza Qureshi[4], Dr.Tarun Verma[5]

[1,2,3,4]student,ECE Lakshmi Narain College of Technology, Bhopal

[5]Professor LNCT Bhopal

akankshasoni2763@gmail.com

Abstract

This is an IOT enabled RFID-based door locking gadget. This door lock system will know how long the door is open and in this door lock system, only those people who register will be able to enter using their card. It uses a servo motor that operates with the help of Arduino. The Arduino board runs with complete programming that is stored inside it. By using this gadget, an owner can track his office and the place where he wants to let the specific people in. It is also very secure. RFID Module, LCD Display Red and Green and Yellow LED Light and Buzzer have also been used in this door lock system. When the door is open, the green led light will turn on. The Red LED work will alert you that your card is wrong.

Keywords: Arduino, Buzzer, Door Lock System, IOT, LED, LCD, Micro controller, RFID

INTRODUCTION

This gadget is designed with the help of an Arduino using a servo motor that pushes the gear forward and back. When we scan our register card, there is a loop start of store programming in which the servo motor rotates 90 degrees, then the gear mechanism it works, which locks and opens the lock. In simple language , when a card is scanned , the condition given in the programming matches, then the command given inthat condition become active , such that when the correct card is scanned, the open condition will match in which the servo motor will rotate 90 degrees and the green light will be on and the buzzer will beep for 500 microseconds and the door lock will be open but when an unregistered card is scanned then the condition of thewrongcardwillmatchwhichwillbeeptwicefor500microseconds andtheredlightwillbeonfor 1second.Thewrongcardwillshowon the LCD..

LITERATURE REVIEW

ByusingArduinoautomaticRFIDbasedaccesscontrolsystemwas designed this system represents a combination of RFID system and order no to achieve a particular task. RF reader detects an RFID tag then the system captures the UID that is a unique identifier. It also captures the user's image which then scans and compares with the databaseformatching.IfcardUIDmatcheswithcaptureimagethen access is granted or access is denied and the system gives an alert alarm for security purposes this system plays a significant task of entrance monitoring controller it can be used in hostels for security purposes.

Inthistechnologyresponsetimecanbeenhancedbyusingcontroller processes and real time images. RFID is radio frequency identification which is a fundamental and cheapest technology to enables wireless data transmission. Radio frequencyidentificationi.e.RFIDisanon-contacttechnique applied in industries for personal tracking, supply chain management, management of books in libraries and at tollgate.

RFID technologyhas a lack of standardization and hence it has not been very often among the manufacturing andhence it has not been very often among the manufacturing companies earlier. RFID technologies are more proficient and more secure as compare to other networks. RFID technology is used in many areas such as public transport, industrialautomation,animalidentification,peopletracking and many more .

METHODOLOGY

The system is composed of three major modules The microcontrollermoduleconsistsoftheArduinoUnoR3 microcontroller. The REID module serves as the input of the microcontroller, as the registeredcardrequiredto open the door must be scanned into the system through the module. The gear mechanism module controls the mechanical action (opening and closing) of the door.it includes a servo motor. The mechanism of this door lock system makes is explained in figure 1. There are main four processes bywhich this gadget works. These fourblocksarenamelyREFIDscanner,microcontroller, servo motor mechanical Door. First the REFID tagwill be scanned by REFID scanner, then the command will go to the microcontroller, The microcontroller will check that if the card is registered or not, then the command will go to the servo motor, according to

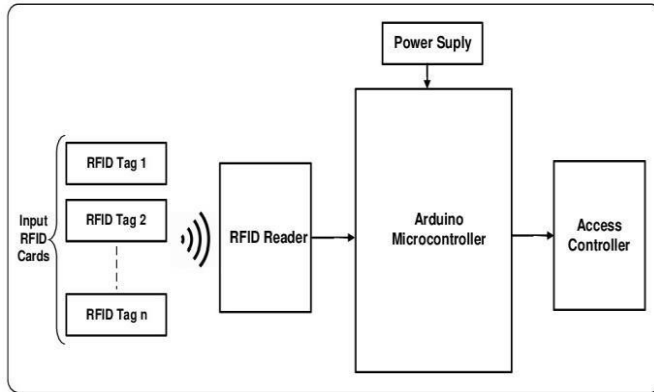whichprogramingtheservomotor willberotated90°sothat the mechanical door lock will work.

Fig:3.1SystemBlock Diagram

The automatic door lock system circuit diagram using an interface RFIDreader withanArduino.ThisprojectcanArdunioisshownin fig 2.1.

The circuit ofthisprojectusesthreeseparateparts,namelyareader,a controller, and a mechanical door lock. In this circuit, a reader reads the RFID tags, a controller is used to accept the data from the RFID reader and control the output of the door lock and RED, GREEN, YELLOW LED. When the door lock is placed on a door and tested with a battery to check the installation. In many cases, we need a simple circuit on the door lock, which means the automatic doorstops locked when there is no flow of current. When 12 volts DC is suppliedthroughtheelectromagnetinthedoor locksystem, aplatein the door lock offers a way to permit the door to be pushed openeasily.
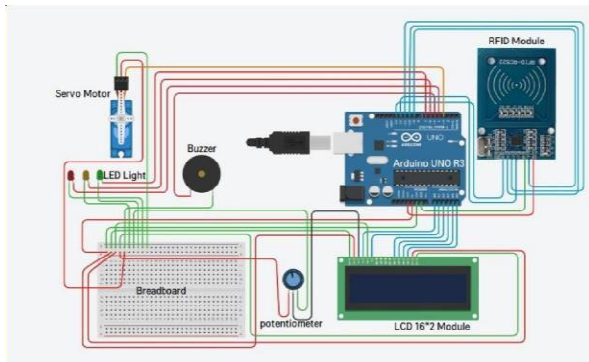

Fig:3.2CircuitDiagramof DoorLockSystem

TheresearchinvolveddevelopinganRFIDdoor locksystemusingan Arduino Uno board. The system utilizes an RFID reader module (RC522) to read RFID tags/cards, a servo motor to act as the locking mechanism, and an Arduino Uno as the central control unit. The necessary components, including the RFID reader, servo motor,

breadboard, jumper wires, resistors, and LEDs, were assembledaccordingtothecircuitdiagram.TheRFID reader was connected to the Arduino using the SPI interface, with specific pins (SDA, SCK, MOSI, MISO, and RST) assigned for communication. The servo motor was connected to a PWM pin on the Arduino to control the locking mechanism. The system was powered using an external power supply.

Software development was carried out using the Arduino IDE, whereaprogramwaswrittentocontroltheoperation of the RFID reader and the servo motor. The code enabled the Arduino to read the unique ID of the RFID tags, compare it against a list of authorized IDs, andactivate the servo motor to unlock or lock the door accordingly. The system was tested for functionality, ensuring it could accurately read RFID tags and operate the locking mechanism reliably.

WORKINGMETHOD

Firstly, the door lock system will start, and the scanning process occurs, if the card is registered previously then the command will proceed otherwise the WRONG CARD message appeared with the Red LED blinks 2 times in 1 secondandbuzzer2timesin1secondandagainthecommand scanning process will start, If the card is registered, the Red LEDwillbeblinkonceforonly500microsecondsandbuzzer beeps 1 time for 500 microseconds and the command will execute into the mechanical door lock system and the door lock will beopen. Whenthedoor lock isopen, thecommand will run again and the scanning process starts, but now the door lock will be closed. The flow chart of the working method is explained in Figure 3.

AnRFIDdoorlocksystemoperatorsthroughtheuseofRadio frequency identification(RFID) technology, which enables secure and convenient access control. At the heart of this system is an RFID reader emits radio waves that power a passive RFID tag when it come into proximity. This tag embeddedwithacardor keyfob, respondsbytransmittingits unique identification number back to the reader.

The working method of the RFID door lock system using Arduino involves a systematic process of initialization, tag reading,UIDverification,andaccesscontrol.Uponpowering the system, the Arduino initialize the RFID reader, servo motor and optional feedback devices such as LED's and a buzzer. When an RFID tag/card is presented to the reader, it scans the tag's unique identification number(UID) and communities it to the Arduino via the serial peripheral interface(SPI). The Arduino compares the received UID against a predefined list of authorized UIDs stored in the memory.IftheUIDmatchesanauthorizedentry,theArduino activatesthelockingmechanismtounlockthedoor,providing visual and auditory feedback, such as lighting a green LED and a sounding a buzzer, to indicate successfulaccess.

If the UID is not recognized, the system remains locked, and a red LED may light up along with a distinct buzzer sound to indicate accessdenial.Afterasettimeoruponremovaloftheauthorizedtag, the Arduinoresetsthelock, returningtheservo motor toits original position and preparingthe system for the next access attempt. This continuous monitoringensurestheRFID door lock system operates securely and efficiently, utilizing the Arduino's capabilities to manage access control reliably.

Fig:3.2FlowChartofWorkingMethod

a robust and efficient solution for secure access control. By integratinganRFIDreader,Arduinomicrocontroller,servomotor or electric strike lock, and optional feedback components, the systemreliablyverifiesandprocesses RFIDtagstograntor deny access. This method ensures enhanced security through unique identificationandpromptfeedback,makingitsuitableforvarious

RESULTANDDISCUSSION

The RFID door lock system using Arduino performed effectively, accurately reading RFID tags and distinguishing between authorized and unauthorized UIDs. The system reliably triggered the locking mechanism for authorized tags and provided clear visual and auditory feedback. Key advantages include scalability, cost-effectiveness, and ease of implementation. However, considerations such as the range of the RFID reader and the need for a reliable power supply are important. Overall, the systemprovedtobearobustandefficient solutionfor secureaccess

applications requiring controlled entry. The system's continuous monitoring and automatic reset functions further enhance its reliabilityanduserconvenience,demonstratingtheeffectivenessof using Arduino in security applications.

FUTURESCOPE

We all proposed thereasonable development to facilitate the genuine issues managing RFID welcoming card unapproved utilizing Greeting card especially. This specific consideringis going tobetotallyset up insideprogramminglocaleinside our drawn out examination, and you will be inspected well various knowledgeable scenes just as strategies. With this shiny new thought, we all utilize RFID welcoming card program. Anyway this specific thought can likewise be plausible to build the genuine lasting attractive hello card program. Subsequently, shrewd as well as charge cards program will be furthermore protected by means of this specific examination, most dire outcome imaginablethe chip can be supplanted with another and modest one and begin once more.
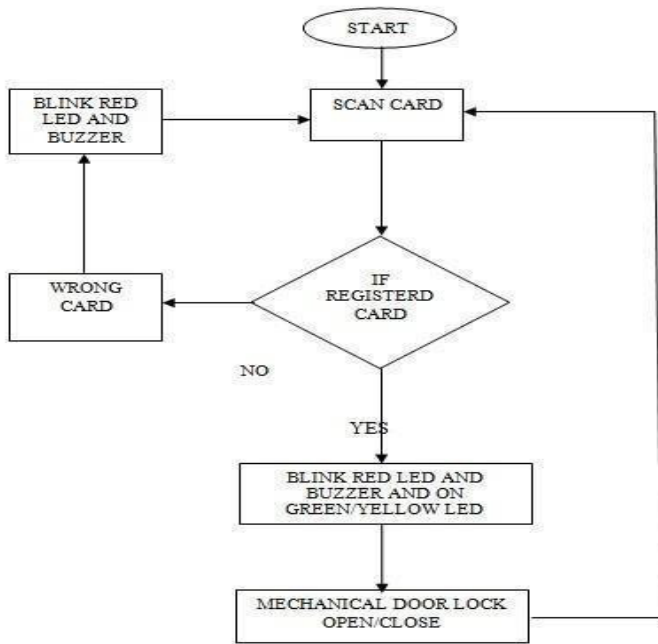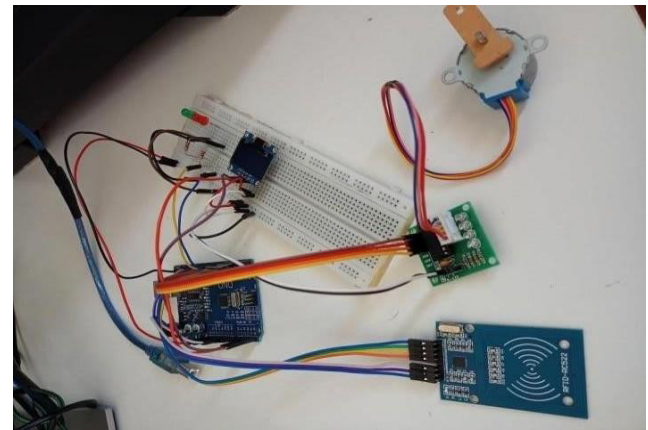

control,demonstrating the practical applicationof Arduino in enhancingsecurity

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CONCLUSION

In conclusion,theRFID doorlock systemusingArduinoprovidesa robustandefficientsolutionforsecureaccesscontrol.Byintegrating an RFID reader, Arduino microcontroller, servo motor or electric strike lock, and optional feedback components, the system reliably verifies and processes RFID tags to grant or deny access. This methodensuresenhancedsecuritythrough uniqueidentificationand prompt feedback, making it suitable for various applications requiringcontrolledentry.Thesystem's continuous monitoringand automatic reset functions further enhance its reliability and user convenience , demonstrating the effectiveness of using Arduino in securityapplications.

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