

RFID BASED DOOR LOCK SECURITY SYSTEM

Project report submitted in partial fulfillment of the requirement for the degree of

BACHELOR OF TECHNOLOGY

IN

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By

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UNDER THE GUIDANCE OF

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DECLARATION

I hereby declare that the work reported in the B.Tech Project Report entitled “**RFID Based Door Lock Security System**” submitted at **Jaypee University of Information Technology, Wagnaghat, India** is an authentic record of our work carried out under the supervision of **Mr. Pankaj Kumar**. We have not submitted this work elsewhere for any other degree or diploma.

<Signature of Student>

Abhishek Malik

171023

This is to certify that the above statement made by the candidates is correct to the best of my knowledge.

<Signature of the Supervisor>

Mr. Pankaj Kumar

Date:

Head of the Department/Project Coordinator

ACKNOWLEDGEMENT

Through this acknowledgment, I express my sincere gratitude to all those people who have been associated with this project and have helped me with it and made it a worthwhile experience.

I would like to thank my mentor Mr Pankaj Kumar, for assisting me in the work I had to do and for helping me correct my mistakes I would like to take this opportunity to express a deep sense of gratitude to our final year project Supervisor for his cordial support, exemplary guidance, monitoring and constant encouragement.

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ABSTRACT

This project is developed to build a security system for a home/office to prevent the other persons to enter into the important room/chamber by checking a suitable RFID card.

The RFID tag gives the unique id whenever it reads the card information. This ID information is send to the micro controller to check the correct card to take a security action. If the card ID matches with the original information, it allows entering into the room, if not gives the buzzer as an indication of wrong person tried to enter into the room.

In present system there are no efficient methods for accurate identifications, there are certain places where accuracy is important mainly in banking, health care and government sectors. This application will provide RFID tag based system which uses micro controller.

Chapter 1

INTRODUCTION

1.1 INTRODUCTION

Today, security is a critical consideration. The world of technology evolves on a daily basis. The criminal gang also upgrades their technology in order to carry out their business. As a result, protection technologies must evolve over time in order to protect criminal activities. We used an RFID SENSOR with a Raspberry Pi Zero module in this project. We will write the information of the approved individual on the RFID card, and the user will scan the card at the entrance, and the data will be read by the card reader. If the data and card are allowed, access will be granted; otherwise, access will be denied to the unauthorised individual. Even if the user tries to reach the door, the buzzer will be enabled, and a message will be sent to the owner will be send for the warning that intruder is detected These technogeis helps us to build up a modern security systems. The microcontroller is a crucial component of the device. The system's main goal is to uniquely identify an individual and provide protection for them. This necessitates a one-of-a-kind product capable of distinguishing between different people. RFID, a new digital technology, makes this possible (Radio Frequency Identification). RFID tags (each with a specific ID number) and RFID readers are the two main components of an RFID system (reading RFID tag).The tag and reader used in this RFID system operate at 125KHz. The details are saved in the microcontroller's internal memory. The PC can be used to restore all of the security information that have been created. This report gives a complete image of the system's hardware and software. It also gives a broad overview of the system's function, as well as a clear explanation of how it works.

1.2 AIM OF THE PROJECT

The major idea of Radio Frequency Identification (RFID)-based security system is to deny access to only approved individuals. The R card must be shown to the R reader before access is granted or restricted to the appropriate person/RFID card.

To combat the security threats that many organisations in Pakistan are facing these days, an automatic identification and in addition access control system has become mandatory.

Only approved people would be able to join the company after the device is installed at the entrance. The system can also be loaded at various points inside the organization to track the person's movement and to deny their access to sensitive areas in the organization. Suspicious people can be found this way, which would undoubtedly increase the organization's security. The access control device can be developed using radio frequency identification (RFID), a wireless technology. The use of this technology to automate a variety of operations, from the manufacturing sector to home automation, is a growing trend has been recorded in the literature [1]. The use of RFID technology to automate the management of sight spot tickets has been documented by Bo Yan [2]. RFID electronic tokens, RFID readers make up the device hardware. Details about the scenic area region amount. The data contained in the e-ticket is read by the RFID reader on site and transmitted through the network to the computer terminal and servers. At the terminal, the data is decrypted and validity is checked. The controller then lets the appropriate tourist into the area.

1.3 TECHNICAL APPROACH

It is a technology that transfers data from a tag to an RFID reader using radio-frequency electromagnetic fields. Passive tags do not need to be powered by a battery. They get their energy from the electromagnetic field generated by the reader. There are also several tags that have their own power source. When it comes to RFID ventures, students often find them to be straightforward and engaging. On the internet, there are a plethora of RFID ventures. We've compiled a list of the top 20 easy RFID projects for you to try.

The RFID device is made up of three parts: a transponder, an interrogator reader, and a computer that stores the database. The label information is perused by the questioner and shipped off the machine for validation. Access is given after the data is handled and confirmed. The gadget has a wide scope of recurrence groups, from below (low) to microwave frequencies [5]:

- Microwave Frequency: 2.4 GHz
- High Frequency: 13.56 MHz
- Ultra High Frequency: 902-928 MHz
- Low Frequency: 125-134 KHz

Depending on the wellspring of electrical energy, RFID labels are named dynamic or inactive. The circuit on the active tags is driven by a battery, and the tag information is transmitted when the

reader requests it. These stickers, on the other hand, are extremely costly and are seldom used. Passive tags, on the other hand, use the reader's energy to fuel their circuit. Since these tags are inexpensive, they are used in the majority of applications. Table I [6]-[8] shows a comparison of these tags with significant features highlighted. Passive RFID tags were used in the current study. When a passive RFID tag comes into contact with the reader's electromagnetic field, it transmits data to the reader. Faraday's law of electromagnetic induction is at the root of the phenomenon. The current flowing through the interrogator coil creates a magnetic field that connects to the transponder coil, causing a current to flow through it. The current is then varied by adjusting the load on the transponder coil's antenna. The modulated signal (load modulation scheme) is obtained by the interrogator coil by mutual induction between the coils, resulting in this variation. This signal is decoded by the interrogator coil and sent to the device for further processing. Figure 1 shows a basic RFID scheme.

III. Linked WORK RFID technology has been used by several researchers in the development of access control systems. The server searches the machine also detects illegal activities, such as when an individual attempts to enter while the door is open without completing the authentication process, and uses online sites to activate the warning device. Installation of RFID kits with antennas covering a 10cm range is used to test the system's performance, and satisfactory results are obtained. An RFID-based embedded security authentication framework with a novel face recognition structure was defined by Xiang-Lei Meng [9]. Registration and acknowledgment are the two steps of the method. Ten pictures of the user's face with various emotions are collected during the registration process, and eigen information is extracted using an extraction algorithm. This information along with a UID is written on RFID tag. In recognition phase, a camera tracks the face and an extraction algorithm returns eigen information of the face in the picture. This information is then matched with the information already stored on the tag for authentication. Instead of using a computer terminal or server, the entire execution is performed on an embedded ARM11 processor, S3C6410. This results in a quicker response time of around 57ms and authentication performance of up to 86.5 percent. As the system's efficiency is compared to that of traditional database systems, it is discovered that the system has a significantly faster response time while maintaining the same level of authentication precision. Dong-Liang Wu [10] describes an RFID-based access management scheme that includes neural network-based face recognition. If the individual carrying the RFID card is considered to be illegal, the device identifies their face and refuses entry. For

learning the face of an individual, a radial basis function neural network (RBFNN) was used.

1.4 HARDWARE DESCRIPTION



Figure 1.1 : RFID

Radio-frequency identification (RFID) It is a technology that use electromagnetic field to recognise and detect tags connected to objects. The tags hold material that has been collected electronically. Passive tags gather energy from interrogating , radio waves emitted by a nearby RFID reader. Valid tags run hundreds of metres away from the RFID reader and provide a nearby power source (such as a battery). The tags, unlike barcodes, do not need to be beyond the reader's line of sight, so they can be inserted in the tracked object. RFID is a form of automated data collection and recognition system (AIDC).

RFID labels are employed in numerous businesses. For illustration, a RFID tag joined to a car during making can be utilized to keep tabs on its development through the mechanical production system; RFID-labeled drugs can be shadowed through stockrooms; and embedding RFID central processor in domesticated animals and pets allows positive ID of individuals.



FIGURE 1.2 : RASPBERRY PI

The **Raspberry Pi** Substance created a series of small single-board CPUs in the United Kingdom to simplify the teaching of basic computer science in schools and evolving countries. The initial model was much more popular than anticipated, selling for uses such as robotics that were not originally intended. Cases and peripherals (like keyboards and mice) are not included. Any accessories, on the other hand, have appeared in both official and 1 informal bundles. The Raspberry Pi organisation is divided into two sections.

The Raspberry Pi Foundation created the first two versions. Following the release of the Pi Model B, the Footing founded Raspberry Pi Transaction, led by Eben Upton, to create the third model, the B+. The Foundation is an educational charity that promotes the teaching of basic computer science in schools and in emerging countries. Raspberry Pi Trading is answerable for fostering the innovation, while the Foundation is an instructive cause that advances the educating of important software engineering in colleges and in agricultural nations.



FIGURE 1.3 : BUZZER

A **buzzer** or **beeper** is an automated, electromechanical, or piezoelectric audio signalling structure (piezo for short). Alarm clocks, timers, and proof of user response such as a keystroke are all general uses for buzzers and beepers.

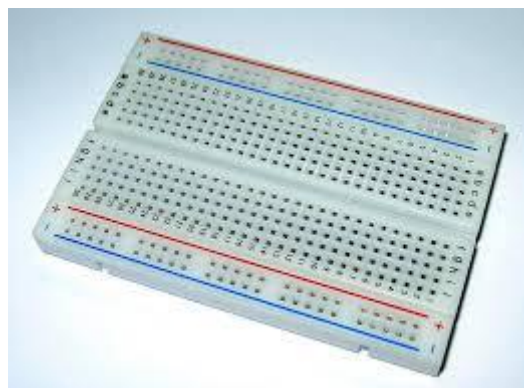


FIGURE 1.4 : BREADBOARD

Breadboard is a development base for prototyping of gadgets. Initially the word alluded to an exacting bread board, a finished part of wood utilized for cutting bread. During the

1970s the solderless breadboard (a.k.a. plugboard, a terminal exhibit board) opened up and these days the expression "breadboard" is usually used to allude to these. Because the solderless breadboard does not need soldering, it is recyclable. This makes it easy to use for generating impermanent examples and experimenting with circuit design. For this reason, solderless breadboards are also general with students and in technological education. Big breadboard types did not have this stuff.

A stripboard also known as Veroboard and comparative prototyping printed circuit sheets, which are utilized to construct semi-lasting welded models or unique cases, can only with important effort be reused. An assortment of electronic backgrounds might be prototyped by utilizing breadboards, from little simple and progressive circuits to finish focal fixing units (CPUs).



FIGURE 1.5 : JUMPER WIRE

A leap wire is an electric wire, or meeting of them in a link, with a connection or pin at each end (or at times without them – basically "tinned"), which is characteristically used to interrelate the parts of a breadboard or other model or test circuit, inside or with other gear or segments, without soldering.

Particular leap wires are fitted by embeddings their "end connectors" into the spaces gave in a breadboard, the heading connection of a circuit board, or a piece of test hardware.



FIGURE 1.6 : RFID TAG

RFID Tag Atmel read-only TK5530 are used in this project. These tags answer to a 125 kHz wave with an 125 kHz AM wave covering a 64-bit rolling code at 3.9kbps. The code covers an 8 bit header followed by a unique ID code. Manchester encoding is used to encrypt the results. In comparison to tags that use other types of schemes such as FSK or PSK, these tags were chosen because we know how to demodulate AM. Furthermore, our submission did not necessitate. We also didn't need the more costly Read/Write tags' enhanced functionality.

Chapter 2

Working Principle

2.1 Types of RFID Systems:

- **Active system:** These are frameworks where the tag has its individual force source like any other force source unit or a battery-operated. The lone imperative being the existence season of the force gadgets. These outlines can be utilized for bigger distances and to follow high worth products like automobiles.

- **Passive framework:** These are frameworks where the tag gets control through the exchange of force from a peruser receiving wire to the label radio wire. They are utilized for short each broadcast.

We will write the information of the approved individual on the RFID card, and the recipient will scan the card at the entrance, and the data will be read by the card reader. If the data and card are allowed, access will be granted; otherwise, access will be denied to the unauthorised user. Even if the user tries to reach the house, the buzzer will sound and a message will be sent to the owner informing them that an intruder has been identified. This technologies aid in the development of new defence systems.

Key perception behind Radio Frequency Identification (RFID) based Safety system is to allow the access only to lawful persons . RFid card has to be revealed in front of the RFid reader, then the access is permitted or denied to the resptive person/RFid card.

Radio-Frequency Identification (RFID) is an revolution that employments radio-recurrence electromagnetic fields to move information from a marker to a RFID peruser for ID purposes. Uninvolved labels don't need battery-operated power. They get power from an electromagnetic field created by the understudy. A few labels are accessible with their own force source. With regards to RFID projects, replacements consistently discover them

forthright and intriguing. There are frequent RFID projects accessible on the web. We have recorded 20 or more RFID projects you can attempt. The entire framework utilizes the uninvolved RFID framework with inductive coupling technique. As the RFID tag is taken in contradiction of the RFID peruser, a carrier signal of 125 KHz is send to the tag coil, which receives this signal and modulates them. This moderated signal is established by the reader, interfaced to the microcontroller. The microcontroller receives this data and is planned to compare it with the data in the existing database. If the data matches, the relevant details of that particular person is displayed on the LCD interfaced to the microcontroller.

The most shared use of RFID in admittance control is in personnell entry systems. RFID-enabled tags are active at a basic level as employee identification badges for any company or industry that uses the access control system. RFID employee identification requests usually work at a very low rate, approximately 140 KHz, to obtain badge availability. Cardholder, object or student information is stored electronically in ccID or RFID tags, which may only contain pieces of information such as identification numbers, pprices or ccodes. tThis technology is also used for door readers. Each RFID reader has a small antenna that transmits its own radio waves in order to detect any RFID tag or card within its range. Depending on the frequency of the radio waves it emits, this range can range anywhere from 10 centimetres to one metre for each reader. The RFID reader translates the specific stored material generated by the corresponding RFID badge and sends the signal to its host software, which allowances or refuses the user access .

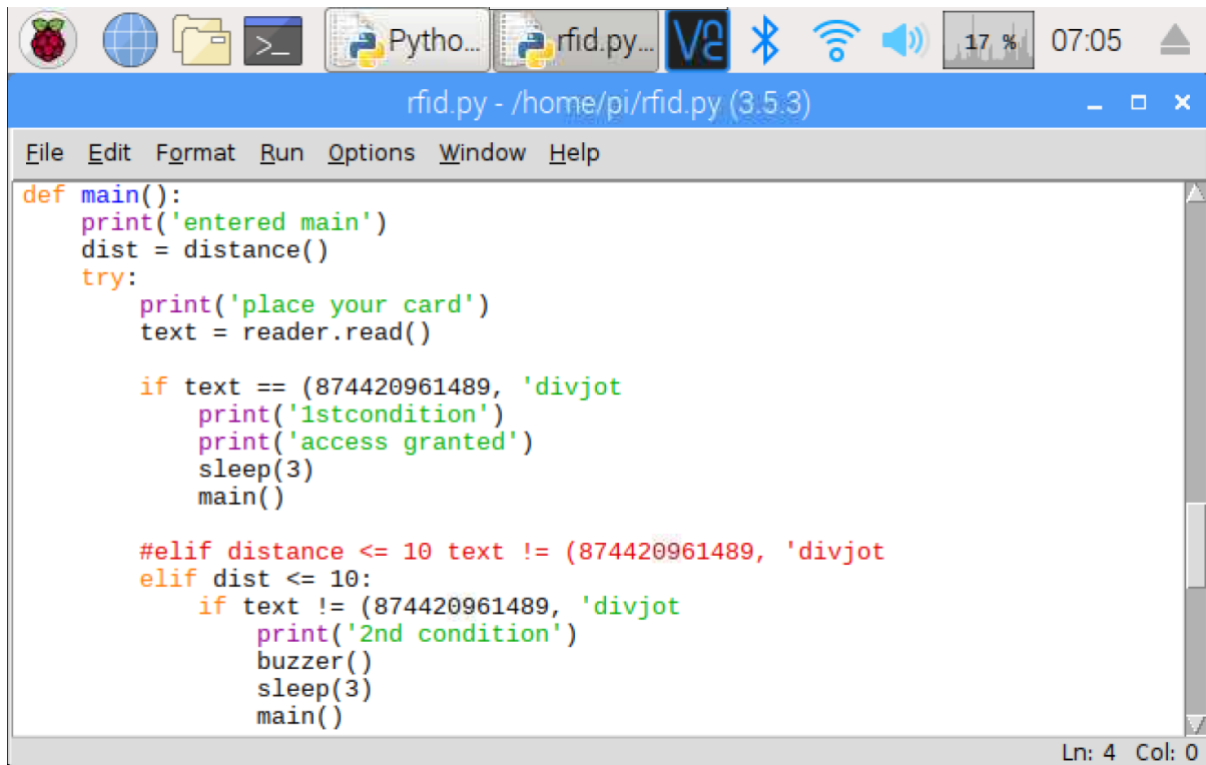
Chapter 3

CODES USED AND CIRCUIT DIAGRAM

3.1 MAIN CODES USED IN PI

This is the main and first code used in project. In this code firstly we checked the distance of card and then it displays that “ PLACE YOUR CARD” then we place the valid card and if the card matches with the reader the access is granted and it allows you to enter. But if the card does not matches the reader then it goes to the else if condition as you can see in the code then coder redirects to the buzzer program and buzzer beeps 5 times

.



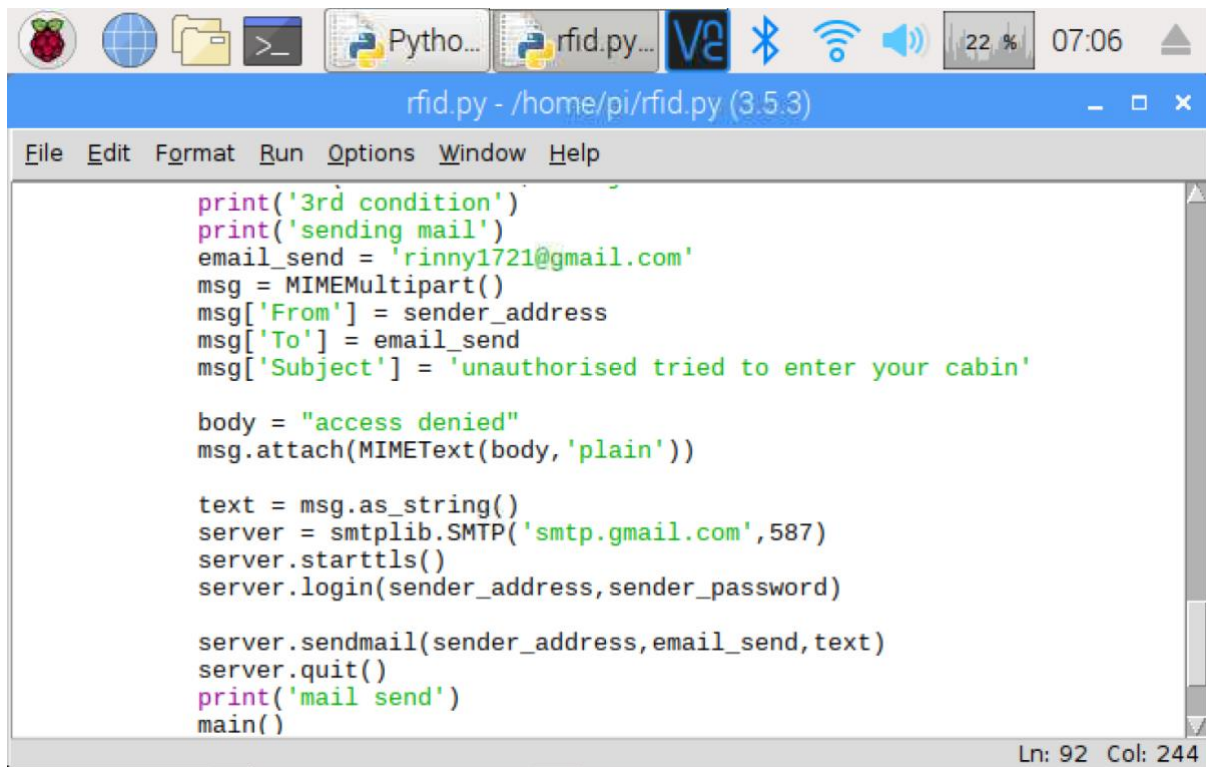
```
def main():
    print('entered main')
    dist = distance()
    try:
        print('place your card')
        text = reader.read()

        if text == (874420961489, 'divjot
            print('1stcondition')
            print('access granted')
            sleep(3)
            main()

        #elif distance <= 10 text != (874420961489, 'divjot
    elif dist <= 10:
        if text != (874420961489, 'divjot
            print('2nd condition')
            buzzer()
            sleep(3)
            main()
```

FIGURE 3.1

Then after buzzer stops an automated mail is sent to the owner of that particular cabin or room .



The image shows a terminal window on a Raspberry Pi. The window title is "rfid.py - /home/pi/rfid.py (3.5.3)". The code in the terminal is as follows:

```
print('3rd condition')
print('sending mail')
email_send = 'rinny1721@gmail.com'
msg = MIMEMultipart()
msg['From'] = sender_address
msg['To'] = email_send
msg['Subject'] = 'unauthorised tried to enter your cabin'

body = "access denied"
msg.attach(MIMEText(body, 'plain'))

text = msg.as_string()
server = smtplib.SMTP('smtp.gmail.com', 587)
server.starttls()
server.login(sender_address, sender_password)

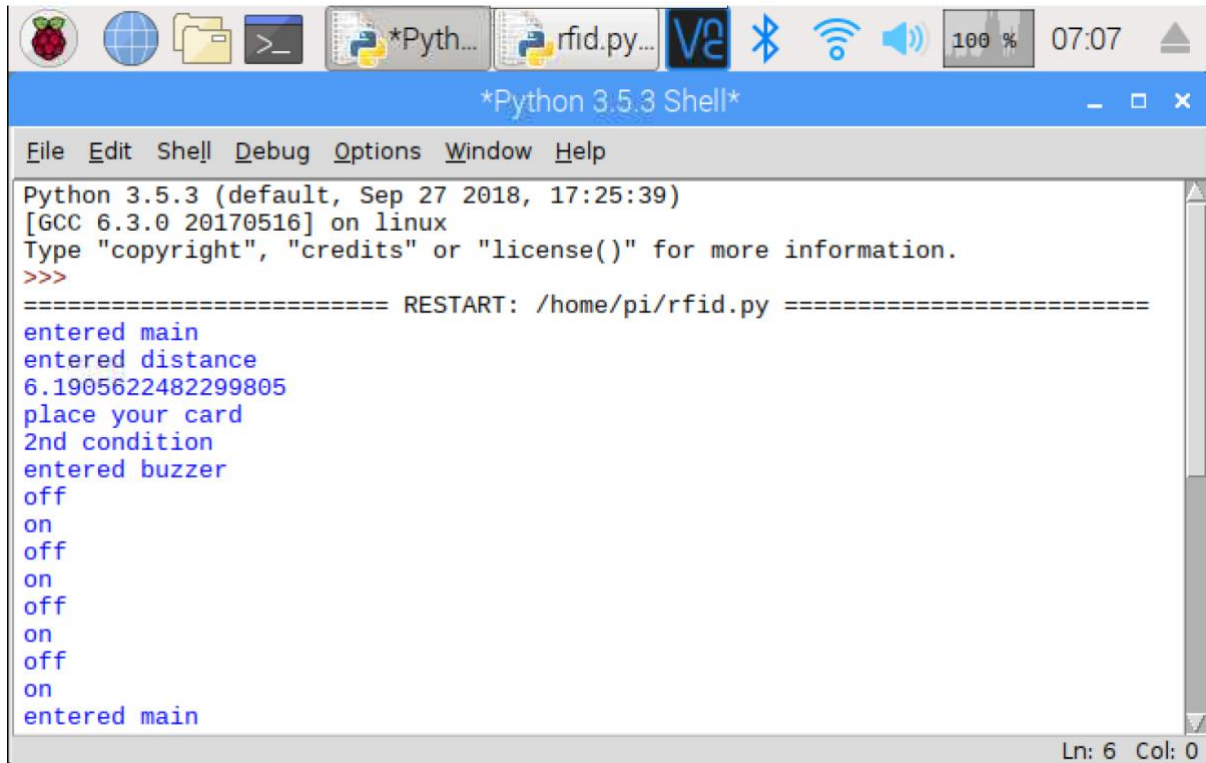
server.sendmail(sender_address, email_send, text)
server.quit()
print('mail send')
main()
```

The status bar at the bottom right of the terminal window shows "Ln: 92 Col: 244".

FIGURE 3.2

3.2 OUTPUT:-

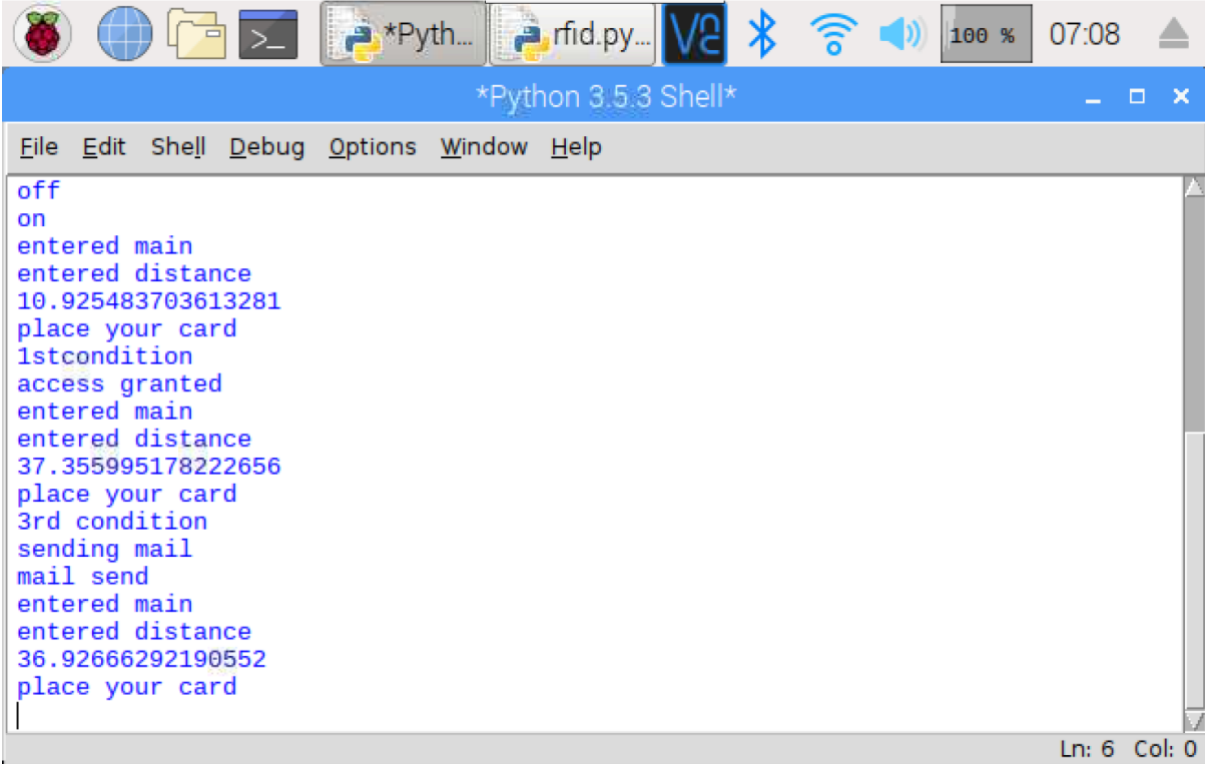
This is the output of the code above used in the project



```
Python 3.5.3 (default, Sep 27 2018, 17:25:39)
[GCC 6.3.0 20170516] on linux
Type "copyright", "credits" or "license()" for more information.
>>>
===== RESTART: /home/pi/rfid.py =====
entered main
entered distance
6.1905622482299805
place your card
2nd condition
entered buzzer
off
on
off
on
off
on
off
on
entered main
```

FIGURE 3.3

This is the output of the above code used in the project



The screenshot shows a terminal window titled '*Python 3.5.3 Shell*' with a menu bar containing 'File', 'Edit', 'Shell', 'Debug', 'Options', 'Window', and 'Help'. The terminal output is as follows:

```
off
on
entered main
entered distance
10.925483703613281
place your card
1stcondition
access granted
entered main
entered distance
37.355995178222656
place your card
3rd condition
sending mail
mail send
entered main
entered distance
36.92666292190552
place your card
```

The status bar at the bottom right of the terminal window displays 'Ln: 6 Col: 0'.

FIGURE 3.4

This is the complete project circuit diagram as you can see the raspberry pi is connected with breadboard through the pins and buzzer is also connected with it and that blue one is RFID reader .

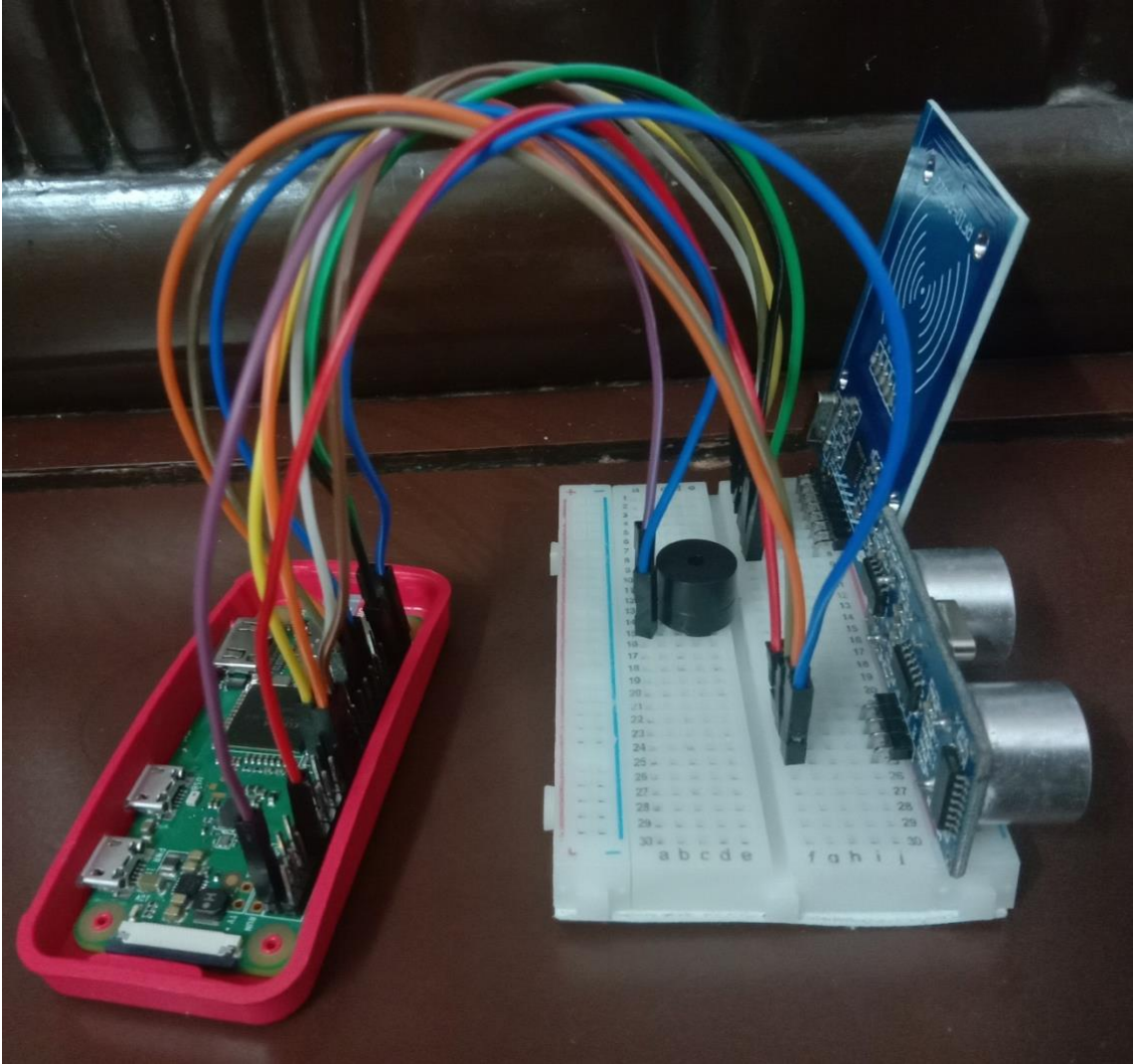


FIGURE 3.5 CIRCUIT DIAGRAM

Chapter 4

Different System For Security

4.1 Entry Mobile Built Arrangement

The previous system, a exact system in which the documentation of a visitor is done in large part by direct contact with the relevant estate estate set. Dialing to the sets by handsfree wire is done by the frame on the input path. Visitors enter the gate by monitoring the gate with the help of elephones. The latest scheme is built on a door-to-door telephone tracking system used by guests, designed by Cha-Huang Wei et. al. . This work has used the novel powerline chip chip to create a digital networked video door. In addition, they exchanged audio and video recordings and developed the ability to monitor the passage.

4.2 Bluetooth Based Systems

The Bluetooth-based solution is similar to sarvy house technologies in that it makes use of the Bluetooth function used in smart devices. For proper use, the Bluetooth system proves to be more simple and efficient. The Arduino platform is commonly used in such systems. Such a framework's hardware is a combination of an Android phone and a Bluetooth module. The Arduino microcontroller serves as a controller, and the solenoid will serve as the locking system's performance.

4.3 OTP Based Systems

The method proposed in the latest operation does not require the help of the administrator to access the location if the user is aware of the OTP process and has a registered cell phone. After that the one time password should pass in complete the keypad at the door, the door will open. In the event that the cell phone is unavailable or turned off the decision to open the door to reaction a security question asked by the scheme.

4.4 Gesture Sensor Built System

The working theory of the Gesture Sensor System is dependent on the amount of light sinking on the photodiode. The photodiode's reading is 255 in decimals while the laser light is continuously falling on it. When it is hampered by a deterrent, however, the voltage drops to less than 50 decimals. This activates the alarm system and notifies the user of the break-in. It is also possible to trigger the automatic lock.

4.5 Combined System

The security system is proven by RFID, FINGERPRINT, PASSWORD and GSM technology which contains door lock frames that can be stretched, activated, authorized and certified by an authorized person. Opens the lock door in real time.

Chapter 5

CONCLUSION

5.1 CONCLUSION

When an authenticated user scans his RFID card, the reader reads the data and grants access to the user; however, if an unauthorised user attempts to enter by scanning an unauthenteid card, a warning mail is sent to the owner, informing him that an intruder is attempting to enter his room, and a buzzer is activated, alerting him to take immediate security measures.

There's no use for such old-fashioned hard locks that were easy to break and dangerous to use. The city is now cleaner, and much of the equipment is digitalized, which suits the function of modernization very well. RFID built security and admission control system is more safe and fast answered as linked to the other system like biometric.

The RFID device has the benefit of being contactless and non-line-of-sight. The arduino is simple to use and operates easily when using the code, making it a plug-and-play unit. Using arduino, users can adjust the feature as required. It is much more user-friendly and precise. As a result, this initiative may be beneficial in terms of implementing an access management application for a surveillance device as well as contribution security aids. This project could be improved by growing the reader situation in which the tag can be delivered.

5.2 ADVANTAGES

- Easy to install and work; both within as well as outside homes
- Very effective perimeter alarm systems around properties like restricted areas
- No need for those old heavy unsafe locks
- RFID tag and reader ought not be in LOS to brand the system work
- Different barcodes, tags can store more data. Moreover it follows commands of reader
- It delivers location to the reader along with its ID

- RFID tags are used for tracking baggage as well as for one-to-one care health history of patients in the hospitals
- RFID technology is multipurpose in nature and hence smaller and larger RFID policies are available as per submission
- Tags can be encode individual as well as read/write different barcodes
- The technology is used for safety and presence purpose in schools, colleges as well as office formations. The time-in and time-out is recorded in the file of the server

5.3 DISADVANTAGES

- Active RFID is costly due to use of batteries
- Confidentiality is a concern with the use of RFID on products as it can be easily appointed or stopped
- security system requires resources to run, add complexity in IT environment and requires effort by those using the systems
- setup and data writing requires lot of managerial tasks
- RFID strategies need to be involuntary which needs enough amount of time
- Use of RFID technology at list control and for other such claims lead to loss of jobs for unskilled labourer
- The outside electromagnetic interfering can limit the RFID remote reading
- The attention range of RFID is partial which is about 3 meters

Chapter 6

Future Scope

6.1 Future Opportunity

It hinges on how original one can be in order to make the most of this initiative. However, we believe that this project would be useful in the future for purposes such as In the near future, a smart cart will be interfaced with radio technology to make it fully moveable. Bill payment via cell phone is possible. A low-cost RFID scanner that can examine several tags (products) simultaneously for quicker handling and less capitals can be produced and used. Product availability and screening are done automatically.

6.2 RFID is leveraging on the mobile technology

Due to many technology advances, many smartphone apps have been able to provide consumers with a seamless web interface. NFC technology, a form of HF RFID skill that allows online stores to provide consumers a more flexible online expense choice with an additional protection layer, is one of these technical advancements. Clients can pay connected with a single tap against an NFC expense station, taking advantage of the benefits of using credit and debit cards with NFC chips. Since this NFC-based payment scheme does not require card swiping, there is no way for anyone to delete data using the magnetic strip. This online payment method was also adopted by Google which led to the rise of Google Pay . It holds all the details of bank cards with many security policies and allows customers to pay NFC systems. However, the difficulty of using it is to limit the number of stores that sell NFC channels and supporting phones. This application allows the user to read data, adapt the data contained in it, and pay with the NFC tags.

6.3 Installing RFID for trades:

Because of its broad range of uses, many retailers are attempting to set up an NFC place in almost every shop . Not just that, but many cell phone manufacturers have begun to incorporate NFC technology into their products in order to meet the increasing demand. NFC chips may analyse passive RFID policies and extract relevant info from them, so RFID tags play an important role in their proper implementation .

Often advertising companies use it to boost the overall impact of their cutting-edge campaign strategies. Advertisers and marketers will create a plethora of "smart" posters using RFID tags , allowing consumers to communicate more easily. Surprisingly, all users need to do is tap their NFC-allowed mobilephones against these "smart" posters. RFID tags are a great way to improve consumer loyalty because they are both inexpensive and effective .

6.4 Utilizing RFID:

RFID technology has the ability to reshape nearly any industry because it allows shoppers to have easy access to pertinent knowledge about every online retailer's products. RFID systems often work well for ongoing consumer participation because they notify them of any updates on a daily basis . These RFID tags also permit consumers to keep pathway of their online orders and assist retailers in providing timely updates. This HF RFID technology can also be used to allow NFC communication in libraries. The concept is intriguing because it helps you to connect with something through your NFC-enabled computer.

6.5 Uses of RFID for mobilephone skill

- RFID class recognized labels are used for example to identify information that usually contains information behind the set of databases.
- • A number of computer-operated companies use a lot of space identification. This task becomes smoother when the student is given a familiar place. It is in this system that the current location of the object can be identified. Some of the top mail services have already installed those RFID features to simplify their tracking operations. This includes companies such as UPS, FedEx, USPS and Finland Postt.
- • Asset tracking is one of the most widely used RFID tools. This is since businesses can place RFID tags on their assets in the event of loss or theft, or even if the remnants are not widely used they can track and know their entire history of use. In fact, each type of RFID program can be used for asset administration.

6.6 RFID to swap barcodes

The Labels must be “viewed” by lasers as part of the optical scanning process of barcodes tags. That can also be parallel to the line of sight. This makes scanning the same impossible. For a barcode reader to work properly, it must be properly positioned in relation to another reader. RFID technology enables mark reading from a greater distance, even in difficult-to-read conditions. The electronic memory of ActiveWave RFID tags is similar to those used in computers or digital cameras, and it can be used to store info about account, supplies, and even user information in a cell phones . The information is complex sufficient to be changed on a regular basis or when required .

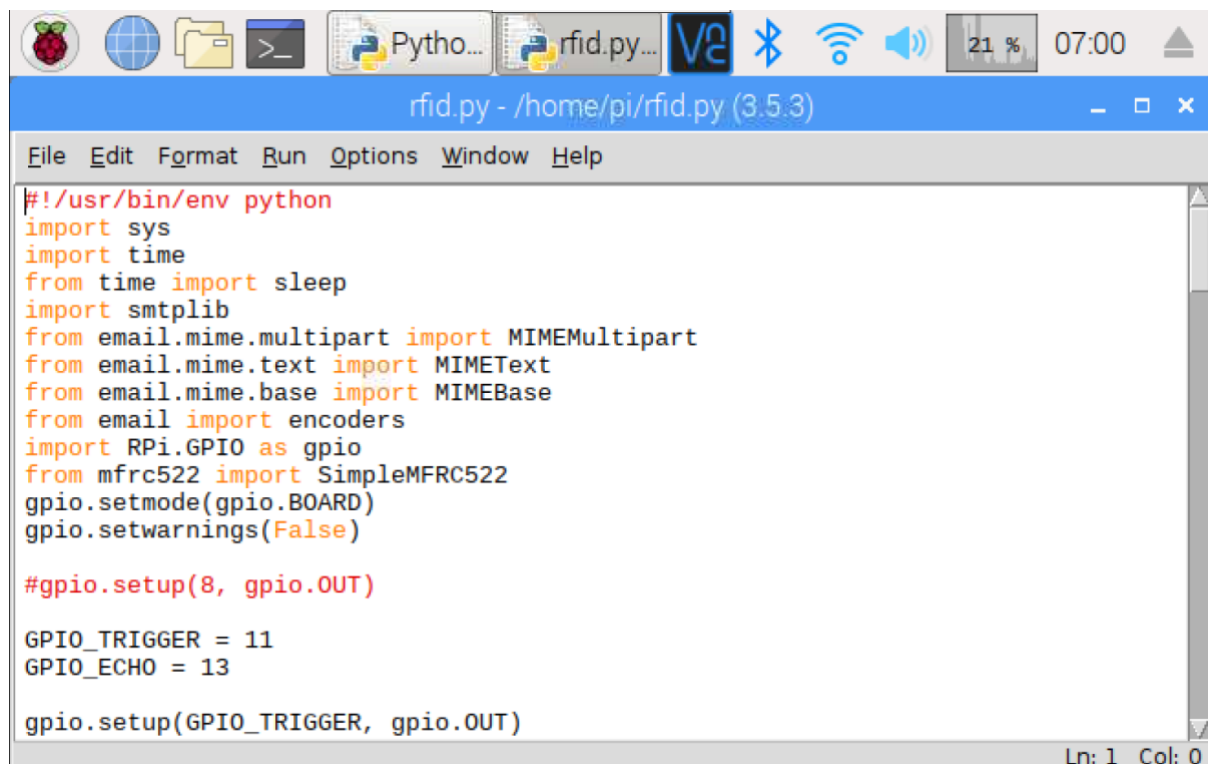
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APPENDIX

CODES USED :-



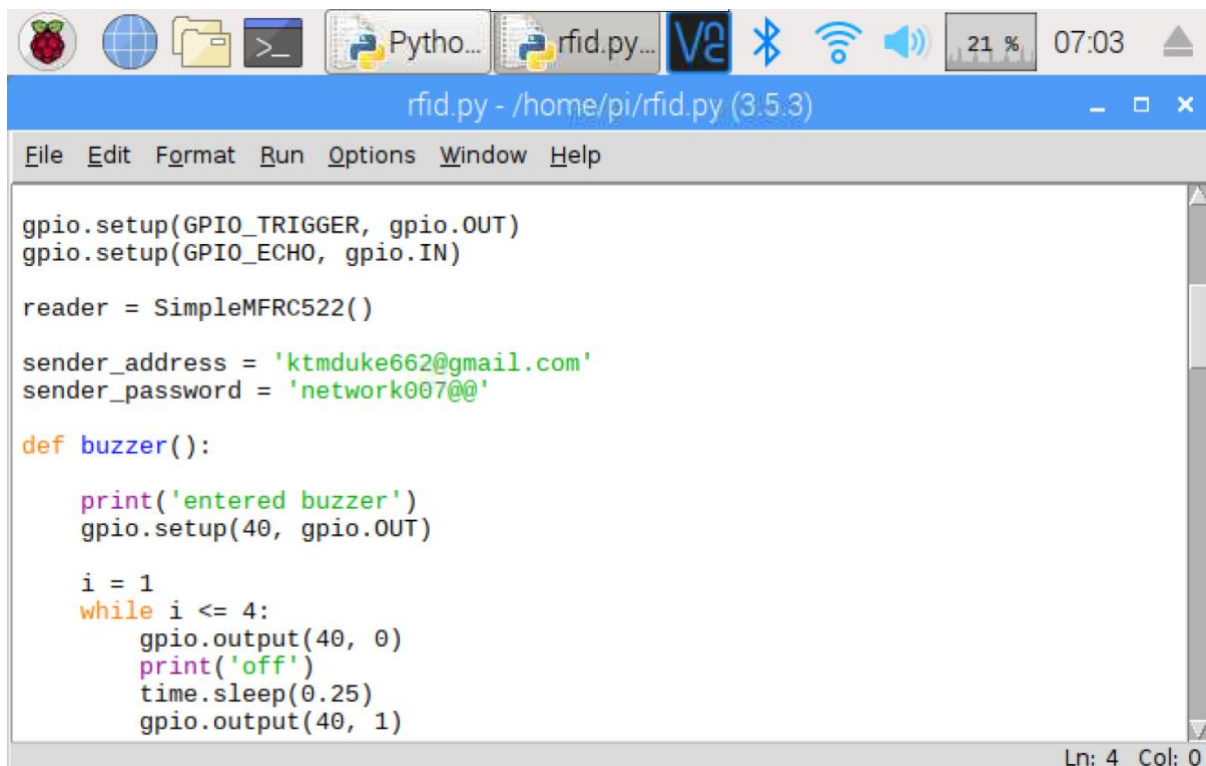
```
#!/usr/bin/env python
import sys
import time
from time import sleep
import smtplib
from email.mime.multipart import MIMEMultipart
from email.mime.text import MIMEText
from email.mime.base import MIMEBase
from email import encoders
import RPi.GPIO as gpio
from mfrc522 import SimpleMFRC522
gpio.setmode(gpio.BOARD)
gpio.setwarnings(False)

#gpio.setup(8, gpio.OUT)

GPIO_TRIGGER = 11
GPIO_ECHO = 13

gpio.setup(GPIO_TRIGGER, gpio.OUT)
```

The image shows a terminal window titled 'rfid.py - /home/pi/rfid.py (3.5.3)'. The window contains Python code for setting up GPIO pins and importing email-related modules. The code includes imports for sys, time, smtplib, MIMEMultipart, MIMEText, MIMEBase, encoders, RPi.GPIO, and SimpleMFRC522. It also shows the configuration of GPIO_TRIGGER and GPIO_ECHO pins, and the setup of GPIO_TRIGGER as an output pin. The window's status bar at the bottom right indicates 'Ln: 1 Col: 0'.



The screenshot shows a terminal window titled "rfid.py - /home/pi/rfid.py (3.5.3)". The code defines a function named "buzzer()" which prints "entered buzzer", sets GPIO pin 40 as an output, and then toggles it on and off four times with a 0.25-second delay between each state change. The code is as follows:

```
gpio.setup(GPIO_TRIGGER, gpio.OUT)
gpio.setup(GPIO_ECHO, gpio.IN)

reader = SimpleMFRC522()

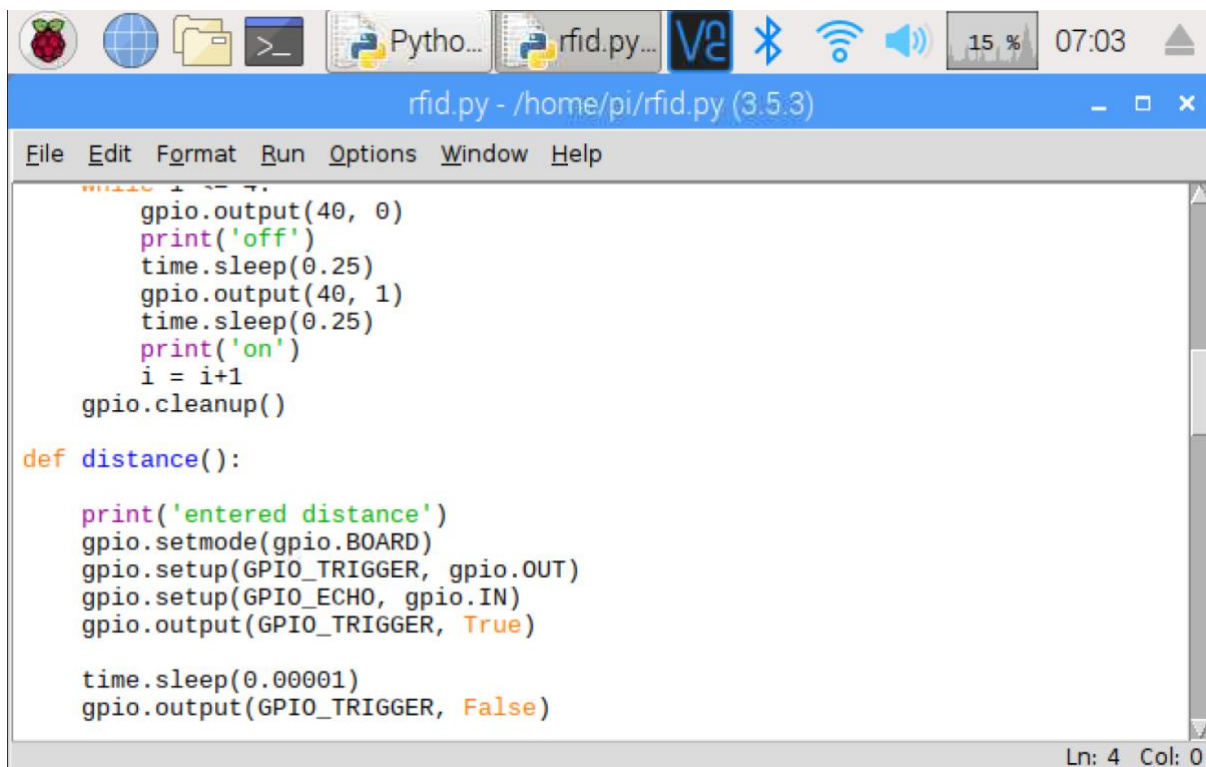
sender_address = 'ktmduke662@gmail.com'
sender_password = 'network007@'

def buzzer():

    print('entered buzzer')
    gpio.setup(40, gpio.OUT)

    i = 1
    while i <= 4:
        gpio.output(40, 0)
        print('off')
        time.sleep(0.25)
        gpio.output(40, 1)
```

The status bar at the bottom right indicates "Ln: 4 Col: 0".



The screenshot shows a terminal window titled "rfid.py - /home/pi/rfid.py (3.5.3)". The code defines a function named "distance()" which prints "entered distance", sets GPIO pin 40 as an output, and then toggles it on and off with a 0.00001-second delay between each state change. The code is as follows:

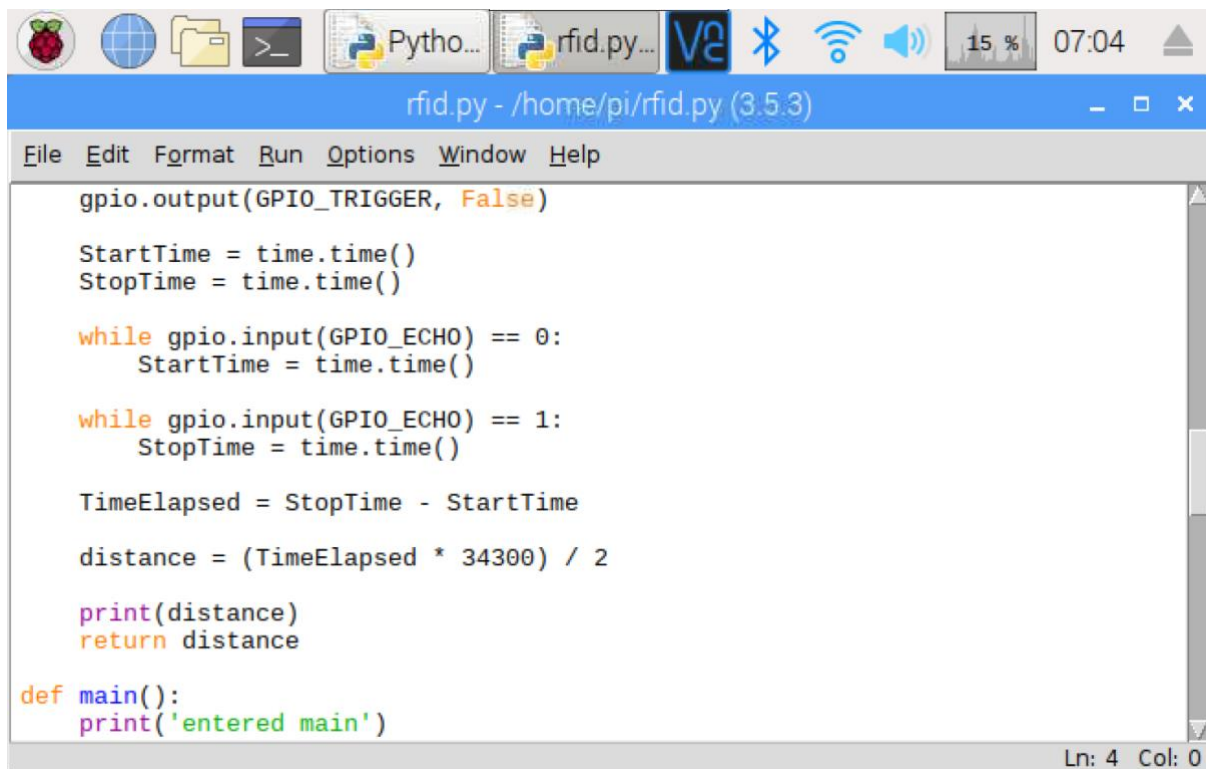
```
while i <= 7:
    gpio.output(40, 0)
    print('off')
    time.sleep(0.25)
    gpio.output(40, 1)
    time.sleep(0.25)
    print('on')
    i = i+1
gpio.cleanup()

def distance():

    print('entered distance')
    gpio.setmode(gpio.BOARD)
    gpio.setup(GPIO_TRIGGER, gpio.OUT)
    gpio.setup(GPIO_ECHO, gpio.IN)
    gpio.output(GPIO_TRIGGER, True)

    time.sleep(0.00001)
    gpio.output(GPIO_TRIGGER, False)
```

The status bar at the bottom right indicates "Ln: 4 Col: 0".



The image shows a terminal window on a Raspberry Pi. The window title is "rfid.py - /home/pi/rfid.py (3.5.3)". The code inside the terminal is as follows:

```
gpio.output(GPIO_TRIGGER, False)

StartTime = time.time()
StopTime = time.time()

while gpio.input(GPIO_ECHO) == 0:
    StartTime = time.time()

while gpio.input(GPIO_ECHO) == 1:
    StopTime = time.time()

TimeElapsed = StopTime - StartTime

distance = (TimeElapsed * 34300) / 2

print(distance)
return distance

def main():
    print('entered main')
```

The status bar at the bottom right of the terminal window shows "Ln: 4 Col: 0".