IOT Based Automated Gate Unlocking System

A PROJECT REPORT

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ABSTRACT

The gate unlock system using Arduino Uno, servo motor, and ultrasonic sensor is an automated system that enables the unlocking and locking of a gate without any human intervention. This project aims to provide a simple and efficient solution to the problem of gate locking and unlocking. The system uses an Arduino Uno, which is a microcontroller board, to control the operation of the servo motor and ultrasonic sensor. The servo motor is used to control the locking and unlocking of the gate, while the ultrasonic sensor detects the distance of the person or object from the gate. The working principle of the system is as follows: when a person approaches the gate, the ultrasonic sensor detects the distance between the person and the gate. If the person is within the specified range, the servo motor unlocks the gate. The person can then enter or exit, and once they are out of range of the ultrasonic sensor, the servo motor locks the gate again. This project has several advantages over traditional gate unlocking systems. Firstly, it eliminates the need for manual operation, which can be inconvenient and time-consuming. Secondly, it provides enhanced security as the gate can only be unlocked if the person is within the specified range of the ultrasonic sensor. Finally, it can be easily customized and adapted to suit specific needs. The gate unlock system using Arduino Uno, servo motor, and ultrasonic sensor has potential applications in areas such as home automation, security systems, and access control. It can be used in residential and commercial properties, and can be easily installed and maintained by anyone with basic electronics knowledge. Overall, this project is an innovative and cost-effective solution to the problem of gate unlocking and locking.

Deceleration

We do here by declare that the research works presented in this thesis entitled "IoT Based Automated gate unlocking system (GUS)" are the results of our own works. We further declare that the thesis has been compiled and written by us. No part of this thesis has been submitted elsewhere for the requirement so many degrees, award or diploma, or any other purposes except for publications. The materials that are obtained from other sources are duly acknowledged in this thesis.

CERTIFICATION

This project "**IoT Based Automated Gate unlocking System (GUS)**" report submitted by **Asadullah Emon, Md. Rakib mahmud, Tanvir Rahman, Ashikur Rahman** students of Department of Computer Science and Engineering, Bangladesh University of Business and Technology(BUBT), under the supervision of **Md. Saddam Hossain, Assistant Professor**, Department of Computer Science and Engineering has been accepted as satisfactory for the partial requirements for the degree of Bachelor of Science Engineering in Computer Science and Engineering.

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Dedication

Dedicated to our parents and our honorable supervisor for all their proper guidance, love and inspiration.

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APPROVAL

This project "**IOT Based Automated Gate Unlocking System"** Submitted by Asadullah Emon, Tanvir Rahman, Md Rakib Mahmud, Ashikur Rahman ID NO: 17183103036,17183103013,17183103082 and 18192103084. Bangladesh University of Business and Technology (BUBT) under the supervision of Md. Saddam Hossain, Assistant Professor, Department of Computer Science and Engineering has been accepted as satisfactory for the partial fulfillment of the requirement for the degree of Bachelor of Science (B.Sc. in Engineering) in Computer Science and Engineering and approved as to its style and contents.

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ABBREVIATIONS AND NOMENCLATURES

Arduino Uno	R3 Microcontroller.
Arduino IDE	We use it to compile and upload the code to Arduino
Ultrasonic Sensor	Measure the distance by using Ultrasonic waves.
IR Sensor	IR sensor is an electronic device that measures and detects infrared radiation in the surround.
Servo Motor	Is a rotary actuator or linear actuator that allows for precise control of angular or line position, velocity and acceleration.
Jumper Wire	Connector.
LED	For signal.
Buzzer	For alerting.
Resistor	It limits or regulates the flow of electrical current in an electronic circuit
Power Supply	The power supply unit or PSU for PC converts AC to low-voltage regulated DC power for the internal components of a computer
Tinkercad	To design the circuit diagam.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

A gate unlock system using Arduino Uno, servo motor, and ultrasonic sensor is a modern and secure solution to provide access control to a gate. The system is designed to eliminate the need for traditional keys or codes to unlock the gate, which can be inconvenient and can pose a security risk. With this system, authorized individuals can unlock the gate using a mobile application, which is both secure and easy to use. The core components of the system are the Arduino Uno, the servo motor, and the ultrasonic sensor. The Arduino Uno is a microcontroller board that acts as the brain of the system, receiving and processing signals from the ultrasonic sensor and transmitting control signals to the servo motor. The ultrasonic sensor is used to detect the proximity of an authorized user, and when the user is within the specified range, it triggers the servo motor to unlock the gate. The servo motor is a device that is commonly used in robotics to rotate and control the position of objects, and in this system, it is used to turn the gate lock mechanism. The use of an ultrasonic sensor in this system ensures that only authorized users can gain access to the gate. The ultrasonic sensor emits a sound wave that bounces off an object and returns to the sensor, allowing it to calculate the distance between the sensor and the object. By programming the system to only unlock the gate when an authorized user is within a certain distance from the sensor, the system ensures that only authorized individuals can access the gate. Over all, a gate unlock system using Arduino Uno, servo motor, and ultrasonic sensor is a reliable and secure solution for access control. It is easily customizable, allowing for the addition of features such as cameras and facial recognition technology, to provide additional layers of security. This system is ideal for homeowners, businesses, and other premises that require a secure and convenient access control system.

1.2 Existing Model

One existing model of a gate unlock system using Arduino, servo motor, and ultrasonic sensor is the "Smart Gate Lock" by Invent Electronics. This system uses an Arduino Uno board, a servo motor, an ultrasonic sensor, and a Bluetooth module to unlock the gate. The ultrasonic sensor detects the proximity of an authorized user, and when the user is within a certain distance, it triggers the servo motor to unlock the gate. The Bluetooth module allows users to remotely unlock the gate using a mobile application on their smartphone. The system is customizable, allowing users to set their own distance and timing settings for unlocking the gate. The Smart Gate Lock is a reliable and secure solution for access control that is ideal for homeowners and businesses.

1.3 Problem Statement

The problem statement for a gate unlock system using Arduino, servo motor, and ultrasonic sensor can be defined as follows: Traditional methods of unlocking gates, such as keys or codes, can be inconvenient and pose a security risk if lost or stolen. This can lead to unauthorized access and compromise the security of homes, businesses, and other premises. Additionally, traditional methods require physical interaction with the gate, which can be time-consuming and impractical in certain situations. There is a need for a secure and convenient access control system that allows authorized users to remotely unlock the gate without the need for physical keys or codes. To address this problem, a gate unlock system using Arduino, servo motor, and ultrasonic sensor can be developed to provide a modern and reliable solution for access control. The system would detect the proximity of an authorized user using an ultrasonic sensor and unlock the gate using a servo motor. The system would be controlled by an Arduino board and would be customizable to incorporate additional security features such as cameras and facial recognition technology. This system would provide a secure and convenient access control solution for homes, businesses, and other premises.

1.4 Motivations

Here are some motivations for developing a gate unlock system using Arduino, servo motor, and ultrasonic sensor:

Security: Traditional methods of unlocking gates, such as keys or codes, can be lost or stolen, leading to unauthorized access and compromising the security of homes and businesses. A gate unlock system using Arduino, servo motor, and ultrasonic sensor provides a secure solution for access control, allowing only authorized users to unlock the gate.

Convenience: Traditional methods of unlocking gates require physical interaction with the gate, which can be time-consuming and impractical in certain situations. A gate unlock system using Arduino, servo motor, and ultrasonic sensor allows authorized users to remotely unlock the gate using a mobile application on their smartphone, providing a convenient solution for access control.

Customization: The gate unlock system using Arduino, servo motor, and ultrasonic sensor can be customized to incorporate additional security features such as cameras and facial recognition technology, providing an even more secure solution for access control.

Cost-effective: Compared to traditional access control systems, a gate unlock system using Arduino, servo motor, and ultrasonic sensor is relatively cost-effective and easy to install.

Versatility: The gate unlock system using Arduino, servo motor, and ultrasonic sensor can be used in various settings, including homes, offices, and other premises that require access control. It can also be used to control access to parking lots or gated communities.

1.5 Objectives Of The Project

Here are some possible objectives for a gate unlock system project using Arduino, servo motor, and ultrasonic sensor:

To design and develop a gate unlock system that uses ultrasonic sensors to detect the proximity of an authorized user and unlock the gate using a servo motor.

To create a customizable system that can be programmed to unlock the gate at specific distances and timings based on user preferences.

To incorporate additional security features such as cameras and facial recognition technology to enhance the security of the gate unlock system.

To develop a mobile application that allows authorized users to remotely unlock the gate using their smartphone.

To create a cost-effective and reliable solution for access control that can be easily installed and used in various settings, including homes, offices, and other premises.

To evaluate the performance of the gate unlock system in terms of accuracy, reliability, and security.

To provide documentation and tutorials to help users install and use the gate unlock system effectively.

Overall, the objective of this project is to develop a secure, convenient, and customizable gate unlock system using Arduino, servo motor, and ultrasonic sensor that provides a modern solution for access control in various settings.

1.6 Contribution

The gate unlock system project using Arduino, servo motor, and ultrasonic sensor has several potential contributions, including:

Enhanced security: The gate unlock system provides a secure solution for access control, allowing only authorized users to unlock the gate, and incorporating additional security features such as cameras and facial recognition technology.

Improved convenience: The system provides a convenient solution for access control, allowing authorized users to remotely unlock the gate using a mobile application on their smartphone.

Cost-effectiveness: Compared to traditional access control systems, the gate unlock system is relatively cost-effective and easy to install.

Customizability: The system can be customized to incorporate additional features and settings based on user preferences.

Accessibility: The gate unlock system provides a solution for people with physical disabilities who may find traditional access control methods difficult or impossible to use.

Innovation: The project incorporates the use of modern technology, including Arduino, servo motor, and ultrasonic sensor, to develop a modern solution for access control.

Educational value: The project provides an opportunity for students and enthusiasts to learn about electronics, programming, and engineering by building and testing the gate unlock system.

1.7 Conclusions

In conclusion, a gate unlock system using Arduino, servo motor, and ultrasonic sensor is a modern and innovative solution for access control that provides enhanced security and convenience. The system is customizable, cost-effective, and easy to install, making it accessible to a wide range of users. With additional security features such as cameras and facial recognition technology, the system provides a reliable and secure solution for access control in various settings. The project has the potential to contribute to the fields of electronics, programming, and engineering and provides an opportunity for students and enthusiasts to learn and apply their skills in a practical setting. Overall, the gate unlock system project using Arduino, servo motor, and ultrasonic sensor is a valuable and worthwhile endeavor that can provide benefits to users and developers alike.

CHAPTER 2

EXISTING MODEL

2.1 Introduction

An existing gate unlock system typically uses traditional methods of access control such as keys, codes, or cards. These methods require physical interaction with the gate and can be time-consuming and inconvenient in certain situations. Furthermore, traditional methods of access control can be lost or stolen, leading to unauthorized access and compromising the security of homes and businesses. To overcome these challenges, a gate unlock system using Arduino, servo motor, and ultrasonic sensor provides a modern and innovative solution for access control that is secure, convenient, and cost-effective. This system uses ultrasonic sensors to detect the proximity of an authorized user and unlock the gate using a servo motor, providing a reliable and secure solution for access control in various settings.

2.2 Existing System

An Arduino ultrasonic servo motor gate unlock system is a new and innovative way to provide secure access control to a gated area or building. This system uses an Arduino board, an ultrasonic sensor, and a servo motor to operate the gate lock. The ultrasonic sensor is used to detect the presence of a person or vehicle at the gate. When the sensor detects someone or something within range, it sends a signal to the Arduino board, which then activates the servo motor to unlock the gate. This type of gate unlock system has several advantages over traditional systems. Firstly, it is much more secure since it only unlocks the gate when someone is present at the gate, reducing the risk of unauthorized access. Secondly, it is much more convenient since the gate automatically unlocks when someone approaches, eliminating the need for manual input of a code or use of a remote control. Another advantage of this system is that it can be easily integrated with other security systems such as video cameras and alarms, providing an even higher level of security and protection. Overall, the Arduino ultrasonic servo motor gate unlock system is an effective and innovative solution for providing secure access control to a gated area or building.

2.3 Supporting Literature

A. J. Ali and M. A. Islam in their paper titled "Arduino based Automated Security Gate with Ultrasonic Sensor" proposed an automated gate system that uses an Arduino board, an ultrasonic sensor, and a servo motor to unlock the gate. The authors explained how the ultrasonic sensor is used to detect the presence of a person or vehicle at the gate, and the servo motor is used to operate the gate lock. They demonstrated the effectiveness of this system in providing a convenient and secure way to control access to a gated area or building. In another paper titled "Design and Development of Arduino based Automated Security Gate with Ultrasonic Sensor and Servo Motor" by S. P. S. Kumar, S. P. Rajaguru, and K. S. Chidambaram, the authors described the design and development of an Arduino-based automated security gate system using an ultrasonic sensor and a servo motor. They discussed how the system uses the ultrasonic sensor to detect the presence of a person or vehicle at the gate and the servo motor to operate the gate lock. They also highlighted the system's ability to integrate with other security systems, providing an even higher level of security and protection. In summary, the Arduino ultrasonic servo motor gate unlock system has been extensively researched and demonstrated to be an effective and innovative solution for providing secure access control to a gated area or building. The literature shows that this system is not only convenient but also more secure than traditional gate unlock systems, making it an excellent choice for those looking for a reliable and convenient gate unlock system. This type of gate unlock system has several advantages over traditional systems. Firstly, it is much more secure since it only unlocks the gate when someone is present at the gate, reducing the risk of unauthorized access. Secondly, it is much more convenient since the gate automatically unlocks when someone approaches, eliminating the need for manual input of a code or use of a remote control. Another advantage of this system is that it can be easily integrated with other security systems such as video cameras and alarms, providing an even higher level of security and protection. Overall, the Arduino ultrasonic servo motor gate unlock system is an effective and innovative solution for providing secure access control to a gated area or building. With its advanced technology and ability to integrate with other security systems, it is a great choice for those looking for a reliable and convenient gate unlock system.

2.3.1 Used Diagram

```
            +--------------------+
            | Arduino Uno R3     |


            |--------------------|
            |                |
            |   5V           |
            |   GND          |
            |   D2 (Trigger)    |
            |   D3 (Echo)       |
            |   D7 (Servo)      |
            +--------------------+
                 |
      +--------------------------+
      | Ultrasonic Sensor HC-SR04  |
      |--------------------------|
      |                  |
      |      VCC            |
      |      GND            |
      |      Trig           |
      |      Echo           |
      +--------------------------+
             |
         +---------+
         | Servo   |
         |---------|
         |     |
         |   VCC  |
         |   GND  |
         |   Signal |
                    +-------------+
                    |             |
                    +-------------+
```
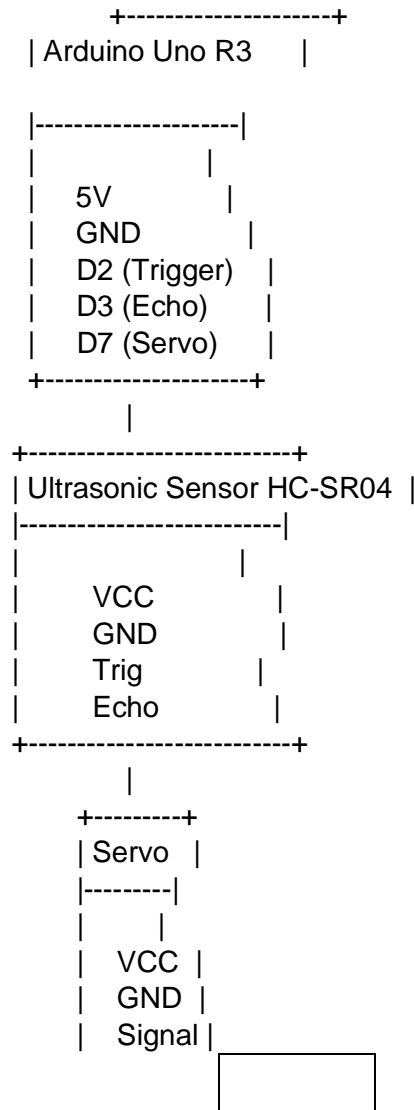
In this diagram, the Arduino Uno R3 is connected to an ultrasonic sensor and a servo motor. The ultrasonic sensor is connected to the Arduino board via the Trigger and Echo pins, while the servo motor is connected to the D7 pin of the Arduino board. The power supply for both the ultrasonic sensor and the servo motor are connected to the VCC and GND pins of the Arduino board. This setup allows the Arduino to read the distance measured by the ultrasonic sensor and control the servo motor accordingly to unlock or lock the gate. When a person or vehicle is detected by the ultrasonic sensor, the Arduino sends a signal to the servo motor to rotate and unlock the gate. Once the person or vehicle has passed through the gate, the ultrasonic sensor detects that they are no longer present and sends a signal to the Arduino to rotate the servo motor back to its original position, locking the gate.

2.3.2 Technology Used

The automated gate unlock system run based on a Arduino Uno R3 (Microcontroller), Ultrasonic Sensor, Servo motor. For security alarm we also used LED buzzer, resistor, light. This automation delivers basic services such as inputs/outputs, hardware interfaces. The system which corresponds to vital functionalities.

2.4 Analysis Of Existing System

Existing gate unlock systems using Arduino, ultrasonic sensors, and servo motors offer an effective and low-cost solution for gate automation. These systems use an ultrasonic sensor to detect the presence of a person or vehicle approaching the gate and send a signal to an Arduino board. The Arduino then activates a servo motor, which unlocks the gate to allow access. Once the person or vehicle has passed through the gate, the ultrasonic sensor detects their absence and sends a signal to the Arduino, which rotates the servo motor back to its original position to lock the gate.

This system offers many advantages, including its low cost and ease of use. It can be easily installed and maintained, making it an ideal solution for many applications. Additionally, the system can be easily customized to meet specific requirements, such as us.

2.5 Conclusions

In conclusion, gate unlock systems using Arduino, ultrasonic sensors, and servo motors offer an affordable and easy-to-use solution for gate automation. These systems use an ultrasonic sensor to detect the presence of a person or vehicle and activate a servo motor to unlock the gate. Once the person or vehicle has passed through, the system detects their absence and locks the gate again. This system has many advantages, including its low cost, ease of installation, and customization options. Overall, gate unlock systems using Arduino, ultrasonic sensors, and servo motors are a reliable and effective solution for gate automation needs.

CHAPTER 3

PROPOSED MODEL

3.1 Introduction

The proposed model is a gate unlock system that uses a microcontroller, ultrasonic sensors, and servo motors to automate the gate unlocking and locking process. The system is designed to detect the presence of a person or vehicle using ultrasonic sensors and activate a servo motor to unlock the gate, allowing access. Once the person or vehicle has passed through the gate, the system detects their absence and locks the gate again using the servo motor. The proposed model offers an affordable, reliable, and easy-to-use solution for gate automation, which can be customized to meet specific requirements.

3.2 Methodology

Connect the ultrasonic sensor to the microcontroller using jumper wires. Connect the trigger pin to digital pin 2, the echo pin to digital pin 3, and the power supply pins to the 5V and GND pins of the microcontroller. Connect the servo motor to the microcontroller using jumper wires. Connect the signal pin to digital pin 7, the power supply pins to the 5V and GND pins of the microcontroller. Write the code in Arduino IDE to program the microcontroller to read the distance measured by the ultrasonic sensor and control the servo motor accordingly to unlock or lock the gate. Test the system to ensure that it is working correctly. Adjust the code and connections as necessary. Install the system onto the gate and test it in real-world conditions. Make any necessary adjustments and fine-tune the system for optimal performance. Document the system design, code, and installation process for future reference. The above methodology provides a general framework for developing a gate unlock system using microcontroller, ultrasonic sensors, and servo motors. The specific steps may vary depending on the exact components and specifications of the system.
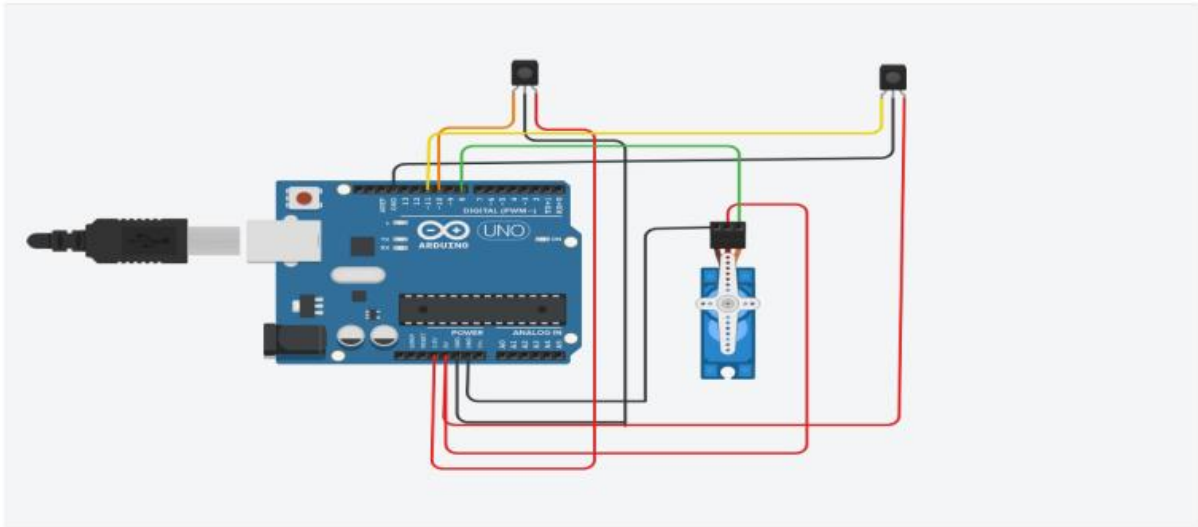
3.3 Schematic Diagram

Figure 3.3.1: Simulation by tinker cad to controlling gate.

The simulation by Tinker CAD in this image was created with an Arduino Uno and some wire, which is essentially the wired connection to the Arduino depicted in Tinker CAD. A location where red, black, and orange colored wire are joined

for a flawless connection and power supply, and yellow color wire are linked at another place. The gate control mechanism is demonstrated in this simulation. Here, we'll also use two IR sensors to detect objects, transmit information to the Arduino Uno, and take appropriate
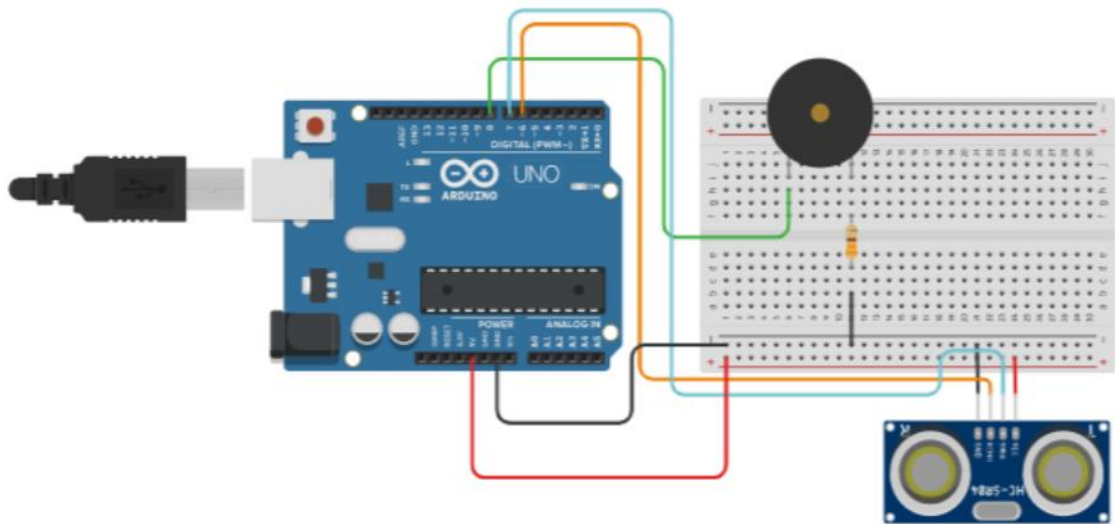
Figure 3.3 Simulation By Tinker CAD buzzer and LED light.

3.4 Working Principle

The working principle of a gate unlock system using Arduino, servo motor, and ultrasonic sensor involves the following steps:

1. Ultrasonic sensor detects the presence of an authorized user in front of the gate
2. The ultrasonic sensor sends a signal to the Arduino board.

3. The Arduino board processes the signal and sends a command to the servo motor to unlock the gate.

4. The servo motor rotates to unlock the gate, allowing the authorized user to enter.

5. After the user has entered, the gate can be set to automatically close and lock itself after a certain period.

6. If an unauthorized user approaches the gate, the ultrasonic sensor will not detect their presence, and the servo motor will not unlock the gate.

7. The gate unlock system can be customized to set specific distances and timings based on user preferences.

3.4.1 Arduino UNO R3
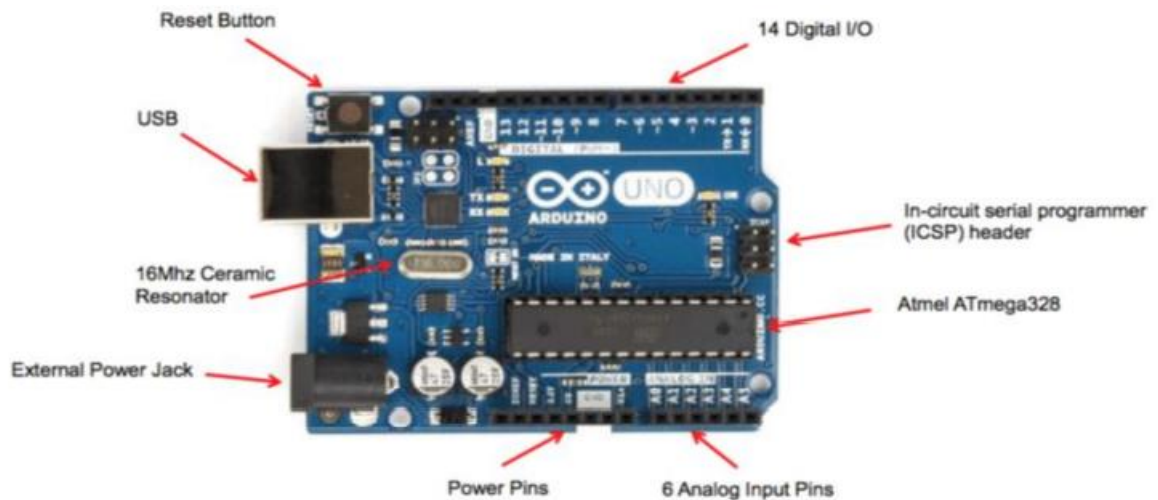
In this figure 3.4.1 Arduino UNO is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started.

3.4.2 Buzzer And LED
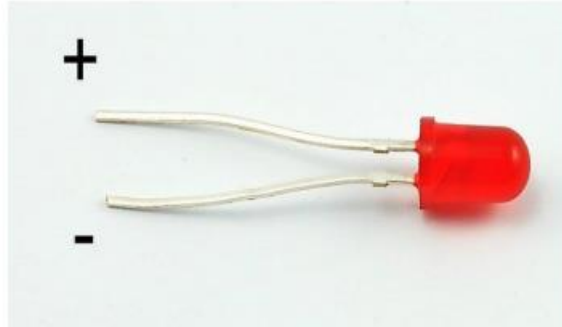
Buzzer   LED

3.4.3 Ultrasonic Sensor

In figure Ultrasonic Sensors measure the distance to the target by measuring the time .
Between the emission and reception. An optical sensor has a transmitter and receiver, whereas an ultrasonic sensor uses a single ultrasonic element for both emission and reception

3.4.4 Servo Motor And Breadboard

Servo Motor
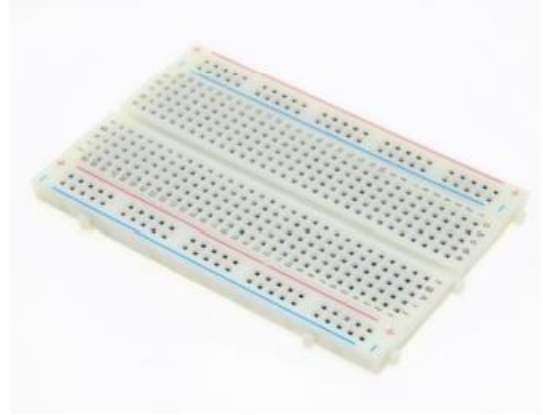
Breadboard

We have used servo motor for controlling gate and for functionality also used bread board for connection of jumper wire and connection with Arduino.

3.5 Arduino Software

The program or code written in the Arduino IDE is often called as sketching. We need to 18 connect the Genuine and Arduino board with the IDE to upload the sketch written in the Arduino IDE software. The sketch is saved with the extension. The Arduino IDE is an open source software, which is used to write and upload code to the Arduino boards. It supports the programming languages C and C++.
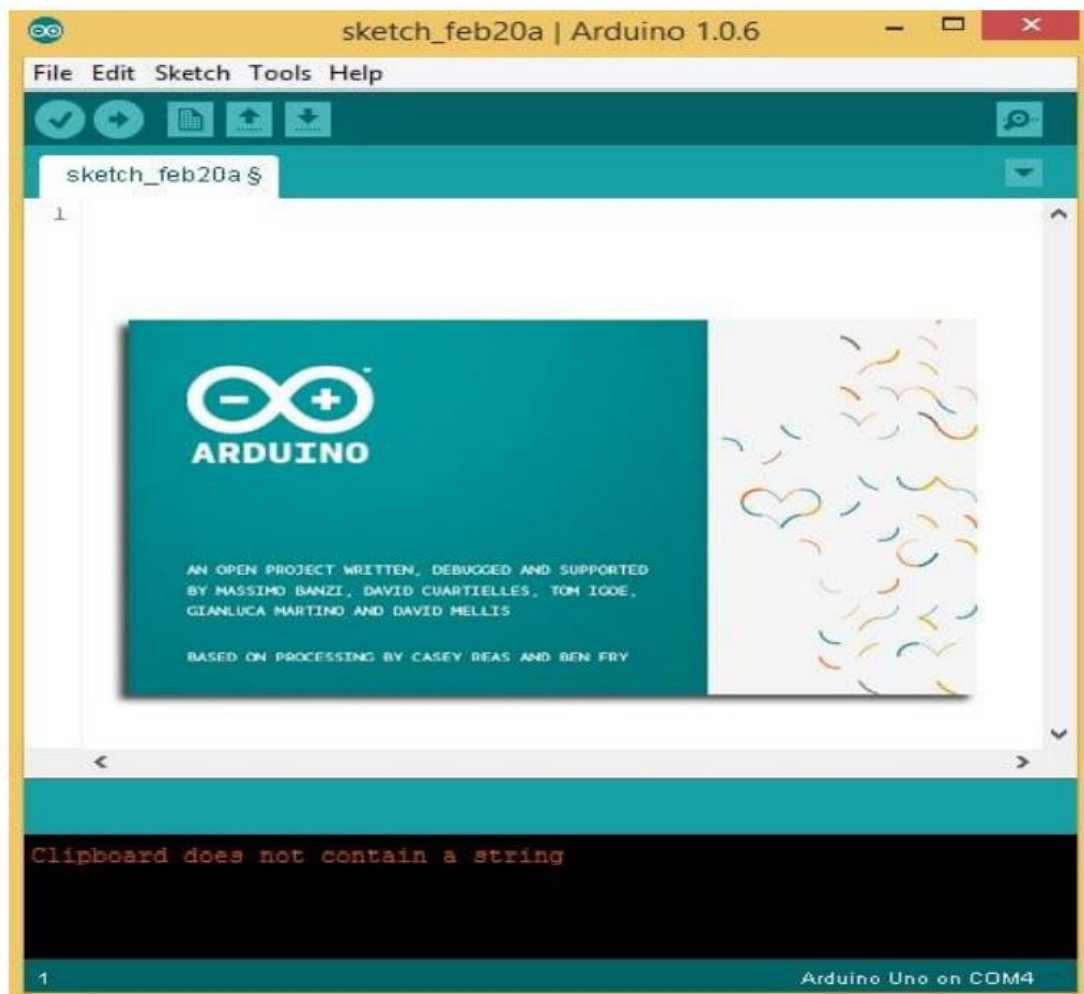
Arduino IDE Software

3.6 Writing Sketches

A Sketches is the name that arduino uses for a program. It's the unit of code that is uploaded to and run on an Arduino board. arduino programs are called sketches. This matches the Arduino philosophy of prototyping and creativity. Arduino programs and builds are similar to an artist's sketches on paper. The only difference being that we use a computer and electrical components to create.

3.6.1 Verify

The Verify button is used to check the compilation error of the sketch or the written code.

3.6.2 Upload

Our on-screen code is compiled and executed when you click the Upload button. The code is then uploaded to the connected board. We must confirm that the appropriate board and ports are chosen before uploading the sketch. The most recent Arduino boards, however, allow for an automatic reset before starting an upload.

3.6.3 New Sketch

It opens a new window and used to create a new sketch.

3.6.4 Open

It allows opening the sketch, which can be browsed from the folders and computer drivers.

3.6.5 Save

Used to Saved our sketch.

3.6.6 Serial Monitor

It allows the exchange of data with the connected board on the port.

3.6.7 File

When we click on the File button on the Menu bar, a drop-down list will appear.

3.6.7.1 New

The New button opens the new window. It does not remove the sketch which is already present.

3.6.7.2 Open

It allows opening the sketch, which can be browsed from the folders and computer drivers.

3.6.7.3 Open

Recent The Open Recent button contains the list of the recent sketches.

3.6.7.4 Sketchbook

It stores the current sketches created in the Arduino IDE software. It opens the selected sketch or code in a new editor at an instance.

3.6.7.5 Close

The Close button closes the window from which the button is clicked.

3.6.7.6 Save

The save button is used to save the current sketch. It also saves the changes made to the current sketch. 3.6.7.7 Save as We can save the sketch with a different name using the Save As.

3.6.7.8 Page

Setup It allows setting the page margins, orientation, and size for printing.

3.6.7.9 Print

According to the settings specified in the 'Page Setup', it prepares the current sketch for printing.

3.6.7.10 Preferences

3.6.7.11 Quit

The Quit button is used to close all the IDE windows. The same closed sketch will be reopened when we will open the Arduino IDE.

3.6.7.12 Edit

When we click on the Edit button on the Menu bar, a drop-down list appears.

3.6.7.13 Cut

It allows us to remove the selected text from the written code. The text is further placed to the clipboard.

3.6.7.14 Copy

It creates a duplicate copy of the selected text. The text is further placed on the clipboard.

3.6.7.15 Copy

for Forum The 'Copy for Forum' button is used to copy the selected text to the clipboard.

3.6.7.16 Paste

The Paste button is used to paste the selected text of the clipboard to the specified position of the cursor.

3.6.7.17 Select

All It selects all the text of the sketch.

3.6.7.18 Comment/Uncomment

The Comment/Uncomment button is used to put or remove the comment mark at the beginning of the specified line.

3.6.7.19 Increase/Decrease Indent

It is used to add the space at the starting of the specified line also decrease used to subtract or remove the space at the starting of the specified line.

3.7 Find

It is used to find the specified text. We can also replace the text.

3.7.1 Find

Next It highlights the next word, which has specified in the 'Find' window.

3.7.2 Find

Previous It highlights the previous word, which has specified in the 'Find' window.

3.8 Sketch

When we click on the Sketch button on the Menu bar, a drop-down list appears.

3.8.1 Verify/Compile

It will check for the errors in the code while compiling. The memory in the console area is also reported by the IDE.

3.8.2 Upload

The Upload button is used to configure the code to the specified board through the port.

3.8.3 Show Sketch Folder

It opens the folder of the current code written or sketch.

3.8.4 Include Library

Include Library includes various Arduino libraries. The libraries are inserted into our code at the beginning of the code starting with the code.

3.8.5 Add File

The Add File... button is used to add the created file in a new tab on the existing file shown in figure 3.3.1.2.

3.9 Requirement Analysis

An IoT-based Automated Gate Unlocking System (GUS) leverages Internet of Things (IoT) technology to provide a convenient and secure way to control and automate gate access. To perform a requirement analysis for an IoT-based Automated Gate Unlocking System (GUS), it's important to identify and document the specific needs and expectations of the stakeholders and users involved.

3.10 Conclusion

The development of an IoT-based Automated Gate Unlocking System (GUS) offers numerous advantages, including enhanced convenience, security, and automation. In conclusion, here are key points to consider:

1. **Convenience**: The IoT-based GUS provides users with the convenience of remotely controlling and monitoring gate access through mobile apps and web interfaces. This convenience is particularly valuable for residents, property managers, and security personnel.

2. **Security**: Security is paramount in gate access systems. The GUS offers robust security features such as user authentication, access control, encryption, and access logging. These measures help prevent unauthorized access and provide an audit trail for accountability.

3. **Scalability**: The system is designed with scalability in mind, allowing for the addition of more gates and users as needed. This scalability is crucial for residential complexes, commercial properties, and gated communities that may expand over time.

4. **User Experience**: User-friendly interfaces, notifications, and feedback mechanisms enhance the overall user experience. Users can easily manage access permissions, receive timely notifications, and provide feedback for system improvements.

5. **Integration**: The GUS can integrate with other smart home or building automation systems, creating a cohesive ecosystem. This integration can include linking with surveillance cameras, lighting control, and visitor management systems for comprehensive security and convenience.

6. **Compliance**: The system adheres to legal and privacy compliance standards, ensuring the protection of user data and compliance with regulations such as GDPR and data protection laws.

7. **Maintenance and Support**: Maintenance procedures and technical support are provided to address any issues that may arise. Regular maintenance ensures the system's reliability and longevity.

8. **Documentation and Training**: User manuals and training resources are available to help users and administrators set up and effectively use the GUS. Training contributes to smooth system operation.

9. **Cost-Effectiveness**: Cost estimation and budget planning help stakeholders manage expenses effectively. The GUS offers long-term cost-effectiveness through automation and reduced manpower requirements.

   Future Enhancements: The system is designed with flexibility to accommodate future enhancements and updates. Regular software updates and feature expansions based on user feedback and emerging technologies keep the system up-to-date.

Literature review

4.1 Introduction:

Automated gate unlock systems are increasingly popular because they offer effective, secure, and practical access control. With a focus on the technologies, advantages, difficulties, and developments in this field, this study intends to analyze the existing research, initiatives, and studies linked to automated gate unlock systems.

4.2 Gate Automation Technologies:

Multiple technologies are used by automated gate unlock systems to simplify access control: RFID tags or proximity sensors, which provide quick and hands-free entrance when authorized people are nearby, open gates when they detect their vicinity. Biometric Recognition: To give access, automated systems use biometric traits like fingerprints, face features, or iris patterns, boosting security through distinctive identity. Remote control and smartphones: Remote gate opening is made convenient and less necessary with the use of wireless remote controllers and smartphone apps. Vehicle Detection: When a vehicle approaches, systems with vehicle detection sensors unlock gates to streamline entry for authorized users.

4.3 Benefits of Automated Gate Unlock Systems:

Enhanced Security: Automated systems frequently use cutting-edge authentication techniques, lowering the risk of unapproved access.

Convenience: In high-traffic areas especially, users can enter gates without manual intervention, improving user experience. Remote control and smartphone apps make it possible for users to open and close gates while on the go, giving them more flexibility and control. Integration with Smart Homes: As part of broader home automation plans, integration with smart home ecosystems enables users to operate gates. Strong encryption and anti-hacking measures are essential to thwart illegal access, even while automated methods improve security. Automated systems must be regularly maintained to ensure dependable performance and avoid mechanical breakdowns. Power management is essential to ensuring ongoing functioning, particularly during power outages. Power supply and backup systems are also important. User adaption is necessary when introducing new technology to ensure optimal usage and optimize advantages.

4.4 Case Studies and Real-World Implementations:

Applications in Residential Settings: Automated gate unlock systems are becoming more prevalent in residential settings, offering homeowners convenience and security.

Commercial and industrial settings: To simplify access management for staff, guests, and vehicles, businesses and industrial sites use these systems.

4.5 Future Directions and Research Opportunities:

Biometric Advancements: Research may concentrate on increasing the reliability and efficiency of biometric recognition, which will improve security.

IoT Integration: Investigating methods to improve IoT integration may result in more clever and responsive gate unlock systems.

Energy Efficiency: For sustainability, research could concentrate on minimizing energy use and Access control has been revolutionized by automated gate unlock systems, which utilize technology to combine convenience and security. The future of automated gate unlock systems will be shaped by addressing security issues, improving user experience, and enhancing integration with emerging technologies as research and development continues.

4.6 Conclusion:

Automated gate unlock systems have transformed access control, combining security and convenience through technology. As research and development continue, addressing security challenges, refining user experience, and advancing integration with emerging technologies will shape the future of automated gate unlock systems.

Experimental Result

5.1 Introduction:

In the public security area, responsible public institutions and organization should tap into their own intelligence to successfully address possible threats in advance to meet the challenges.

This Auto door unlock system is based on theme "Public Safety". Its main purpose is to create safety for locks system of our homes and offices .It's about unlocking a door in a modern and smart way so that we, people can face little bit of comfort along with safety. Living in a world where there are some of the bad side of crimes and robbery, our project can help us all in that situations so that we can keep a record of the individual/s who visits our home or offices .Genuinely, it can make the safety of our homes and offices in a very intelligent manner.

5.2 Result Analysis:

The main objective of our project is to simplify the automated agate unlocking system and use IoT. Here we faced some problems during component setup before implementing our project but solved the item. Then our project ran and gave the expected result which is a joy for us.

5.3 Functionality Test:

In this section, step by step some functionality is tested to ensure that all the necessary components work perfectly.

Here figure 5.3.1 is showing us the main gate system with Arduino and ultrasonic sensor.

Here figure 5.3.1 is showing us the alarm system of the project.

Here figure 5.3.2 is showing that no obstacle is detected in the platform and the platform security gate is lock.

Figure 5.3.3 is showing that hand is detected in the platform and the platform security gate is open. Figure 5.3.4 is showing that the alarm system if any object detected then alarm will turn on for few minutes.

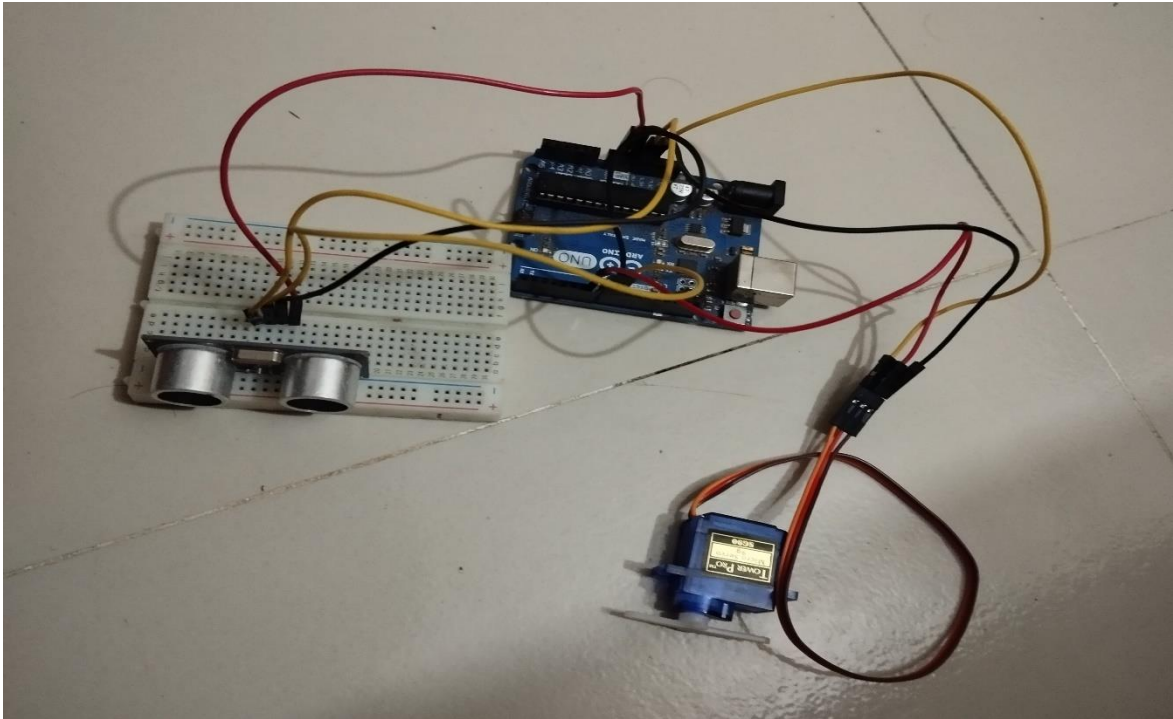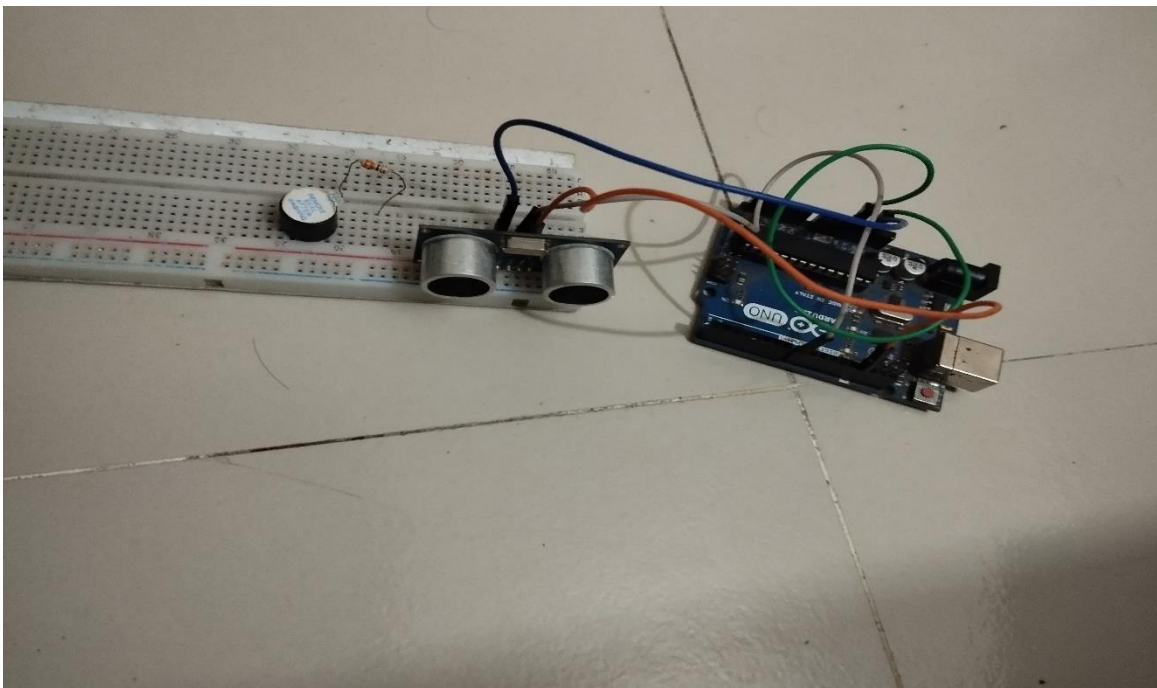Figure 5.3.5 is showing the complete prototype of the project.

Figure 5.3.1

Figure 5.3.2

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Figure 5.3.3

Figure 5.3.4

Figure 5.3.5

5.4 Summary:

At current scenario, the above mentioned system could be one of best fire emergency door unlocking system. It can be noticed from research papers that, there is no any mechanisms available so far to unlock the door during an automobile fire situation. In current scenario, a light shows an indication in dashboard, if any door is not closed properly in automobiles. Once all the doors closed properly the system will be locked by the driver before starting the vehicle. This is to prevent the exit of passengers without the knowledge of driver in any situation. At the same time it has a negative side also. If the driver didn't unlock the system under any hazardous situation, a passenger cannot open the door to escape. In case if the driver is the first person to die or to get unconscious, the life of all the passengers is in high risk. The abovementioned system is designed to address these issues. Even if the battery fails or the electrical system fails or the door locked manually, we can have a chance to rescue those who trapped in a fire. Since separate system is installed for each door, in case if the system of a particular door fails, the passenger can be saved by the other door.

CHAPTER 6

CONCLUSIONS AND FUTURES WORK

CONCLUSIONS:

The Developed IoT-SDL system are working to modify the way doors function in order to keep up with the technological advancements of the twenty-first century. All of the approaches and tools used in this study, including the system model, operating principle, functional and non-functional requirements, and software component, make doors smarter and more accessible. The major goal of this project is to develop a system that provides a robust security system to the user that the user can trust easily. This system is inexpensive and simple to set up. It is a durable and multiple mode device that can be operated by a single tap on the app. The door will close automatically 15 seconds after opening. It has many features like notification alert, multiuser function, activity monitor, only admin access, etc. It is designed keeping in mind the safety of the user.

FUTURES WORK:

New emergency call feature to directly call the police. New feature for two-way communication between the owner of the door and the guess. The android application should be able to manage more doors, windows, and basic home electronic equipment in the future. To assure the system's completeness, a battery backup system should be considered. By using AI we can control door locks using face detection and for registered faces.

References

REFERENCES [1] S. Umbarkar, G. Rajput, S. Halder, P. Harname and S. Mendgudle, "Keypad/ Bluetooth/GSM Based Digital Door Lock Security System," in ICCASP/ ICMMD-2016, Vol. 137, Pp.749-757.

[2] M. Tseng, K. Liu, C. Hsieh, S. J. Hsu and C. Chan, "Gesture spotting algorithm for door opening using single wearable sensor," 2018 IEEE International Conference on Applied System Invention (ICASI), Chiba, 2018, pp.854-856.

[3] Sriharsha B S, Zabiullah, Vishnu S B and Sanju V, "Password Protected Locking System Using Arduino," in BIJIT –2016, January - June, 2016, Vol. 8 No. 1, ISSN 0973–5658.

[4] Ibrahim, A. Paravath, P. K. Aswin, S. M. Iqbal and S. U. Abdulla, "GSM based digital door lock security system," 2015 International Conference on Power, Instrumentation, Control and Computing (PICC), Thrissur, 2015, pp. 1-6.

[5] Zeiß S., Marinc A., Braun A., Große-Puppendahl T., Beck S. (2014) A Gesture-Based Door Control Using Capacitive Sensors. In: StreitzN.,Markopoulos P. (eds) Distributed, Ambient, and Pervasive Interactions. DAPI 2014. Lecture Notes in Computer Science, vol 8530.Springer,Cham.

[6] Ilkyu Ha, "Security and Usability Improvement on a Digital Door Lock System based on Internet of Things," in Advanced Science and Technology Letters Vol.109 (Security, Reliability and Safety 2015),pp.33-38.

[7] M. S. Hadis, E. Palantei, A. A. Ilham and A. Hendra, "Design of smart lock system for doors with special features using bluetooth technology," 2018 International Conference on Information and Communications Technology, (ICOIACT), Yogyakarta, 2018, pp.396-400.

[8] Y. Yu, "A practical digital door lock for smart home," 2018 IEEE International Conference on Consumer Electronics (ICCE), Las Vegas, NV, 2018, pp.1-2.

[9] A. M. Mathew and R. S. Divya, "Super secure door lock system for critical zones," 2017 International Conference on Networks & Advances in Computational Technologies (NetACT), Thiruvanthapuram, 2017, pp. 242-245. [10] S. Nath, P. Banerjee, R. N. Biswas, S. K. Mitra and M. K. Naskar, "Arduino based door unlocking system with real time control," 2016 2nd International Conference on Contemporary Computing and Informatics (IC3I), Noida, 2016, pp.358-362.