Secure Entry: Revolutionizing Access Control with OTP-Based Door Lock System

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ABSTRACT

In today's world advancement and technology both are necessity for human being. Every person needs own privacy and security. Security defines that no one can access place or any information without permission of owner, so for the safety it is necessary to have good locking and unlocking system that can be unlocked without any physical contact it can be done with wirelessly. As technology advances and expands on a daily basis, safety becomes increasingly essential in all disciplines. Everyone desires a private place where no one can enter without their permission, thus we need to secure our room, office, locker, etc. that preserve our valuable accessories, documents, data, and jewellery. Introducing an innovative security solution, our OTP-based door lock system employs cutting-edge technology to ensure robust access control. Comprising a microcontroller, GSM module, LCD display, keypad, and solenoid lock, the system offers a comprehensive approach to secure entry. Upon user input of their mobile number, a unique OTP is generated and transmitted via the GSM network. The LCD display provides real-time feedback, guiding users through the authentication process. Once the OTP is successfully verified, access is granted, making it an ideal choice for a wide range of applications requiring heightened security measures. With its cost-effective design and user-friendly interface, our system represents a significant advancement in modern access control solutions, surpassing traditional lock-and-key mechanisms in efficiency and effectiveness.

Keywords: Microcontroller, GSM Network, Real-time feedback, Authentication process, Cost-effective design, User-friendly interface.

1. INTRODUCTION

The integration of technology into daily life has greatly impacted human activities, with mobile phones and computers leading the way in simplifying tasks. Our project falls under the realm of home automation, aiming to create a smarter network of devices for controlling household appliances. Traditional locking systems, like key-based and electronic wireless locks, pose safety concerns and inconvenience. The use of physical keys can lead to loss or duplication issues, especially for elderly individuals. In contrast, the OTP-based door lock system utilizes Arduino Uno, GSM, and SIM modules to offer a secure and efficient alternative.

Unlike traditional locks, OTP-based systems rely on dynamic codes for access, enhancing security and eliminating the need for physical keys. Arduino Uno serves as the core component, providing computational power and interface capabilities. Paired with GSM and SIM modules, the system enables remote communication via SMS, enhancing accessibility and control. The system comprises a 4x4 keypad for PIN entry, an LCD display for visual feedback, and a servo motor for

door locking/unlocking. Upon PIN entry, the microcontroller compares it with stored codes; if a match is found, access is granted, and the door opens, else access is denied.

1.1. OBJECTIVE

The objective of the OTP (One-Time Password) based door lock system using Arduino, GSM module, and SIM module is to create a secure and convenient access control mechanism for a door. The system will allow authorized users to unlock the door by entering a valid OTP generated by the Arduino system and transmitted via GSM to a designated mobile phone. The project aims to enhance security while providing flexibility and ease of access.

1.2. PROBLEM STATEMENT

This smart lock can generate a new password every time you unlock it, which further enhances your security level. This new device is much safer than the traditional key based system and electronic wireless lock system. If you are still using the key-based system, you are likely to landing a big problem if your key gets lost or stolen. The electronic wireless lock system is not safe either. You might forget the password and there is also a high risk being hacked. For your safety and security, we bring to you a revolutionary smart lock that has the capability to remove all these security threats and problems.

1.3. METHODOLOGY

In our project, we designed an OTP based door lock system where we have used various components for making a working prototype. In this digital era, we thought to build a security system where the authentication will be much better as we are using Arduino and GSM modules. Here, whenever the IR sensor senses the object it will send the unique 4-digit OTP to the registered mobile number for unlocking the door. If the entered OTP is correct, the access will be granted otherwise the process will get halt and will get start from square one after few seconds.
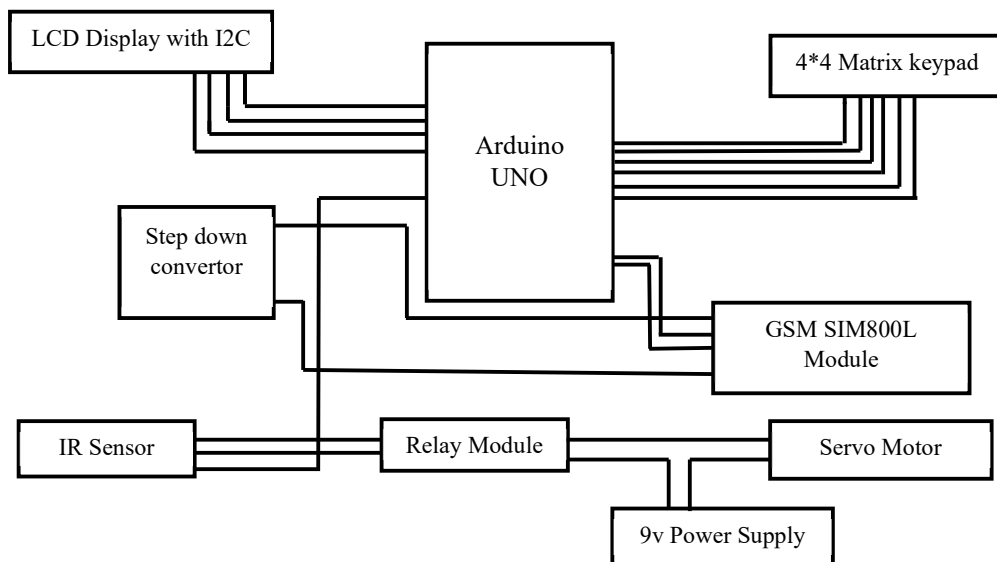
1.4. BLOCK DIAGRAM

Figure 1: BLOCK DIAGRAM

2. PROBLEMS FACED

While developing our prototype we faced several issues like we have used GSM SIM800L which is taking much time for sending OTP due to its limited range, hence we like to suggest to use the SIM 900A module so that the issue faced will not be there. Also, the working of our code gives errors and bugs which took the time to get resolve.

3. APPLICATIONS
  i.   Home Security
  ii.   Offices and Commercial buildings
  iii. Rental properties
  iv.   Vehicle Security
  v.   Smart lock Integration

4. FUTURE SCOPE

As we all know, this is the era of automation. Automation is running fast in almost every stream and field of life. Thus, our security system of OTP based locking system can be used with the integration with home automation system, with previous locking systems like biometrics lock, RFID and electronic locks. In future, we can integrate the Iris detection factor in this system so that the OTP will only be sent when the Iris detection succeed. Also, we can design a user management system to manage the access information of authorized users.

5. CONCLUSION

In this updating generation everything depends on our safety. Anything can be theft easily in anywhere in anytime from anyone without the knowledge of the owner or a particular person. So, safety is most important in this generation. Everything is replaced by new technologies. At that time, we got to know about the vehicles theft, theft in home and like other regions so we have to decide increase the safety in those places so we come up with the idea OTP based digital locking system. Along with the artificial intelligence the internet of things gradually making up the things digital. So, we decided to move on with IoT based project. So, we developed this project which is the best replacement of old method locking system. By exploring these future scope opportunities, the OTP-based door lock system can evolve into a more advanced and comprehensive solution that meets the evolving needs and challenges of access control and security in modern environment.

6. REFERENCES

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