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Smart Door Lock System Using IOT

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Abstract

The Internet of Things (IoT) represents a revolution in the way we interact with technology and the world around us. It incorporates a network of interconnected devices, sensors, and systems that collect, share, and analyze information to be effective, enhance decision-making, and improve every aspect of our lives. This content aims to provide an indepth look at the evolution, current state and future potential of the Internet of Things. The evolution of the Internet of Things can be traced to the convergence of various technological advances, such as ubiquitous connectivity, sensor miniaturization, and the spread of cloud computing. These advances have expanded IoT from healthcare and transportation to agriculture and manufacturing. The emergence of the Internet of Things (IoT) devices, making it easier to create smart, connected devices. Among these innovations, the development of smart door locks is a major advancement in home security and access control. This summary provides an overview of the design, functionality and benefits of smart door locks powered by IoT technology, Smart door lock systems combine door locking systems with IoT-enabled devices such as sensors, actuators and connectivity modules. These products work together via a smartphone, tablet or web interface. The central access point provides remote access, monitoring and control functions. has changed the way we interact with everyday.

Keywords: Arduino, internet of things, smart door lock system, security, buzzer

INTRODUCTION

In an age defined by connectivity and technology, the integration of Internet of Things (IoT) technology with traditional home security systems for innovative solutions designed to improve security, convenience and control. Among these developments, the smart door lock, which combines technology with everyday functionality, stands out as the foundation of modern home security. Of course, these are the days when you fumble with your keys or worry about whether they will work. The door closes properly. With the advent of smart door locks, homeowners can now enjoy unprecedented convenience, security and peace of mind [1]. These systems use IoT technology to turn door locks into smart, connected devices that can be accessed, monitored and controlled remotely. The essence of a smart door lock involves connected devices, sensors and network actuators that communicate with each other and with users through a central platform accessed via smartphones, tablets or web interfaces. Integrated with existing home electronics such as smart hubs or virtual assistants, these systems provide an effective way for home security and access control [3]. The development of smart door locks is driven by the increasing demand for more convenient solutions without compromising security. Allowing temporary guest access, real-time door monitoring, or automating tasks by allowing integration with other smart home devices, these systems help homeowners manage their residences [5].

But with great innovations comes the responsibility to address key issues and concerns such as data privacy, cybersecurity and

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interoperability. As smart door locks continue to evolve, it is important to ensure appropriate security, comply with industry standards, and educate users on best practices to ensure the integrity and reliability of these systems [2].

Features of Smart door lock system:

1. Users can lock or unlock the door remotely using a smartphone app or web interface; This provides convenience and flexibility, especially for those who often need permission from the host to access the guest or service provider [4].
2. Does not require a physical key, reduces the risk of loss or theft, and is provided through methods such as PIN code, biometric authentication (fingerprint or facial recognition) or proximity sensor. Security access.
3. Provides reports and alerts that allow users to monitor gate operations, data access and security events in real-time designed for nature and peace awareness [6].
4. Administrators can easily manage access rights of different users and grant or revoke access rights as needed. Customized visiting hours can be established to allow for occasional or regular visits from guests, family members, or service personnel.
5. Seamlessly integrates with other smart home devices and platforms to enable automatic actions based on triggers or conditions, such as unlocking when users are detected using geofencing. hand control.
6. Uses advanced encryption techniques and multiple authentication methods to ensure the security of user credentials and prevent unauthorized access to the system law.
7. There are sensors or mechanisms that detect tampering or unauthorized access, causing an alert or alerting the user to a possible breach.
8. Equipped with battery backup to ensure continuous protection and use during power outages.
9. Designed to be easy to install on existing doors, providing a simple solution for homeowners looking to upgrade their door locks to smart options without much modification.
10. The intuitive user interface allows for seamless navigation and configuration, appealing to users with a variety of skill levels and preferences.

Software and Hardware used are:

1. *Arduino:* Arduino is an open source electronic device based on easy-to-use hardware and software. It consists of a programmable circuit board (often called a microcontroller) and a development environment for writing, writing, and sending code to the board. Arduino boards are equipped with input/output pins that allow them to interact with a variety of electrical and electronic devices; This makes them suitable for many tasks, from simple testing of eight flashing LEDs to robotics and IoT [7].
   Arduino's combination of simplicity, versatility and usefulness has made it one of the most popular platforms for design and DIY electronics projects, allowing individuals and communities to turn their ideas into reality.
2. *Node MCU:* Node MCU is an open- source firmware and development kit that supports Internet of Things (IoT) projects. It is based on the ESP8266 Wi-Fi module and uses the Lua coding language for easy operation and fast deployment of IoT applications. Node MCU provides a platform for prototyping and building IoT devices, providing built-in Wi-Fi connectivity and GPIO (General Purpose Input/Output) pins for interfacing with sensors, actuators, and other electronic components [8].
3. *Adafruit IO:* Adafruit IO is a cloud-based Internet of Things (IoT) platform developed by Adafruit Industries. It provides tools and services to create, manage, and interact with IoT projects, allowing users to collect, store, view, and manage data from Internet-connected devices. Adafruit IO offers a variety of modules designed to simplify the development process, allowing users to build powerful IoT applications without the need for extensive networking or backend development knowledge [9].
4. *Solenoid Lock:* A solenoid is an electronic device that operates using a solenoid, which is a coil of wire wrapped around a ferromagnetic core. When electric current is applied to the solenoid, it

creates a magnetic field that attracts or pushes the piston or bolt, locking or unlocking the door or machine.

5. *Wireless network:* Monitoring wireless communication in a smart door is important for its function and connection. Wireless communication provides seamless communication between the smart door lock and other devices or platforms such as smartphones, tablets and home appliances, without using a body or connection.
6. *Finger print sensor:* A fingerprint sensor, also known as a fingerprint scanner or biometric sensor, is an electronic device that captures and analysis fingerprint patterns for identification or authentication purposes. It is widely used in many applications such as access control, smartphones, laptops and police.
7. *Buzzer:* A buzzer is a small electronic device that produces a humming sound or noise when electricity passes through it. It is frequently used in many applications, including alarms, alerts, electronic games, and feedback**.**
8. *Intelligent biometric lock:* Smart Biometric Lock is a perfect solution that uses biometric technology for control and authentication**.** Unlike traditional locks that rely on keys or passwords, smart biometric devices use biometric identifiers (such as fingerprints, facial recognition, or iris scans) to authorize or deny entry to a secure area [10].

Future Scope

Driven by continuous advances in connectivity, artificial intelligence, and user-centred design, the future of smart door locks using IoT technology is expected to expand and drive new construction. As the IoT ecosystem continues to evolve, smart door locks are expected to play a significant role in shaping the future of home security and access control. An important area of development is improved integration with new technologies such as edge computing and machine learning algorithms, which allow the door to adjust to the user's behavioural pattern and make it smarter, responding to the door locking machine. Additionally, the integration of smart door locks into the smart home ecosystem should increase, facilitating interaction with various connected devices and platforms. This integration will allow homeowners to create beautifully and easily personalized automation systems that deliver safe, energy-efficient solutions using data from a variety of sensors and devices. In addition, advances in biometric authentication methods such as facial recognition and behavioural testing will improve the security and usability of smart door locks, adding more effort and user-friendliness to other key or keyboard-based entry systems. supplied. Additionally, as the adoption of IoT devices becomes more widespread, developing regulatory frameworks and integration processes will be important to ensure interoperability and enable capabilities across different devices and platforms. Overall, the future of smart door lock technology using IoT has great potential to revolutionize home security, providing homeowners with unprecedented control, convenience and peace of mind in protecting their living spaces.

Advantages

Using smart door locks using IoT technology can provide many benefits to homeowners and property managers. First, the convenience of remote access allows users to lock or unlock the door from anywhere using a smartphone or other connected device. These features eliminate the need for physical keys and provide easy access to guests or service providers even when the homeowner is away. Additionally, real-time monitoring can improve security by providing real-time notifications and door-to-door alerts, ensuring homeowners are always aware of events such as authorized access or security breaches. In addition, integration with the smart home ecosystem brings about the harmony of technology and personal experiences, such as opening the door when the user sees it or integrating with other smart devices for collaboration. Additionally, advanced security features, including advanced encryption and tamper detection tools, provide strong protection against threats, giving homeowners peace of mind knowing their devices are protected with the latest technology. Overall, the use of smart door locks using IoT technology is redefining the way homeowners interact with and protect their living spaces by providing unparalleled convenience, security and peace of mind.

CONCLUSION

The conclusion of the research paper on smart door locks using IoT should summarize the main points, contributions and conclusions of the research. Below are sample results: In summary, this research paper investigates the design, implementation and evaluation of smart door locks using IoT technology. Some important insights and contributions have been gained through in-depth examination of existing literature as well as experiments and observations. , the importance of convenience and accessibility. Using remote monitoring, advanced authentication methods, and seamless integration with the smart home ecosystem, IoT door lock systems give users the ability to further manage their security and access control while streamlining their daily activities. The technical components and architecture of door locks provide a detailed analysis of smart door lock systems, covering microcontrollers/SBCs, locking mechanisms, sensors, communication modules, power options, user interfaces, and back end servers/applications. A review of existing literature provides insight into the selection, distribution, and optimization of these components to create a smart and reliable door lock. Sexually closed system that includes access, authentication, access control, and communications protection. IoT door lock systems can reduce security risks and protect user privacy and data integrity by using security measures such as encryption protocols and secure authentication mechanisms. Grow the Body of Knowledge Understand the scope of IoT- enabled smart door lock systems by providing comprehensive information on hardware, architecture, and security monitoring. The results of this study may provide valuable resources for researchers, practitioner, and policymakers involved in the development, deployment, and management of IoT-based home solutions. and becomes more important. The research presented in this article lays the foundation for future advances and innovations in smart door locks by integrating with modern technology and technology, ultimately helping to create a safer, easier and more secure environment for people and communities.

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