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Design and Development of Smart Door Lock System Over IoT Cloud

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ABSTRACT

An intelligent garage door system, controlled by an Arduino microcontroller using a smartphone app and the Blynk cloud server, is detailed in this article. Moreover, the smart garage door may be controlled and accessed from any distant place using the Blynk cloud server, which is linked to the Internet via Wi-Fi or 3G/4G network. This can be done using this mobile application. Home, school, authorised room, and garage systems may all benefit from this smart door lock and unlock system's functionality. At long last, testing has shown that this smart door software can carry out the fundamental functions of an intelligent garage door, just as envisioned throughout the planning and development phases.

INTRODUCTION

A feature of contemporary innovation in the ever-changing world of the Internet of Things (IoT) is the incorporation of smart technology into commonplace items. With an emphasis on improving the old-fashioned door lock mechanism, the Internet of Things (IoT) has the potential to radically alter home security systems. To meet the need for cutting-edge security solutions that harmoniously combine technology with user-friendliness, the "Design and Development of a Smart Door Lock System over IoT Cloud" project has been initiated. While conventional door locks do the job, they aren't always up to the task of keeping up with the fast-paced, always-connected world of today. By using Internet of Things (IoT) technology and cloud connection, the suggested smart door lock system intends to close this gap. Not only does this novel method improve the safety of homes and businesses as a whole, but it also gives users unparalleled power over and visibility into their protected areas. Users may control and monitor access to their premises remotely, get real-time alerts, and customise security settings from anywhere in the world by linking the smart door lock system

with the IoT cloud. A state-of-the-art smart door lock system will be designed and developed as part of this project, with an emphasis on integrating state-of-the-art hardware, strong software algorithms, and a safe cloud infrastructure.

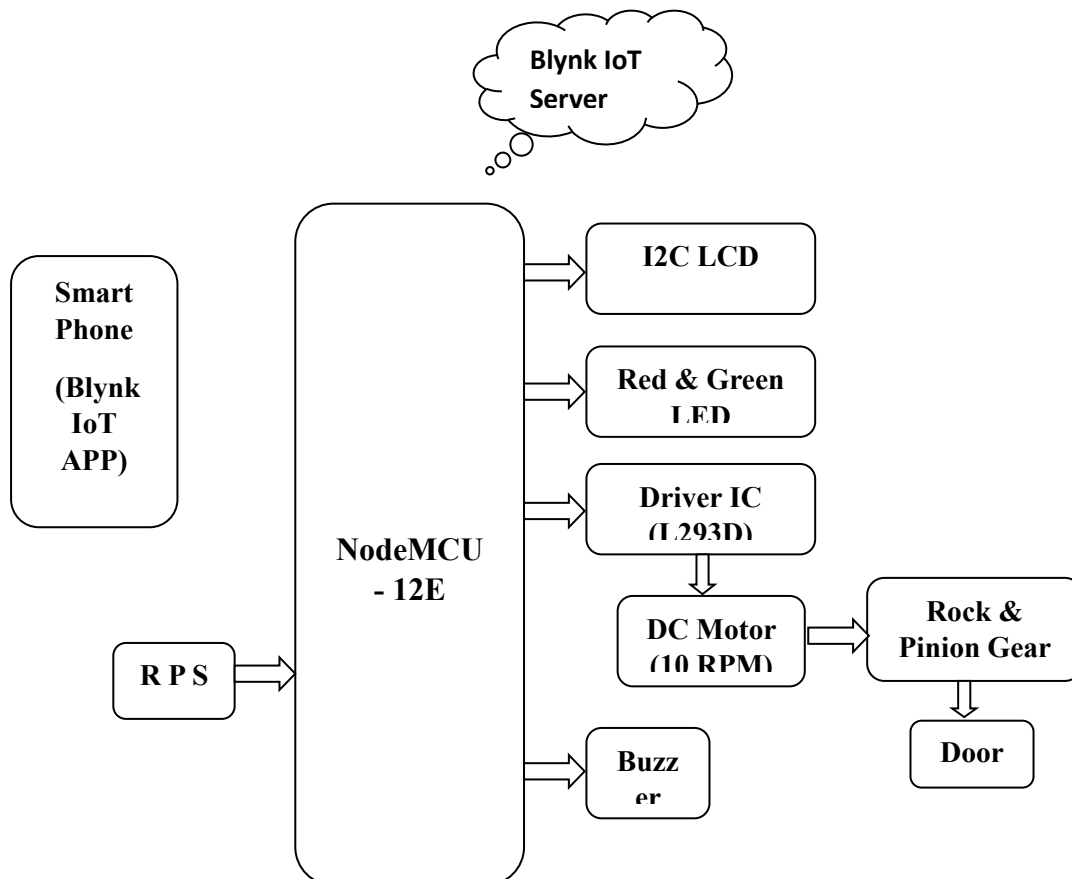


Figure.1 Block Diagram

LITERATURE SURVEY

Introduction to Smart Door Lock Systems Over IoT Cloud:

Start with an overview of smart door lock systems and their integration with IoT cloud platforms.

Explore literature discussing the benefits of smart door locks, such as enhanced security, convenience, and remote access control, when integrated with cloud-based IoT solutions.

Design and Architecture of Smart Door Lock Systems:

Look at articles and studies that go into the architecture and design of smart door lock systems that run on the Internet of Things (IoT) cloud. Study up on how to remotely lock and unlock, manage user access, and track activities by integrating sensors, actuators, microcontrollers, communication modules, and cloud platforms.

IoT Communication Protocols and Standards:

Review literature on communication protocols and standards used in smart door lock systems over IoT cloud.

Explore studies that discuss protocols such as MQTT, CoAP, HTTP, or Bluetooth Low Energy (BLE), and standards like Zigbee, Z-Wave, or Wi-Fi for connecting door locks to IoT cloud platforms.

Security Features and Authentication Mechanisms:

Examine research papers and articles that explore security features and authentication mechanisms in smart door lock systems over IoT cloud.

Look for studies that discuss encryption techniques, access control policies, authentication protocols (e.g., OAuth, JWT), and biometric authentication methods to ensure secure access and prevent unauthorized entry.

Remote Access Control and Monitoring:

Investigate literature on remote access control and monitoring functionalities in smart door lock systems over IoT cloud.

Explore studies that describe how users can remotely lock or unlock doors, grant temporary access permissions, receive notifications of door activities, and monitor access logs using mobile apps or web portals connected to the cloud platform.

PROPOSED SYSTEM

An Arduino microcontroller is the brains of the smart garage door system, coordinating data transfers between the various hardware components and the Blynk server in the cloud. A specialised smartphone app is included into the system to allow for remote control and monitoring.

The smart garage door may be controlled by a mobile app that was built on the Blynk platform.

Connecting a user's mobile device to the Blynk cloud server is as simple as downloading the app. The smartphone app and the Arduino microcontroller are able to communicate seamlessly over the Blynk cloud server, allowing for real-time control and monitoring. The other components will get the necessary power from the regulated power supply (RPS), which has been linked to a transformer.

Connecting the RPS to the NODEMCU-12E, which has a built-in WIFI chip, will allow the Blynk app to communicate with the NODEMCU. The DC motor, LCD display, driver IC, and blinking LEDs are all connected to the NODEMCU.

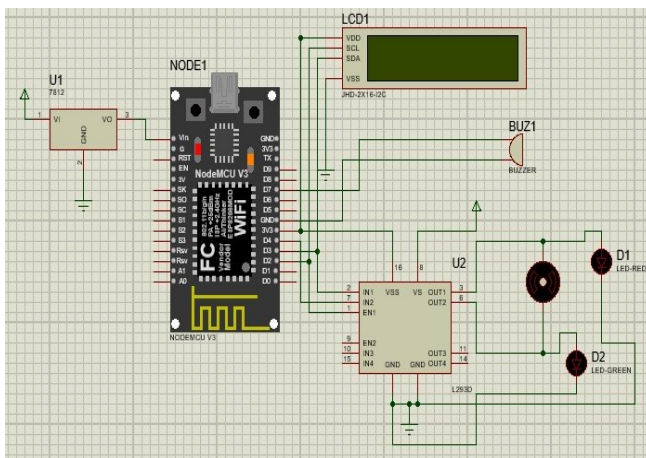


Figure.1 Schematic Diagram

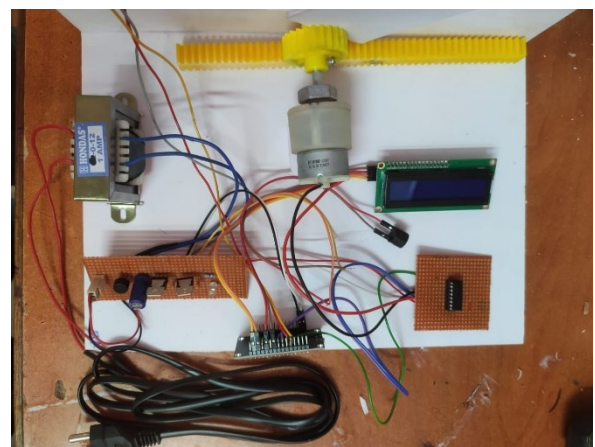


Figure.2 Working kit

RESULTS

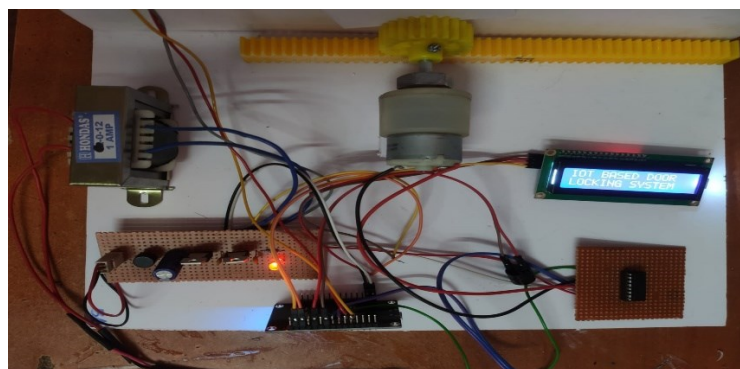


Figure.3 Output

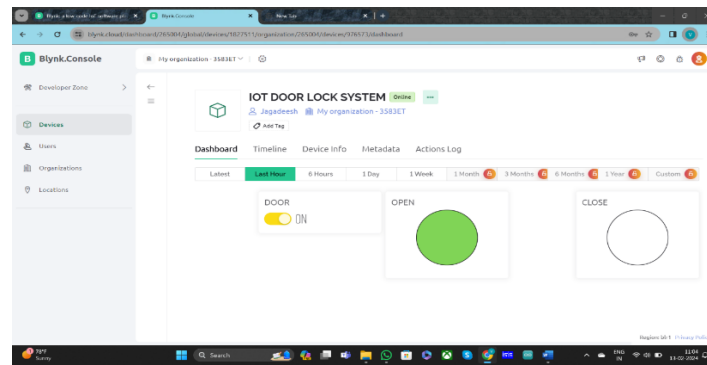


Figure.4 Status of Door (OPEN)

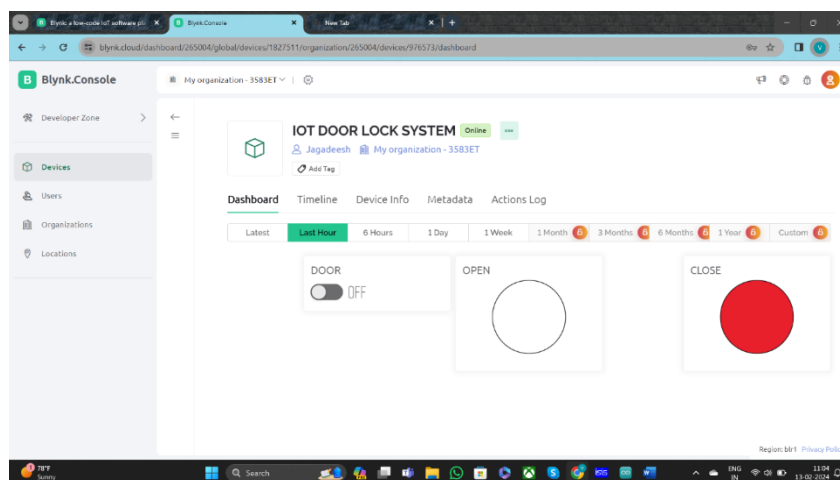


Figure.5 Status of Door CLOSED

APPLICATIONS

There are several applications of Door lock system using IoT(internet of Things).Here are the few examples

- Home Garage Door
- Commercial Garages/Storage Facilities
- Industrial Warehouses
- Integration with Smart Home Systems

ADVANTAGES

- 1. Enhanced Security:** Protects property, assets, and inventory from unauthorized access.
- 2. Burglary Deterrent:** Acts as a strong deterrent, reducing the risk of break-ins.

3. **Convenience:** Offers easy and customized access through features like keyless entry and remote control.
4. **Peace of Mind:** Provides assurance and confidence in overall security.
5. **Valuables Protection:** Safeguards vehicles, tools, and high-value items from theft.
6. **Smart Technology Integration:** Allows for remote monitoring and control via mobile devices.
7. **Safety Improvement:** Enhances safety by restricting access to potential hazards.
8. **Customization:** Users can tailor access permissions, adding a personalized layer to security measures.

CONCLUSION

Last but not least, an Internet of Things (IoT) door lock system may greatly increase the efficiency and security of door operations. The gadget has the potential to become an all-encompassing safety system via its use and operation of the Blynk app, sensors, WIFI, and interaction with other smart devices.

Door opening and shutting activities may be enhanced by device interaction with many features, allowing for easy control with online alternatives.

FUTURE SCOPE

The potential for the Internet of Things (IoT) to revolutionise door lock systems is enormous.

1. **Cutting-Edge Tech Integration:** With the help of AI and the Internet of Things, door lock systems are going to become much more intelligent and flexible.
2. **Enhanced Biometrics:** To make access more secure and convenient for users, future systems may include enhanced biometrics such as face recognition or fingerprints.
3. **A potential use of predictive analytics in door locks** is the ability to anticipate potential security risks and make proactive adjustments to access restrictions.
4. **Energy Efficiency:** Smart sensors might optimise power use according to usage patterns, making future systems more energy efficient.

5. Look for door lock systems that provide the option to enter a temporary or one-time code for shared areas or for short-term authorization.

6. Personalisation and User-Friendly Features: Ongoing emphasis on intuitive interfaces and flexible customisation options to provide security solutions that are both tailored to each individual and simple to use.

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