DOORBELL SYSTEM FOR DEAF USING IOT

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Introduction

The smart doorbell project leverages an Arduino microcontroller as its central processing unit, providing a multifunctional response when the doorbell is pressed. At the core of this system, pressing the doorbell triggers multiple actions aimed at notifying residents in anadvanced, efficient manner. Firstly, upon activation of the doorbell, two LED bulbs blink in separate rooms. This visual alert ensures that the presence of a visitor is signaled across multiplelocations within the residence, utilizing DC-powered LEDs for energy efficiency and reliability. Simultaneously, the system communicates with a custom-designed mobile application, triggering a vibration alert on the user's mobile device. This immediate physical feedback is crucial, especially in noisy environments or when the user is not within direct sight of the blinking LEDs.

Moreover, the smart doorbell incorporates a camera, strategically positioned to capture the image of the person at the door. This camera activates automatically upon the doorbell's use andcaptures a photograph, which is promptly processed by the Arduino. The captured image is then transmitted to the same mobile app. This integration allows the app not only to receive alerts andvibrational notifications but also to display the image of the visitor in real-time. This feature adds a significant layer of security and convenience, enabling residents to visually confirm the visitor's identity before deciding to answer the door. Notifications with the visitor's image are pushed to the user's mobile device. The app facilitates immediate viewing of the image, ensuringthat the resident can make an informed decision about opening the door or interacting further.

Objective

The objective of this project is to develop a smart doorbell system using an Arduino microcontroller to enhance home security and convenience. The system will feature visual notifications through blinking LED bulbs in multiple rooms, alerting occupants of a visitor's presence. Simultaneously, it will send vibration alerts to a specially designed mobile application, ensuring users are notified even when away from the visual indicators. The doorbell will integrate a camera to capture and transmit the image of the person at the door directly to the mobile app. This will allow residents to visually verify the visitor before opening the door. Overall, the project aims to combine the functionalities of traditional security systems with advanced technology to provide a comprehensive and user-friendly solution for home safety.

Methodology

The methodology for creating a smart doorbell system with an Arduino involves several streamlined steps:

1. Planning:

- Determine the requirements like real-time alerts, image capture, and multi-location notifications.

- Select necessary hardware: Arduino board, camera, LED bulbs, wireless communication modules, and push button.

2. Design:

- Create a circuit diagram to connect LEDs, camera, and the doorbell button to the Arduino.

- Sketch out how the Arduino will communicate with a mobile app using Wi-Fi or Bluetooth.

3. Assembly:

- Build the circuit, initially on a breadboard for testing and later solder on a PCB for durability.

- Securely install the camera to face the door and ensure all connections are stable and robust.

4. Programming:

- Write Arduino code for handling doorbell presses, triggering LEDs, capturing images, andcommunicating with the mobile app.

- Develop the mobile app to receive and display notifications, images, and trigger vibrationalerts.

5. Testing and Integration:

- Thoroughly test each component individually and then as a complete system to iron out anyglitches.

- Adjust software and hardware settings based on test results to optimize performance.

6. Installation:

- Place the complete system at the door, ensuring it is protected from environmental factors.

- Perform a final test to confirm everything operates smoothly.

7. Maintenance:

- Regularly update the system software and check hardware for any necessary repairs.

This simplified approach ensures each phase of the project is manageable, from initial design through to final installation and maintenance, focusing on both technical and practical aspectsof the smart doorbell system.

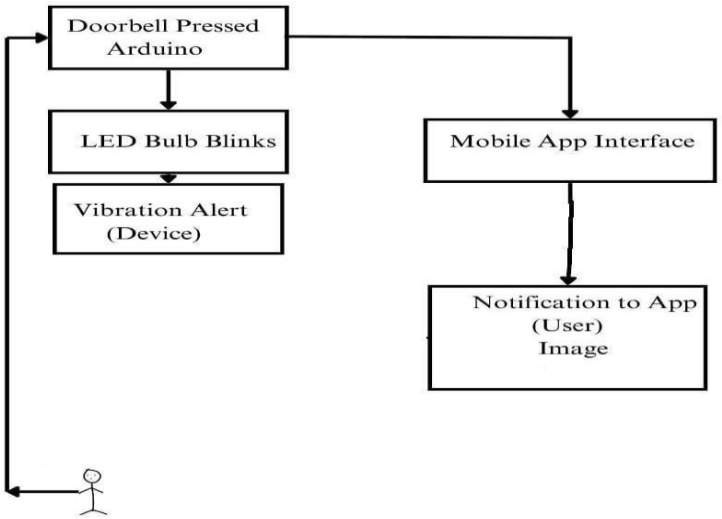

Fig. System Architecture

Innovation

The innovation in this smart doorbell system lies in the integration of several functionalities to enhance both the convenience and security of a traditional doorbell. Here are the innovative aspects:

- Multi-room Alert System: The use of LED bulbs in different rooms to indicate when the doorbell is pressed enhances the visibility of a visitor's presence, ensuring that the homeowner can be alerted regardless of their location within the house.
- Mobile Integration and Notifications: By integrating the doorbell system with a mobile appthat not only receives vibration alerts but also captures and sends images of the visitor, thesystem adds a layer of security and convenience. This allows the homeowner to visually verify who is at the door from anywhere, directly on their mobile device.
- Image Capture Feature: The ability of the doorbell to capture an image when activated is asignificant security feature. It not only allows for immediate visual identification but also could potentially record evidence in the event of suspicious activity.
- Comprehensive Notification System: Combining visual (LED blinks), tactile (vibration alerts), and digital (image notifications) alerts ensures that the homeowner is informed through multiple sensory channels, which is particularly useful in noisy environments or for individuals with hearing impairments.

Result and Conclusion

The proposed smart doorbell system represents a comprehensive and innovative solution to modernize traditional doorbell functionality. By integrating Arduino microcontroller technology with advanced features such as LED visual alerts, mobile notifications, and image capture capabilities, the system offers unparalleled convenience, security, and peace of mind for homeowners.

The seamless interaction between hardware components, including the Arduino microcontroller, doorbell button, LED bulbs, and mobile devices, enables swift and reliable detection of visitor activity and timely notification delivery to users. The system's ability to capture images of visitors provides an additional layer of

security, allowing users to visually verify visitor identity and make informed decisions regardingdoor access.

Reference:

[1] " PiCam: IoT based Wireless Alert System for Deaf and Hard of Hearing by Pushpanjali Kumari, Pratibha Goel , Dr. S. R. N. Reddy PUBLISHER: CSE Dept.,IGDTUWKashmere Gate, Delhi

[2] "IOT BASED DOOR ALERT SYSTEM FOR PEOPLE WITH HEARING IMPAIRMENT" by Arun Vignesh.M & Sabura Tasneem.M PUBLISHER: ME Dept.,Sri Sivasubramaniya Nadar college of Engineering

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Scope For Future Work

- **Integration with Home Automation Platforms:** Explore integration possibilities withpopular home automation platforms such as SmartThings or Home Assistant, enablingseamless interoperability with other smart devices and systems in the home.
- **Enhanced Image Recognition**: Invest in research and development to implement advanced image recognition algorithms, enabling the system to recognize familiar faces, detect motion, and provide more detailed insights into visitor activity.
- **Cloud Connectivity**: Integrate cloud connectivity to store captured images securely and enable remote access to historical visitor data, allowing users to review past eventsand monitor doorbell activity from anywhere.
- **Voice Assistant Integration**: Integrate voice assistant capabilities such as Amazon Alexa or Google Assistant, enabling users to interact with the smart doorbell system using voice commands for hands-free operation.
- **Expandable Hardware Architecture**: Design the system with an expandable hardware architecture to accommodate future upgrades and additions, ensuring scalability and longevity in functionality.