iJRASET
International Journal For Research in Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 12 **Issue:** IV **Month of publication:** April 2024

DOI: https://doi.org/10.22214/ijraset.2024.59643

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 12 Issue IV Apr 2024- Available at www.ijraset.com

Intelligent Microcontroller-Based Doorbell Communication

Dr. Veerababu. A[1], Bandaru Shiva Sai Rohith[2], Ch. Harshitha[3], Jondle Mounika[4]
[1]*Assistant professor, Department of ECE, CMR College of Engineering & Technology, Hyderabad*
[2, 3, 4]*UG Student, Department of ECE, CMR College of Engineering & Technology, Hyderabad, Telangana*

Abstract: ***Microelectronics, wireless, and network technologies are all advancing quickly along with science and technology. At the same time, people's standards of living are continuously rising, and their expectations for the comfort and safety of their living environments are also rising. The design of intelligent voice message doorbells has grown popular because people in smart residential buildings are in more urgent need of a new kind of wireless doorbell product that can integrate the advantages of dependability, security, convenience, and so on. The Arduino microcontroller, ESP32 camera module, key circuit, voice recording and playback circuit, and power circuit make up the design. Via the recording module, outsiders can record voices and leave messages.***

Keywords: Doorbell, Telegram integration, GSM Calling interface, Remote notification, Surveillance, Real-time communication

I. INTRODUCTION

Modern doorbell communication systems are significantly improved in terms of functionality, security, and convenience by embedded systems. A specialised computer system created to carry out duties or operations inside of a larger system is called an embedded system. Both conventional and smart doorbells depend on embedded systems for proper operation in the context of doorbell communication. These give rise to an entirely new set of specifications for an enhanced and effective system. Features like remote access must be available on these systems.

Among today's constantly changing smart technology and networked systems, the simple doorbell has experienced a significant metamorphosis. Modern doorbells are becoming sophisticated communication and surveillance hubs that improve home security and convenience. They are no longer just a basic signaling device to announce visitors. The demand for more sophisticated features that satisfy our needs for seamless connectivity and instantaneous environment awareness is what is driving this evolution.

Doorbell: The doorbell, which is the main point of contact between guests and residents of a home, is at the center of this change. In the past, all that was needed to set off an audible chime was a push button. But just as technology advances, so do our standards.

The need for doorbells that not only notify us when someone is there but also offer extra features like video monitoring and remote access is rising in the modern world.

Remote Notification: The capacity to send out notifications remotely is one of the main benefits of contemporary doorbell systems. In a time when privacy and security concerns are more pressing than ever, this helps homeowners keep an eye on their property and spot possible threats. All things considered, the development of doorbell technology is essentially the result of a marriage between necessity and innovation, propelled by our shared need for better home security, convenience, and connectivity.

II. RELATED WORKS

IoT means connecting, transferring data of devices via the Internet. By using IoT we control appliance anytime, anywhere and the cloud which provides storage and computing resources to implement a web application as describe in [1] The authors of the paper are Liangshan Zhang and Meili Liu. This article discusses the design and development of an intelligent voice message doorbell that addresses the increasing demand for smart home solutions that priorities dependability, security, and convenience. The circuitry for the STC89C52 single-chip microprocessor, the 315M wireless module, the voice recording and playback circuit, the music chip, the key, and the power circuit are just a few of the components that are described. [2] The following papers' authors are Shaik Mabasa, Abdul Hameed SHAIK, Sadhu Ratna Babu, and Srinivasa Rao Kamini. The paper's writers are trying to provide an explanation of the planning and creation of an intelligent audio message doorbell system. The goal of this system is to meet the growing need for smart home solutions that put convenience, security, and dependability first. They want to build a doorbell system that can wirelessly send data, record voice messages, and help visitors and residents communicate by using a variety of components like microcontrollers, wireless modules, voice recording/playback circuits, and key circuits.

©IJRASET: All Rights are Reserved

The authors' overall goal is to advance the field of smart residential technology by offering a thorough and creative solution that satisfies the changing demands of contemporary homes for increased convenience, security. In [3] Konda Anusha1, Ashok Kumar Konduru The project's objective is to mechanically operate and keep an eye on household electrical and electronic items. The affordability and convenience of use of home automation with smartphone and tablet connectivity has led to a rise in its popularity. For centralized control and monitoring, dedicated gateways link controllers from Home Automation and Building Management Systems with sophisticated VRV/VRF and split HVAC systems. The suggested technology combines short-range radio networks with an infrared sensor. The paper gives a summary of attack vectors for mobile network security and draws parallels between traditional security work and mobile security.[4] This paper describes the development of a smart home automation system that uses an Arduino board with Bluetooth and can be remotely controlled by any smartphone running the Android operating system. On the transmitter end, a Graphical User Interface (GUI) application on the cell phone transmits ON/OFF commands to the receiver where loads are connected, while at the receiver end, a Bluetooth module is interfaced to the Arduino board. With this technique, the loads can be remotely turned ON or OFF by pressing the designated spot on the GUI. Using trials and opto-isolators and thyristors, the Arduino board controls the loads. By attaching test appliances to the smart home automation system and successfully controlling the appliances from a wireless mobile device, the system's functionality was shown in an experimental setting. [5] In their study, Dhruvi Shah, Arushi Doshi, and Brijesh Kumar Y. Panchal Using a Raspberry Pi 2, GSM, and numerous other components, the main goal of the Wireless Remote Controlled Door Answering System is to display the appropriate message to any visitor who rings the doorbell or approaches the door, regardless of whether the owner is present or not. The owner receives notification of the visitor's identification, and the system is managed by SMS messages sent from the owner's mobile device. The owner's suitable message response can be shown on a screen outside the house. The AT Command Set, Python 2.0, Raspbian Linux operating system, and Linux are the technologies employed in this implementation. [6] the authors O. A. Simon, U. I. Bature, K. I. Jahan, N. M. Tahir in their paper in our residences or workplaces, safety has always been a top priority. A home security system that can be remotely operated not only keeps burglars out of the house but also provides a host of other benefits including video monitoring, energy management control, and the ability to arm and disarm alarms. Considering the earliest straightforward security measures, which are mechanical lock systems with keys serving as the authentication component; these were later upgraded to universal types, and lock codes are now unique. The huge application of communication gadgets into our various areas of existence has been brought about by the recent advancement in the communication system. A smart doorbell notification system for homes is being developed in real time. Unlike conventional security measures, security consists of the doorbell interfaced

III. PROPOSED METHODOLOGY

Our goal is to develop a technology that describes an alarm and security system for homes utilizing an Arduino UNO microcontroller, an APR33A3 audio playback module, an ESP32 camera module for Telegram output, and other circuits for power and key control. This is an explanation of how to create such a system

1) *Arduino UNO Microcontroller:* This serves as the central control unit for the system. It will interface with other modules and sensors and execute the logic for the functionality you described.
2) *APR33A3 Module:* This module is responsible for recording and playing back audio. You will need to connect it to the Arduino UNO to control recording and playback based on the system's state (home or away).
3) *ESP32 Camera Module:* The ESP32 will handle communication over Telegram to send notifications when someone is at the doorstep or when a guest leaves a message. It will capture images or videos and send them as notifications to the homeowner's Telegram account.
4) *Key Circuit:* This could involve physical keys or electronic keypads to arm/disarm the system. When the homeowner is away, the system should be armed to record messages from guests. When the homeowner is at home, the system should be disarmed to play doorbell chimes and notify the homeowner of guests at the door.
5) *Power Circuit:* Ensure that all modules and components receive stable power. You might need to incorporate voltage regulation and protection circuits to prevent damage to sensitive components.

The system will operate as follows:

A. *Home Mode*

The system operates in this mode while the homeowner is present.
The APR33A3 module plays a doorbell chime when someone rings the doorbell, which is initiated by the Arduino.
The homeowner can equip the system with the key circuit if they need to leave the house for a short while.

B. Distant Mode

This is the mode that the system is in when the homeowner is away.
The ESP32 camera module is triggered by Arduino to take a picture or record a video when someone rings the doorbell.
The APR33A3 module records a message when a guest leaf one by being triggered by Arduino.
The homeowner's Telegram account receives notifications from the ESP32 that include recorded messages and pictures or videos of guests.

C. Returning Home

Using the key circuit, the homeowner disarms the system upon their return.

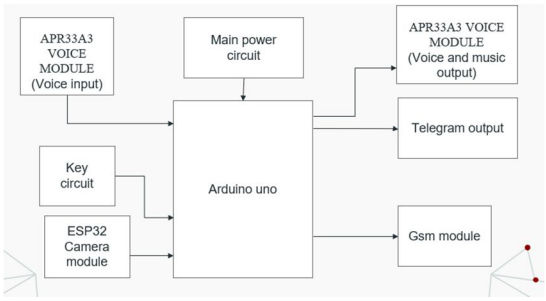


Fig 1: Block diagram

IV. IMPLEMENTATION & RESULTS

The Arduino board is used in our working model of the doorbell system to regulate the GSM module, APR33A3 speech module, and LCD display. At the door step, an esp32 camera module is utilized to take pictures of any visitors that transgress. The circuit is made to connect all of the operational inputs and outputs to the Arduino. A simple doorbell is operated by pushing a button.

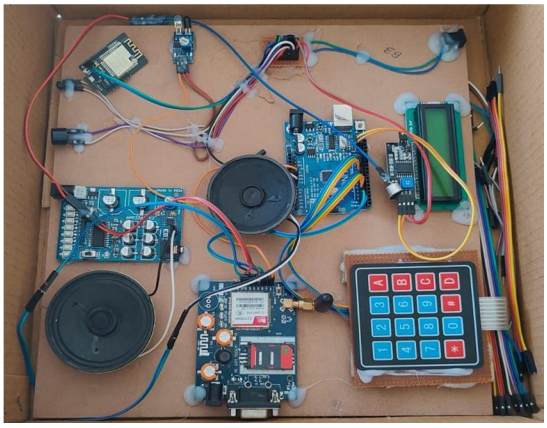


Fig 2: working model of the door communication.

The entire circuit is powered by a 5V DC adaptor, which supplies 5V to the system. When linked to a network, the GSM module on the Arduino provides a steady connection display. If the guest can connect via a GSM module, they can use the eight inbuilt channels on the apr33a3 voice module to record voice messages. By using the apr33A3 voice module and GSM, we can have door-to-door communication using the links mentioned above. that allows us to communicate at the door with minimal effort and efficiency.
The esp32 camera module, which is used to snap photos of the person at the door, is connected to the circuit.. The esp32 camera module is linked to an IR sensor with a one-meter detection range. When the ire sensor detects something that is inside its detection range, the esp32 camera module is turned on.. The photos taken are transmitted via Telegram using the esp32 camera module. The Internet of Things is used to carry out this process (IoT) To perform IoT operations, the esp32 camera module is linked to the home network.

©IJRASET: All Rights are Reserved | SJ Impact Factor 7.538 | ISRA Journal Impact Factor 7.894 |

.

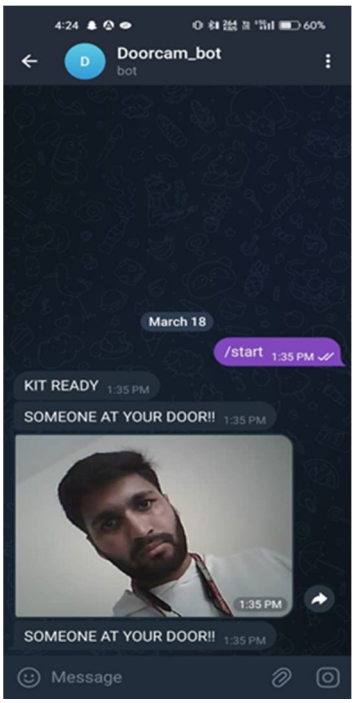


Fig 3: Telegram output

The telegraph output of the esp32 camera module is shown in Fig 3. The device displays "kit ready" as the first line of output when it is connected to a home network. An output of "some is at your doorstep" is provided by the Ir sensor when it detects something in its field of view. The image is then taken and sent to the Telegram front.

V. CONCLUSION

Finally, for improving home safety and communication, this doorbell communication system provides an advanced yet approachable solution. The system effectively handles the homeowner's security demands while staying user-friendly and intuitive because to the smooth integration of cutting-edge technology like the Arduino UNO microcontroller, APR33A3 module, ESP32 camera module, and GSM module.

Because it can adjust to the homeowner's presence, send out timely alerts, and allow visitors to communicate with you in real time using the GSM module, this system is incredibly efficient. Its tech-savvy design makes use of contemporary components to provide residents with remote access and real-time notifications, keeping them informed and always connected. The system's basic design prioritizes usability and simplicity even with its sophisticated features, making it a trustworthy and useful option for contemporary home security and communication demands.

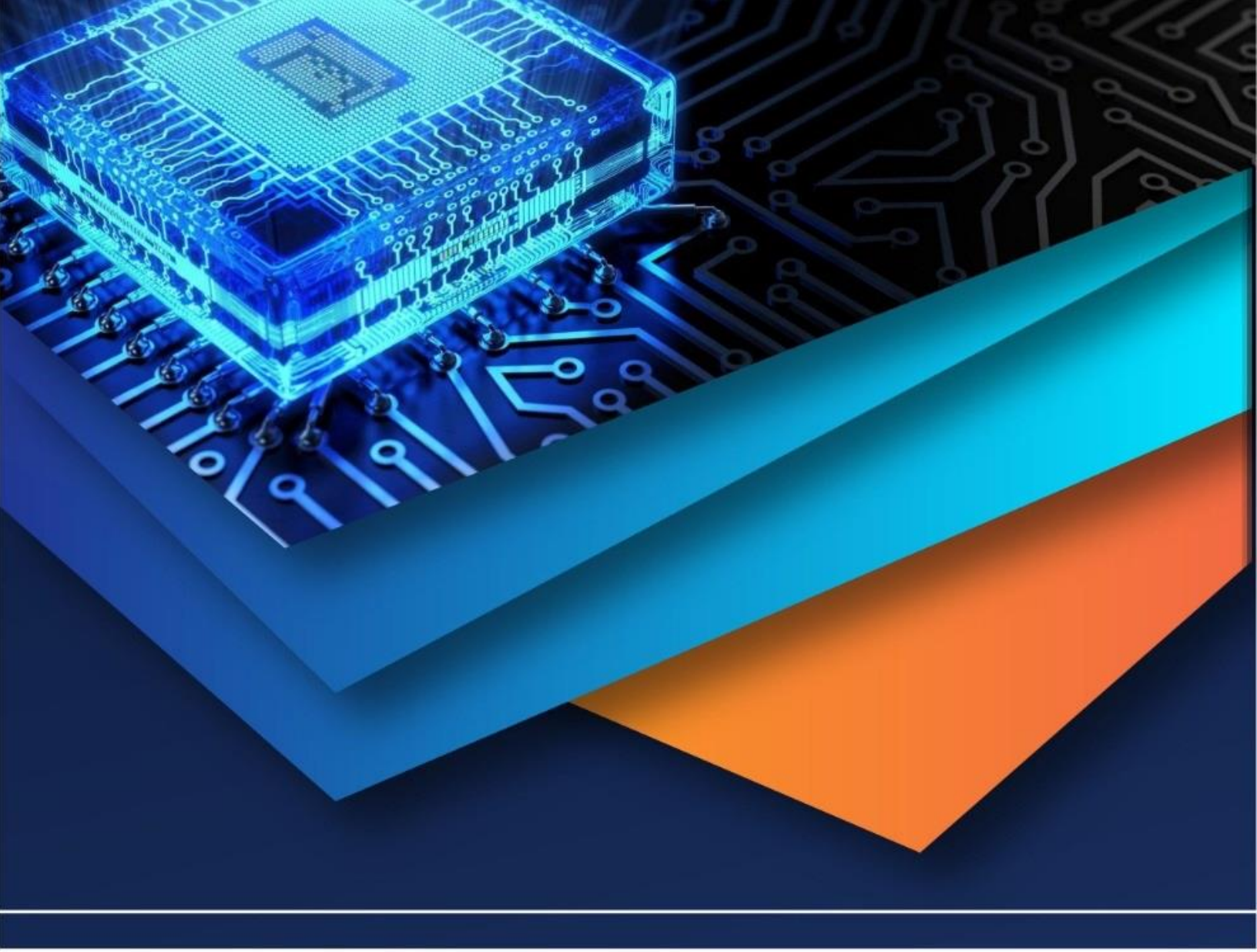
REFERENCES

[1] Design of Intelligent Voice Message Doorbell Based on Microcontroller Meili Liu; Liang Zhi Zhang 2020 IEEE International Conference on Artificial Intelligence and Computer Applications (ICAICA).

[2] Implementation of Wireless Remote-Controlled Visitor at the Door Response System Using GSM and Raspberry Pi Technology Journal of Emerging Technologies and Innovative Research, Volume 7, Issue 7, July 2020

[3] Visitor at the Door Response System Using GSM and Raspberry Pi Technology Journal of Emerging Technologies and Innovative Research, Volume 7, Issue 7, July 2020 Brijesh Kumar Y. Panchal, Sardar Vallabhbhai Patel Institute of Technology, Vasad – GTU, Arushi Doshi, affiliation not provided to SSRN,Dhruvi Shah, Deloitte (Ireland) Date Written: June 01, 2020

©IJRASET: All Rights are Reserved | SJ Impact Factor 7.538 | ISRA Journal Impact Factor 7.894 |



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Call : 08813907089 (24*7 Support on Whatsapp)