VISVESVARAYA TECHNOLOGICAL UNIVERSITY

"Jnana Sangama", Belagavi – 590018, Karnataka.

A

Mini-Project Report

On

"SENSOR DOORBELL"

Submitted in partial fulfillment for the award of degree of

BACHELOR OF ENGINEERING

In

ELECTRONICS & COMMUNICATION ENGINEERING

Project Associates

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for the Academic Year 2022-23

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CERTIFICATE

This is to certified that, the mini-project entitled **"SENSOR DOORBELL"** carried out by **ABHINANDAN K (4GM20EC001), BASAVARAJ ARUN SUNADHOLI (4GM20EC018), DANESH S ANGADI (4GM20EC025) and LIKHITH G K (4GM20EC54),** bonafide students of VI semester in partial fulfillment for the award of Bachelor of Engineering in **ELECTRONICS & COMMUNICATION ENGINEERING** of the Visvesvaraya Technological University, Belagavi for the academic year 2022-23.

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The joy and satisfaction that accompany the successful completion of any task would be incompletewithout the mention of the people who made it possible.

We would like to express our gratitude to the Principal, **Dr. Sanjay Pande M B,** for providing us a congenial environment for engineering studies and also for having showed us the way to carry out the project.

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ABSTRACT

Doorbells are usual signaling devices used to alert the person inside the house to open the door as someone has arrived. Classic doorbells can be seen in every house now a days, which uses simple button and when that button is pressed the bell rings. A doorbell is automatic, i.e. it will detect someone in front of it and then it will ring. Also, there is a flexibility to adjust the distance, some changes in the code to drive the doorbell. Sensor to detect the person and then give the alert using a buzzer. The Sensor Doorbell project aims to revolutionize the traditional doorbell system by incorporating smart sensing technology, thereby enhancing security and convenience for homeowners, The Sensor Doorbell project aims to revolutionize the traditional doorbell system by incorporating smart sensing technology, thereby enhancing security and convenience for homeowners. The Sensor Doorbell project aims to revolutionize the traditional doorbell system by incorporating smart sensing technology, thereby enhancing security and convenience for homeowners. These sensors work in synergy to detect and identify visitors , the Sensor Doorbell project introduces an innovative solution to transform traditional doorbell systems into intelligent and interactive devices. By leveraging smart sensing technology, the project enhances security measures, provides real-time monitoring,

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Chapter 1

INTRODUCTION

1.1 Overview

Doorbells are usual signaling devices used to alert the person inside the building to open the door as someone has arrived. Classic doorbells can be seen in every house now a days, which uses simple button and when that button is pressed the bell rings. This doorbell is different from that. a doorbell which is automatic.

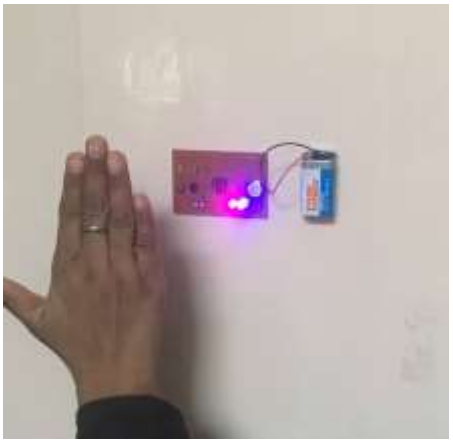

Figure 1.1: Sensor Doorbell

A very simple circuit to implement this project. This project can be really beneficial because it's not always the case that a person can reach the doorbell, so it would be nice if it rings automatically after detecting the person. Also, there is a flexibility that you can adjust the distance according to you by doing some changes in the code you are using to drive the doorbell. Here IR sensor is used to detect the person and then give the alert using a buzzer. As IR sensors are used for distance measurement without physical contact for small distances. So it's the best thing to use IR sensor for detecting object.

1.2 Problem Statement

Traditional doorbells lack the ability to provide comprehensive security and convenience features, limiting homeowners' ability to monitor and interact with visitors at their doorstep. There is a need for a sensor doorbell that incorporates advanced sensing technology and smart features to address the following problems.

1.3 Objectives

- To enable the users to monitor visitors in real time.
- To avoid contact while pressing doorbell.
- To use wireless and touchless doorbell for safety purpose.
- To provide real-time monitoring of the front door or entrance area.
- To enhance home security. They can detect and alert homeowners of any activity or movement near the door.

1.4 Motivation of the Project

The motivation behind the development of a sensor doorbell project , A primary motivation for sensor doorbell projects is to improve home security. By incorporating sensors into a doorbell, homeowners can have better awareness of their surroundings and potential threats. This can provide a sense of safety and peace of mind. Sensor doorbells can aid in managing visitors effectively , Projects involving sensor doorbells often stem from a motivation to explore and harness the potential of emerging technologies.

Chapter 2

LITERATURE REVIEW

Chen, C., et al [1], "Smart Doorbell Based on Facial Recognition and Wireless Sensor Networks" Published on 2016. This paper proposes a smart doorbell system that incorporates facial recognition and wireless sensor networks. The authors discuss the system's design, sensor integration, and features such as visitor identification, real-time notifications, and integration with home automation systems.

Ali, F., et al [2],"Smart Doorbell for Home Automation Using Internet of Things" Published on 2017. The authors present a smart doorbell system integrated with an IoT platform. They discuss the system's architecture, sensor integration, and features such as remote monitoring, visitor identification, and integration with other smart home devices.

Ahmed Salad, Ahmed Muktar, AbdulAziz Ahmed [3],"**A Framework for Wireless Doorbell System with Object Detection**, " SOMALI JOURNAL OF ENGINEERING AND SCIENCE , July 2017 According to paper "A Framework for Wireless Doorbell System with Object Detection" Door lock securitysystems are classified based on technology used as Password based, Biometric based, GSM based, smart card based, RFID based, Door phone based, Bluetooth based, social networking sites based, OTP based, Motion detector based he programmable electronic code lock device is programmed in such a way that it will operate only with the correct entry of predefined digits. The biometric technique is very useful in bank lockers. In many doorlock security systems, GSM is used for communication purpose. A model entryway security framework is intended to permit an authorized person for getting a safe (without need of any key) entryway .

Johnson, A., Smith, B., & Williams C [4], "Smart Home Doorbell with Sensor Technology for Enhanced Security" Published on 2018 . In this study, the authors propose a sensor doorbell system that utilizes motion sensors and cameras to enhance home security. They discuss the design, implementation, and evaluation of the system, highlighting its effectiveness in detecting and alerting homeowners of potential threats.

Patel, D., & Shah [5], A "Internet of Things (IoT) Enabled Doorbell System for Smart Homes" Published on 2019 .This research paper presents an IoT-enabled doorbell system that incorporates sensors, cameras, and a mobile application. The authors discuss the system architecture, sensor integration, and features such as remote monitoring, visitor identification, and package delivery management.

Lee, S., et al [6] ,"Design and Implementation of a Wireless Smart Doorbell System" Published on 2019. This research focuses on the design and implementation of a wireless smart doorbell system using various sensors. The authors discuss the system's architecture, sensor integration, and features such as motion detection, video recording, and remote monitoring.

Gupta, R., & Kumar [7] , A "Development of a Sensor-Based Smart Doorbell System" Published on 2020. This study focuses on the development of a sensor-based smart doorbell system that utilizes infrared sensors and facial recognition technology. The authors discuss the system's design, implementation, and functionality, including visitor identification and real-time notifications.

Chapter 3

METHODOLOGY

System Design:

- Define the overall system requirements and specifications.
- Design the hardware setup, including the Zero PCB, IR sensor, and power supply.
- Plan the connections between the components and ensure compatibility.

Sensor Integration:

- Connect the IR sensor to the PCB using appropriate wiring.
- Connect the necessary resistors for the IR sensor.

Detection and Connection:

- Develop a detection algorithm using the IR sensor.
- Connect or Solder the 10k variable resistor in the PCB in order to varey the distance.
- Similarly solder the LED ,BUZZER by looking at the circuit diagram.

Final Output:

- The transmitter emits a beam of infrared light, which is then detected by the receiver when the object interrupts.
- The receiver detects the change in the signal and sends a corresponding output signal.
- Then the LED blinks and buzzer makes the sound.

By following this methodology, the Sensor Doorbell using IR sensor project can be effectively implemented, ensuring accurate detection, reliable sound, and a user-friendly experience.

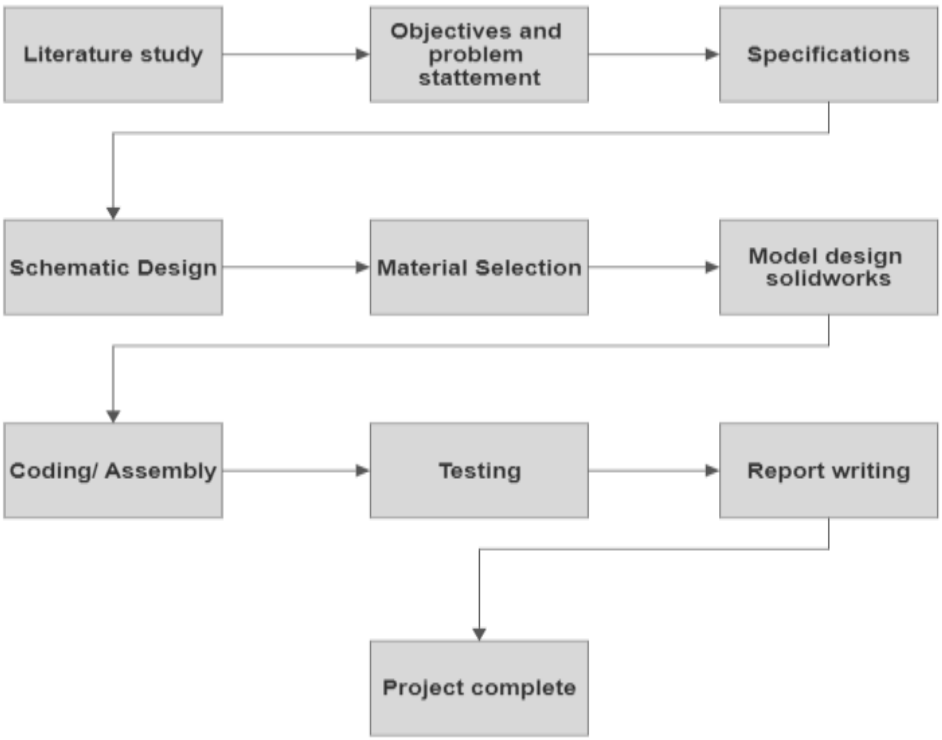

Figure 3.1: The implementation flow of Sensor Doorbell

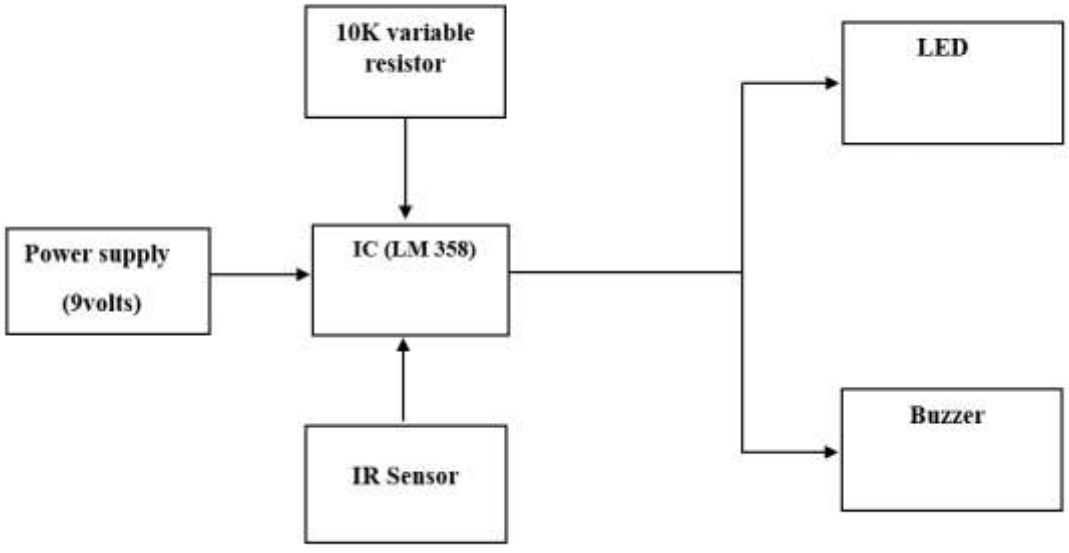

Figure 3.2: Block Diagram of Sensor Doorbell

Chapter 4

COMPONENTS REQUIREMENTS

4.1 Components

Zero PCB :

The LM358 is a dual operational amplifier integrated circuit (IC) that is widely used in various electronic applications. It is a low-power, low-voltage device that can operate from a single supply voltage of 3V to 32V. The IC has two independent operational amplifiers with high gain and low input offset voltage. The LM358 is designed to work in a wide range of temperature from -40°C to 105°C. It has a high common-mode rejection ratio (CMRR) and a high open-loop gain. The LM358 is widely used in audio amplifiers, voltage followers, voltage regulators, and signal conditioning circuits. It comes in an 8-pin DIP or SOIC package and is widely available in the market.

Figure 4.1: Zero PCB

IR Rx Tx (sensor) :

IR Rx Tx sensors are electronic devices that use infrared radiation to detect and transmit signals. They consist of two components: an infrared transmitter (Tx) and an infrared receiver (Rx). The transmitter emits a beam of infrared light, which is then detected by the receiver. When an object interrupts the beam, the receiver detects the change in the signal and sends a corresponding output signal.

IR Rx Tx sensors are commonly used in automation and control systems, such as automatic doors, security systems, and motion detectors. They are also used in remote controls for TVs, DVD players, and other electronic devices. IR Rx Tx sensors are easy to use, reliable, and cost-effective, making them a popular choice for many applications.

Some key features of IR Rx Tx sensors include their ability to detect objects at a distance of several meters, their immunity to ambient light interference, and their low power consumption. They are available in various shapes and sizes, including surface-mount and through-hole packages, to suit different applications.

Figure 4.2: IR Rx Tx

LM358 (IC) :

The LM358 is a dual operational amplifier integrated circuit (IC) that is widely used in various electronic applications. It is a low-power, low-voltage device that can operate from a single supply voltage of 3V to 32V. The IC has two independent operational amplifiers with high gain and low input offset voltage. The LM358 is designed to work in a wide range of temperature from -40°C to 105°C. It has a high common-mode rejection ratio (CMRR) and a high open-loop gain. The LM358 is widely used in audio amplifiers, voltage followers, voltage regulators, and signal conditioning circuits. It comes in an 8-pin DIP or SOIC package and is widely available in the market.

Figure 4.3: LM 358 (IC)

10k Variable Resistor:

A 10k variable resistor, also known as a potentiometer, is an electronic component that allows for variable resistance. It has three terminals, with the outer two acting as fixed resistors and the middle one as the wiper that moves along the resistor track to adjust the resistance. The

resistance can be adjusted by turning a knob or sliding a lever. It is commonly used in audio equipment, lighting controls, and other electronic devices where variable resistance is needed.

Potentiometers are adjustable resistors that allow the user to vary the resistance along its track by rotating a mechanical shaft or knob . The 10k value represents the range of resistance that can be achieved by adjusting the potentiometer, with 0 ohms at one extreme end and 10,000 ohms at the other.

Figure 4.4: 10K Variable

LED:

LED stands for Light-Emitting Diode. It is a semiconductor device that emits light when an electric current passes through it. LEDs are widely used in various applications due to their energy efficiency, longevity, compact size . LEDs are highly energy-efficient compared to traditional lighting sources. They consume less power and convert a higher percentage of electrical energy into visible light. LEDs have a longer lifespan than incandescent and fluorescent bulbs. They can operate for tens of thousands of hours, reducing the need for frequent replacements.

Figure 4.5: LED

Buzzer :

A buzzer is an electronic sound-producing device that generates a continuous or intermittent sound or tone. It is commonly used to provide audible alerts, notifications, warnings, or indications in various applications. Buzzer devices are typically compact, low-cost, and simple to use. Buzzers are designed to produce audible sound signals when activated. The sound can be a continuous tone or intermittent, depending on the specific design and configuration.

Figure 4.6: Buzzer

Resistors (1K(2),10k):

Resistors are passive electronic components that impede the flow of electric current in a circuit. They are widely used in electronics to control current, voltage, and provide specific resistance values. Resistors are typically made of a conductive material, such as carbon, metal film, or wire-wound materials, with specific properties to regulate the flow of electricity.

Figure 4.7: Resistors

4.2 Connection Diagram for the Assembly.

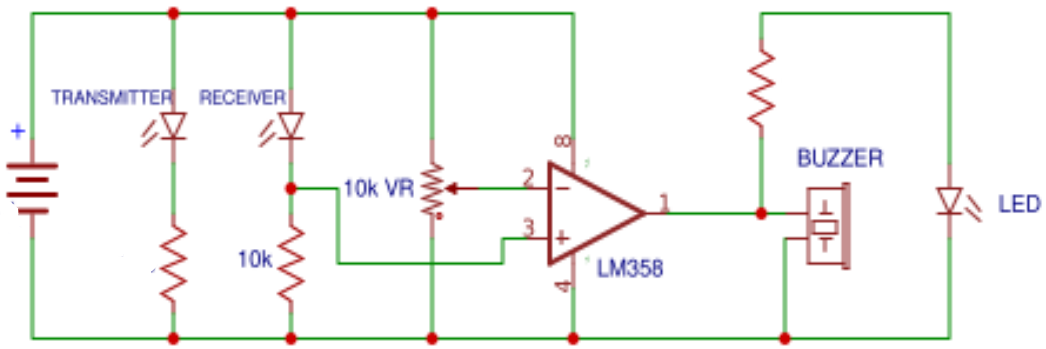

Figure 4.8: Connection Diagram Sensor Doorbell

Chapter 5

RESULTS AND DISCUSSION

Sensor doorbells typically have the capability to detect motion and alert homeowners when someone approaches their door.

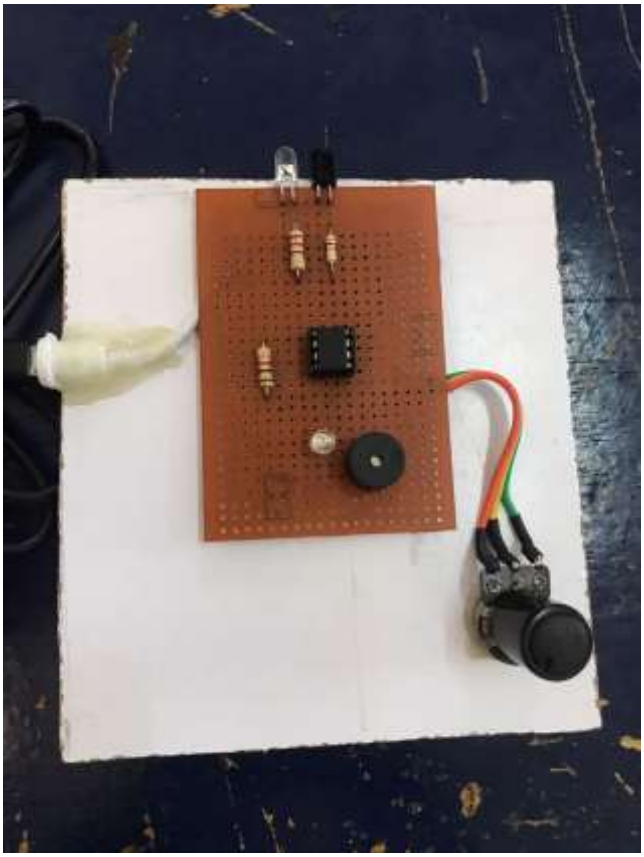

Figure 5.1: Snapshot of prototype

The transmitter emits a beam of infrared light, which is then detected by the receiver when the object interrupts.The receiver detects the change in the signal and sends a corresponding output signal. Then the LED blinks and buzzer makes the sound. Alerts the person inside the home by making a clear sound.

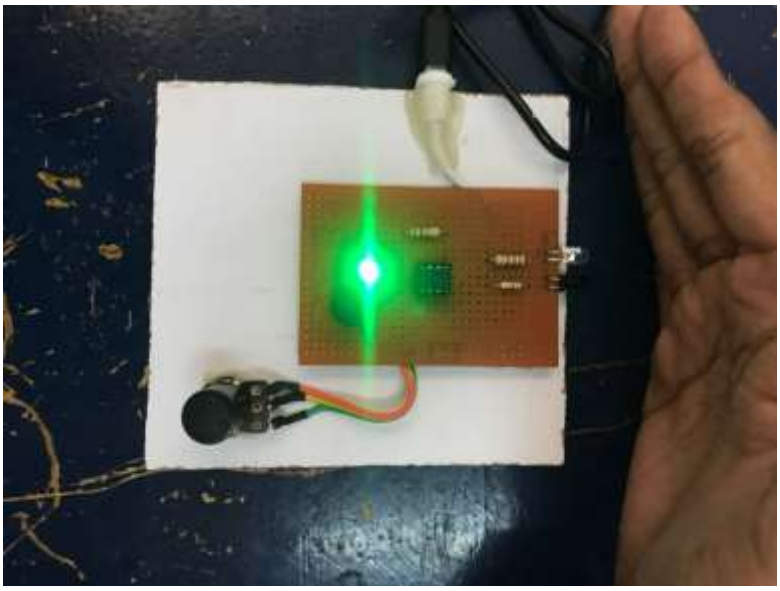

Figure 5.2: Final output

Chapter 6

ADVANTAGES AND APPLICATIONS

6.1 Advantages

- One of the significant advantages of sensor doorbells is the ability to monitor your front door remotely.
- Sensor doorbells often include motion detection capabilities.
- It is used for safety purpose , And real time alerts.

6.2 Applications

- The Wireless Doorbell implemented in this project is just a demonstration of the idea. But the idea can be extended to actual, real time wireless doorbell system.
- The project is suitable for homes.
- The project is suitable for shop.
- This project can be implemented in garages,offices.
- This project can mainly used in hospitals.

Chapter 7

CONCLUSION AND FUTURE WORK

We conclude that this automatic wireless doorbell is used for security purpose. It can be used not only in house hold but also in public places.

Wireless Doorbell increases the safety and security of your home as well as the comfort of your home. They give you the option of being able to speak with visitors through an intercom system without revealing where you are in your home.

In future, adaptive changes may be occurred in technology. It is motion sensor replacing switch.

We will also looking further for the addition of various sound effects to it and also a line of LED at the edge of the doorbell so that it look more of fascinating.

REFERENCES

[1] Chen, C., et al , "Smart Doorbell Based on Facial Recognition and Wireless sensor Networks" Published on 2016.

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[3] Ahmed Salad, Ahmed Muktar, AbdulAziz Ahmed ,“A Framework for Wireless Doorbell System with Object Detection, ” SOMALI JOURNAL OF ENGINEERING AND SCIENCE , Published on July 2017.

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[7] Gupta, R., & Kumar , A "Development of a Sensor-Based Smart Doorbell System" Published on 2020.

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CO3	Demonstrate the project with proper understanding of hardware and software design
CO4	Incorporate skills for writing the report and oral communication.