**SMART PASSENGER DETECTION AND ALERT SYSTEM FOR BUS DOOR CLOSURE**

**A MINI PROJECT REPORT**

**Submitted by**

**CHRISTY ANGEL A**

**JASMINE MARIA V**

**910021106005**

**910021106702**

***In partial fulfilment for the award of the degree***

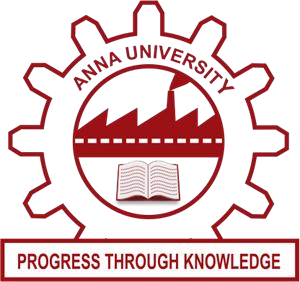
***of***

**BACHELOR OF ENGINEERING**

***in***

**ELECTRONICS AND COMMUNICATION ENGINEERING**

**ANNA UNIVERSITY REGIONAL CAMPUS MADURAI**



**ANNA UNIVERSITY: CHENNAI 600 025**

**OCTOBER 2024**

**BONAFIDE CERTIFICATE**

It is hereby certified that this project report on “**SMART PASSENGER DETECTION AND ALERT SYSTEM FOR BUS DOOR CLOSURE”** is the bonafide record of work of **CHRISTY ANGEL A (910021106005)** and **JASMINE MARIA V (910021106702)** in partial fulfilment for the award of the degree of BACHELOR OF ENGINEERING in ELECTRONICS AND COMMUNICATION ENGINEERING by the ANNA UNIVERSITY, Chennai.

Submitted for the project viva-voce examination held on \_\_\_\_\_\_\_\_\_\_\_

**INTERNAL EXAMINER EXTERNAL EXAMINER**

**ABSTRACT**

As cities expand and public transport becomes a primary means of commuting, ensuring passenger safety in buses has never been more crucial. In India, where buses are often crowded and the risk of accidents is heightened, particular attention must be paid to passengers standing at the last step. This vulnerable position can lead to serious injuries if the bus suddenly accelerates or brakes. Current safety measures may not adequately address these risks, creating a compelling need for a proactive solution. This project aims to develop a sophisticated Passenger Detection System designed specifically for buses, addressing a critical safety concern: the risk posed to passengers standing in the last step of the bus while it is in motion.

Ultimately, the implementation of this system has the potential to improve the overall efficiency and reliability of bus services, contributing to a more secure and pleasant travel experience in urban settings. The accelerometer continuously monitors the bus's motion. If it detects that the bus is in motion, it activates the passenger detection process. When the IR sensor detects a passenger, it sends a signal to the microcontroller. The microcontroller simultaneously triggers the buzzer and the red LED indicator to alert the driver. Once the passenger moves inside the bus, the IR sensor recognizes the absence of a person and sends a signal to turn on the green LED. The buzzer is deactivated.

**ACKNOWLEDGEMENT**

I would like to thank the almighty god for all the blessings he bestowed, which lead to the successful completion of this project.

I would like to extend my heartfelt gratitude to our respected Dean of Anna University, Regional Campus, Madurai Dr. **K. Lingadurai, M.E., Ph.D.,** who is the guiding light for all the activities in our university.

I express my sincere thanks to our Head of the Department Dr. **K. Esakki Muthu, M.E., Ph.D.,** for his cooperation, guidance and suggestions at every stage of this project.

I also thank all the teaching staff and non-teaching staff of the Department of ECE, our parents and all my friends for their help and support to complete this phase of the project successfully.

**CHRISTY ANGEL A**

**JASMINE MARIA V**

**TABLE OF CONTENTS**

**CHAPTER TITLE PAGE**

**NO. NO.**

**ABSTARCT iv**

**LIST OF FIGURES vii**

**LIST OF ABBREVIATION ix**

1. **INTRODUCTION 1**
2. **CODEBIND TECHNOLOGIES 5**
3. **EMBEDDED SYSTEM 7**
   1. CHARACTERISITICS OF 9

EMBEDDED SYSTEMS

* 1. APPLICATIONS OF 10

EMBEDDED SYSTEMS

* 1. DESIGN AND DEVELOPMENT 11

EMBEDDED SYSTEMS

* 1. CHALLENGES OF 12

EMBEDDED SYSTEMS

* 1. ADVANTAGES OF 13

EMBEDDED SYSTEMS

1. **WORKING EXPERIENCE 14**
   1. SMART LOCK SYSTEM 14
   2. INTRUDER ALARM 15
   3. CAR COUNTING SYSTEM 15
   4. PLANT WATERING SYSTEM 16
   5. TRAFFIC CONTROL SYSTEM 16
   6. ULTRASONIC RADAR 17
2. **AIR QUALITY CONTROL SYSTEM 18**

* 1. COMPONENTS 18
  2. BLOCK DIAGRAM 19
     1. INPUT BLOCK GAS 19

SENSOR

* + 1. PROCESSING BLOCK 20

ARDUINO UNO

* + 1. OUTPUT BLOCK 20

LED INDICATORS

* + 1. OUTPUT BLOCK 21

LCD DISPLAY

* + 1. BREADBOARD CIRCUIT 21

ASSEMBLY

* 1. CIRCUIT DIAGRAM 21
  2. COMPONENTS EXPLAINATION 22
     1. ARDUINO UNO 22
     2. GAS SENSOR 25
     3. LED 26
     4. LCD DISPLAY 27

5.4.4.1.LCD STRUCTURE 28

* + 1. ARDUINO IDE 29
  1. WORKING PRINCIPLE 29
  2. PROGRAM 30
  3. KEY FEATURES OF AQCS 33

1. **CONCLUSION AND FUTURE WORK 37**
   1. CONCLUSION 37
   2. FUTURE WORK 38

**REFERENCE 40**

**LIST OF FIGURES**

**FIGURE TITLE PAGE**

**NO. NO.**

3.1 Components of Embedded System 8

5.2.1 Block Diagram 19

5.3.1 Circuit Diagram 21

5.4.1.1 Arduino Uno 22

5.4.1.2 Choosing Board 24

5.4.1.3 Upload 25

5.4.2.1 Gas Sensor 25

5.4.3.1 LED 26

5.4.4.1 LCD display 27

5.4.4.2 LCD 16X2 29

**LIST OF ABBREVIATIONS**

**ABBREVIATIONS EXPANSION**

AQCS Air Quality Control System

CPU Central Processing Unit

LED Light Emitting Diode

LCD Liquid Crystal Display

PCB Printed Circuit Board

RTOS Real Time Operating System

IR Infrared Radiation

PIR Passive Infrared Radiation

LDR Light Dependent Resistor

SPI Serial Peripheral Interface

USB Universal Serial Bus

GPIO General Purpose Input Output

SRAM Static Random Access Memory

EPROM Erasable Programmable Read Only Memory