

**BUSITEMA
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**FACULTY OF ENGINEERING AND TECHNOLOGY
AN ARDUINO UNO BASED SYSTEM FOR COLLISION
AVOIDANCE ON RAIL TRACK**

BY

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ABSTRACT

This report presents an Arduino Uno based system for collision avoidance on rail tracks. The system aimed to enhance the safety of railway operations by detecting and preventing collisions between trains. The system utilizes ultrasonic sensors to detect the presence of obstacles on the tracks and sends signals to the train's control system to initiate appropriate actions for collision avoidance.

The Arduino Uno microcontroller acts as the central processing unit of the system, receiving data from the ultrasonic sensors and making decisions based on predefined algorithms. The ultrasonic sensors are strategically placed along the tracks to provide a comprehensive coverage of the train's surroundings. When an obstacle is detected, the Arduino Uno triggers an alarm and sends signals to the train's control system to apply brakes or change the train's speed to avoid a collision.

The system also incorporates a user interface that allows railway operators to monitor the status of the system and receive real-time notifications in case of any detected obstacles. The user interface provides a graphical representation of the train's position and the detected obstacles, enabling operators to make informed decisions regarding train operations. The proposed Arduino Uno based system offers a cost-effective and efficient solution for collision avoidance on rail tracks. By utilizing ultrasonic sensors and a robust control algorithm, the system can effectively detect obstacles and prevent collisions, thereby enhancing the safety of railway operations. The system can be easily integrated into existing railway infrastructure and can be further enhanced with additional features such as communication with other trains or centralized control systems.

Key words :rail track, ultrasonic sensors, collision avoidance

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Great thanks to all our classmates and friends for their practical help and prayers during the work synthesis.

DECLARATION

I ENYOGOU ALEX OBOI Reg. No BU/UP/2021/0682 respectively hereby declare that this project report is original work except where explicit citation has been made and has never been published and/or submitted for any other degree award to any other university or institution of higher learning for any academic award.

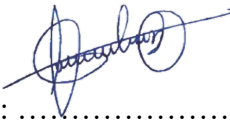
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APPROVAL

This is to certify that the project report entitled “AN ARDUINO UNO BASED SYSTEM FOR COLLISION AVOIDANCE ON RAIL TRACK” has been done under my supervision and is submitted to the board of examiners with my approval.

Lecturer's Name: ERIC KATABARWA BUTIME

Sign: 

Date: 31/7/2023

DEDICATION

We dedicate this report to our supervisor ENG BUTIME ERIC, our parents and relatives, friends, mentors and colleagues who have been supportive in all conditions during the academic journey.

LIST OF ACRONYMS

GND-ground

LED-Light Dependent Resistor

DIL-Dual in line Socket

Arduino IDE-Arduino Integrated Development Environment

DC-direct current

AC-alternating current

Table of Contents

ABSTRACT.....	i
ACKNOWLEDGEMENT.....	ii
DECLARATION.....	iii
APPROVAL.....	iv
DEDICATION.....	v
LIST OF ACRONYMS.....	vi
Table of Contents.....	vii
TABLE OF FIGURES.....	ix
CHAPTER ONE: INTRODUCTION.....	1
1.1 BACKGROUND.....	1
1.2 PROBLEM STATEMENT.....	1
1.3 OBJECTIVES.....	2
1.3.1 MAIN OBJECTIVE.....	2
1.3.2 SPECIFIC OBJECTIVES.....	2
1.4 SIGNIFICANCE OF THE STUDY.....	3
1.5 SCOPE.....	3
1.5.1 TECHNICAL SCOPE.....	3
1.5.2 GEOGRAPHICAL SCOPE.....	3
1.5.3 TIME SCOPE.....	3
CHAPTER TWO: LITERATURE REVIEW.....	4
2.1 INTRODUCTION.....	4
2.2 KEY TERMS.....	4
2.2.1 RAILWAY TRACK.....	4
2.2.2 ANTI-COLLISION SYSTEM.....	4
2.3 RELATED SYSTEMS.....	4
2.3 IR BASED SYSTEM.....	4
2.4 RESEARCH GAP TABLE.....	5
2.5 THE PROPOSED SYSTEM.....	5
2.5.1 ADVANTAGES.....	5

2.5.2 DISADVANTAGES.....	5
CHAPTER THREE: METHODOLOGY.....	6
3.0 INTRODUCTION.....	6
3.1 REQUIREMENTS GATHERING.....	6
3.1.1 DATA COLLECTION.....	6
3.1.2 DOCUMENT REVIEW.....	6
3.1.3 CONSULTATION.....	6
3.2 REQUIREMENTS ANALYSIS.....	6
3.2.1 FUNCTIONAL REQUIREMENTS.....	6
3.2.2 NON-FUNCTIONAL REQUIREMENTS.....	7
3.3 SYSTEM DESIGN AND OPERATION.....	7
3.3.1 SYSTEM SECHAMATIC DIAGRAM AND CONNECTION.....	7
3.3.2WORKING PRINCIPLE.....	8
3.3.3PARTS REQUIRED.....	8
3.3.4CONNECTION OF COMPONENTS TO ARDUINO THROUGH WIRES.....	11
3.4 SYSTEM IMPLEMENTATION.....	12
CHAPTER FOUR.....	17
4.0 SYSTEM VALIDATION AND TESTING.....	17
4.1 SYSTEM VALIDATION.....	17
4.2 TESTING.....	17
4.2.1UNIT TESTING.....	17
4.2.2 INTEGRATION TESTING.....	17
4.2.3 SYSTEM TESTING.....	17
4.3 CONCLUSION.....	17
4.4 RECOMMENDATIONS.....	17
4.5 FUTURE ENHANCEMENT.....	18
4.6 REFERENCES.....	18

TABLE OF FIGURES

Figure 1 showing Head-on collision	2
Figure 2 showing Rear-end collision.....	2
Figure 3 showing infrared based anti collision system.....	4
Figure 4 showing system design.....	7
Figure 5 showing Circuit Diagram of System.....	7
Figure 6 showing Arduino uno	9
Figure 7 showing Timing diagram to start the operation of the ultrasonic module	10
Figure 8 showing ultrasonic sensors	10
Figure 9 showing bread board	11
Figure 10 showing piezo buzzer	11
Figure 11 showing the prototype.....	16

CHAPTER ONE: INTRODUCTION

1.1 BACKGROUND

At present railways is one of the most widely used transportation system in the world. Approximately 10,000 billion freight tonne-Kilometres are travelled around the world every year and more than 5 billion passengers travel per year as per Railway statistic report. But till now railway transportation system are not safe. Many countries railway faces many collisions during travelling in every year as a result, happened lot of damages and casualties.

But if we add Anti Collision Technology (ACT) in railway then we can prevent any types of collision. It is an innovative technology which can detect collision objects from a specific distance of train and avoid collision dynamically and efficiently by using ultrasound and embedded system. The common reason of the train collisions are malfunctioning train signals or lights, failing mechanics, safety gates not in place, crossings that are unprotected, negligence of train conductor and lack of awareness of the people.

1.2 PROBLEM STATEMENT

The current rail track systems lack an efficient collision avoidance mechanism, leading to potential accidents and endangering the lives of passengers and railway staff. There is a need for a reliable and cost-effective solution that can detect obstacles on the rail tracks and alert the train operator in real-time to prevent collisions.

The existing collision avoidance systems are often expensive and complex, making them unfeasible for implementation in all railway networks, especially in developing countries. Additionally, these systems may require extensive infrastructure modifications, which can be time-consuming and disruptive to the existing rail operations.

Therefore, there is a need for an Arduino Uno based system for collision avoidance on rail tracks that is affordable, easy to implement, and compatible with existing rail infrastructure. This system should be capable of accurately detecting obstacles, such as other trains, vehicles, or debris, on the tracks and provide timely alerts to the train operator to take necessary actions to avoid collisions.

The solution should be able to integrate with the existing train control systems and provide seamless communication between the collision avoidance system and the train operator. It should also consider factors such as varying weather conditions, track conditions, and train speeds to ensure reliable and accurate collision detection.

There are two types of collisions are available. A Head-On collision is one where the front ends of two ships, trains, planes or vehicles hit each other [4] and A Rear-End collision often implies a collision on a single line railway