

Railway Accident Prevention Using Sensor

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Abstract: Rail accidents pose a significant threat to both human life and infrastructure. This abstract presents a comprehensive overview of the railway accident prevention system that incorporates various sensors for effective monitoring and early detection of potential threats. The proposed system includes sensors such as ultrasonic Sensor and Vibration Sensor. These sensors work in tandem to collect real-time data on various parameters, including train location, Accident, obstacles on the track. Obstacles on the right of way of the train can cause derailment, collision, injuries to train passengers and loss of properties, Railway accident prevention and protection are a key part of a wider picture of transport safety. so, there is a need to look at various ways to prevent or reduce the frequency and severity of these accidents by using Arduino based safety system to mitigate these accidents. The aim of this paper is to simulate a program in Proteus to detect obstacles on the right of way of trains. Arduino code is written to detect obstacle on the track in the train. By implementing these features in real time application, we can avoid accidents up to a very significant margin. The railway accident prevention system aims to minimize the occurrence of accidents, reduce response time, and enhance overall safety in railway operations through the use of advanced sensor technologies.

Keywords: Vibration Sensor, Ultrasonic Sensor, Relay, Motor, GPS tracking, Accident.

I. INTRODUCTION

Railway accidents have been a cause of concern for both passengers and authorities, leading to a dire need for effective accident prevention measures. In recent years, the advancements in sensor technology have provided a promising solution to enhance railway safety. By utilizing sensors, we can eliminate or reduce the risk of accidents by detecting potential hazards and warning the concerned parties in real-time. Unfortunately, there have been many accidents involved in the railways. Not only in India, a lot of countries railway faces many collisions during travelling in every year as a result happened lot of damages, harm and mortalities. But if we add Anti Collision Technology (ACT) in railway then we can prevent any types of collision. It is a modern technology which can be detect collision obstacle from particular distance of train and prevent collision energetically and efficiently by using Arduino microcontroller, ultrasonic sensor and vibration sensor with embedded system. These sensors are designed to continuously monitor the track conditions, train behaviour, and nearby surroundings to identify any potential dangers that could lead to accidents. For instance, by using vibration sensors, we can detect abnormalities in railway tracks, such as cracks or breaks, that could cause derailment or accidents. Furthermore, motion sensors installed at critical locations can detect unauthorised movement or trespassing on the railway tracks, enabling immediate intervention to prevent accidents. These sensors can also detect the presence of any objects or obstructions on the tracks, allowing train operators to react in a timely manner.

II. METHODOLOGY

The main elements of the prototype model of an Accident prevention system using Sensors for Railway safety messaging are GSM module and Arduino UNO. The proposed system consists of several sensors, Vibration Sensors, UltrasonicSensors. The detection of the train is tracked via round trip time of the ultrasonic sensor and a micro-controller is used together with a GPS module to detect accidents. Hence there is two-way communication between the train and the control room. The proposed system is implemented by controlling the automated doors according to the reading of the sensors. When the sensors detect the movement of the rail, they can indicate this in real time through a buzzer and the message, which will eventually close the doors installed at the level crossing. In addition, the

coordinates of the rail are transmitted via the GPS module, the GPS module continuously monitors the location. Ultrasonic sensors can also detect the presence of any objects or obstructions on the tracks, allowing train operators to react in a timely manner. This sensor is fitted in front of train engine to detect any obstacle present on track within the line of sight. It sends appropriate signal to train control system, which in-turn stops train immediately if an obstacle is detected. If obstacle is detected then buzzer will be ON else the buzzer will be OFF. Therefore, the stated goal is achieved through real-time two-way communication between the control room and the rail via GPS modules. In this research, a prototype is designed and tested in real time for various scenarios to demonstrate the effectiveness of the proposed system.

III. LITERATURE REVIEW

Sarika R. Gujar explained advanced Embedded System of Vehicle Accident Detection and Tracking System. The main objective of this system is to first detect the accident location and call for the emergency services. Vehicle accident detection is possible with the help of sensors. A GPS and GSM module helps to trace the vehicle.

Mohd Khairul Amri Kamarudin has established, "Smart Helmet with Sensors for Accident Prevention. This paper provides an intelligent system for two-wheeler accident prevention and detection for human life safety. The prevention part involves, Smart Helmet, which automatically checks whether the person is wearing the helmet and has non-alcoholic breath while driving.

Vijay J, Saritha B, Priyadarshini B, Deepeka S and Laxmi R (2011) has established, "Drunken Drive Protection System". International Journal of Scientific & Engineering Research. This system efficiently checks the wearing of helmet and drunken driving. By implementing this system, a safe two-wheeler journey is possible which would decrease the head injuries during accidents and also reduce the accidents due to drunken driving. An intelligent system has been embedded in the helmet itself.

Harish Chandra Mohanta, Rajat Kumar Mahapatra and Jyotirmoyee Muduli (2014), "Anti-Theft Mechanism System with Accidental Avoidance and Cabin Safety System for Automobiles". An anti-theft system is any device or method used to prevent or detect the unauthorized appropriation of items considered valuable. Theft is one of the most common and oldest criminal behaviors.

Safety measures for "Two wheelers by Smart Helmet and Four wheelers by Vehicular Communication", The small voltage of ignition of the two wheelers is grounded. In normal condition when the helmet is wearied the pressure is senses pressure and the RF transmitter radiates the FM modulated signal.

Nitin Agarwal Anshul Kumar Singh, Pushendra Pratap Singh, Rajesh Sahani, "SMART HELMET", International Research Journal of Engineering and Technology, volume 2, issue 2, May 2015, "Next generation motor cycle helmet with sound control and 360-degree vision that will transform your ride. The cross helmet X1 is a revolutionary motor cycle helmet that will transform your ride.

D Kumar, S Gupta, S. Kumar, s. Srivastava "Accident detection and reporting system using GPS and GSM module", It aims at finding the occurrence of any accident and reporting the location of the accident to the previously coded numbers so that immediate help can be provided by ambulance or the relative concerned. Jennifer William, Kaustubh Padwal, Nexon Samuel, Akshay Bawkar Smita Rukhande, "Intelligent Helmet", The intelligent helmet band is an idea which makes motor cycle driving safer than before. This is implemented using GSM and GPS technology. Limit switch is placed in the helmet which will detect whether the rider has worn the helmet or not. If not, the bike will not start.

IV. RESULTS



Figure.01



Figure.02

V. CONCLUSION

We have proposed system for accident prevention and making the world a much better and safe place to live. In conclusion, the use of sensors for railway accident prevention has proven to be highly effective in enhancing safety and reducing the occurrence of accidents. The implementation of various types of sensors, such as proximity sensors, speed sensors, and obstacle sensors, has significantly improved the detection and response capabilities of railway systems. These sensors have allowed the detection of potential hazards, such as obstacles on the tracks or trains approaching each other, in real-time, allowing for immediate action to be taken. The use of sensors has also enabled the integration of advanced technologies, such as automatic braking systems and collision avoidance systems, which further enhance safety measures. These systems can automatically apply brakes or divert trains to avoid collisions, minimizing the risk of accidents caused by human error or equipment failure. The implementation of sensors in railway accident prevention has revolutionized the industry by providing real-time information, enhancing safety measures, and improving the overall efficiency of operations.

ACKNOWLEDGMENTS

With deep sense of gratitude we would like to thank all the people who have lit our path with their kind guidance. We are very grateful to these intellectuals who did their best to help during our project work.

It is our proud privilege to express deep sense of gratitude to, Prof. P. T. Kadave, Principal, K.K.Wagh Polytechnic, Nashik for his comments and kind permission to complete this project. We remain indebted to Prof. G.B. Katkade, Head of Computer Technology Department for his timely suggestion and valuable guidance.

The special gratitude goes to our external guide Mr. Gauresh Suryawanshi, Chief Executive Officer at R3 Systems India Pvt. Ltd. Address: First Floor, Rohini Apartment, KBT Circle, Gangapur Rd, near Saraswat Bank, Thalte Nagar, Nashik, Maharashtra 422005 for their sponsorship permissions and directions for our project selection and

implementations. We are grateful and remain indebted to our Internal Guide Mrs.K.N.Ahire for her consistent instructions, guidance for the completion of project.

We are thankful to all Faculty members, Technical staff members of Computer Technology Department for their expensive, excellent and precious guidance in completion of this work. We thank to all the class colleagues for their appreciable help for our working project.

With various industry owners or lab technicians to help, it has been our endeavor to through out our work to cover the entire project work.

We also thankful to our parents who providing their wishful support for our project completion successfully. Lastly we thank to our all friends and the people who are directly or indirectly related to our project work.

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