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ACCIDENT PRIVENTION SYSTEM FOR RAILWAYS

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ABSTRACT

Transport is a key necessity for specialization that allows the production and consumption of products to occur at different locations. Economic prosperity depends on efficient and sustainable transportation that also prioritizes safety and environmental impact. The accident prevention system designed by us is one of the sub-systems for the railway lines of India and is essential equipment to ensure the transportation safety of the high-speed railway. This paper proposes a framework structure and accident prevention methods, particularly against cracks, obstacles, and fire catching which cost them their life.

Keywords: Railway Accident, crack, obstacle, Fire, Arduino, Zigbee, dc motor.

1.INTRODUCTION

Presently in the real time world, commuters are using different types of transport facilities such as flights, trains, buses, etc. But majority of the people in our country prefers travelling in trains. The reason may be the comforts available for long journeys and relatively lesser travelling charges Though the railways has implemented many safety standards for the safe journey, still one can witness some rail accidents and leading to the loss of many precious lives and loss of property. Some of the major reasons for rail accidents are due to the crack, obstacle on the rail and fire catch. At present our railways are using manual methods of detection through human inspectors. Many lives are affected due to the lack of carelessness. To avoid this, we are introducing a system that can avoid all this accidents that occur on rails. In the same way, accidents also occur in the station. In order to prevent this too, we are introducing a fence system to prevent loss of lives. The proposed system uses sensors to detect the obstacles on the railway tracks and notifies the loco pilot and the train stops. This system uses a

wificamera for live streaming. The presence of cracks can be identified using IR sensors and the train is automatically stopped. This system consists of automatic movable fence which prevents the people getting into the tracks in the station whenever train is not there in the station also this system detects fire in the engine and activates sprinkler

2.LITERATURE SURVEY

[1]. Train Accident Prevention System designed by Yash Verma, Vineet Kesharwani, Tushar Kesharwani, and Vaibhav Agrawal, The aim of this project is to detect obstacles on railway tracks (e.g., animals and boulders) using piezoelectric and PIR sensors with a microcontroller, and alert nearby stations and upcoming trains to take preventive measures. GPS is used to determine the location, and the system can differentiate between landslides and animals. The system is 95% accurate, and improvements can be made by covering PIR sensors and using multiple piezoelectric sensors. Successful implementation of this project can save thousands of animal lives and prevent train accidents cost-effectively every year.

[2]. Prevention of wild-life collision in railway tracks using image processing designed by Kalaivani A , Hemalatha J. Train accidents involving wildlife are common in India, and a proposed computer vision system using YOLO object detection has been introduced to detect wild animals near railway tracks. With an accuracy of 98.8%, the system is cost-effective and customizable to specific areas. Although mitigation methods to reduce WTCs include providing wildlife crossing structures, reducing vegetation along the tracks, and using acoustic warning systems, more research and mitigation efforts are required given the growth of rail networks. Early detection and monitoring of animals can help reduce WTCs and their impact on wildlife and humans. Additional mitigation methods may still be necessary for optimal results.

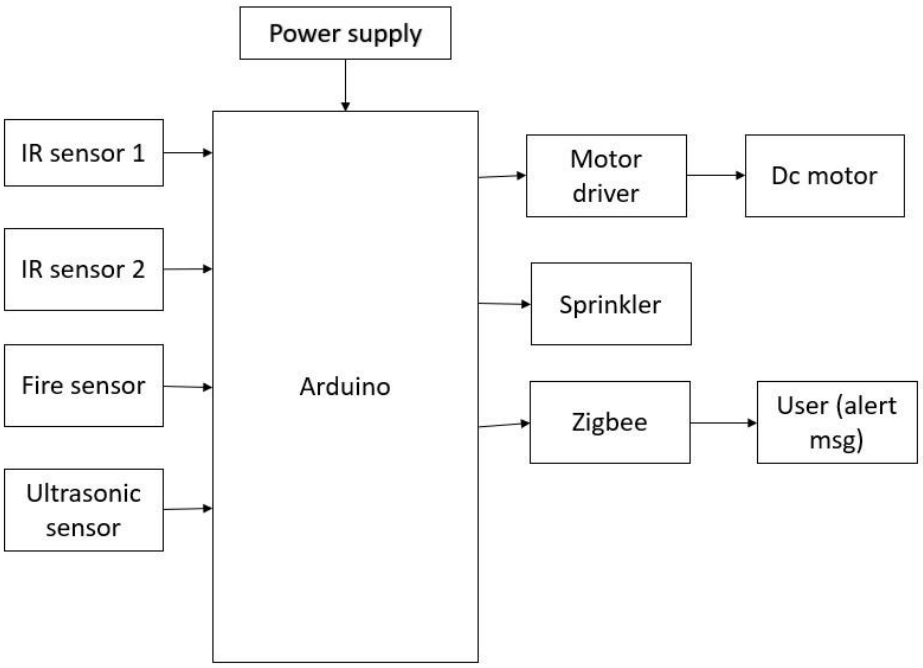
[3]. Railway track tracer system for creature detection using image processing designed by M Deepa, C G Raji, VA Ajina, Ashla, Afsal Azra, and George Susanna. A Railway Track Tracer System is proposed to detect creatures on railway tracks and avoid accidents. Cameras are placed along tracks to monitor objects. Convolutional neural networks detect objects and alert the nearby control room and loco-pilot to stop train. The system includes two capturing processes and real-time monitoring of the train status. The system aims to reduce accidents caused by animals and vehicles crossing railway tracks and can be a crucial part of an intelligent monitoring system for Indian Railways.

[4]. Railway Track Crack and Break Detection System using Arduino designed by Chethan s, sebin Mathew, Vivek Purushotham, Raghu j. This paper proposes a system that uses sensors to detect cracks in railway tracks. The system is composed of an Arduino Uno microcontroller, IR sensor, ultrasonic sensor, GPS module, GSM module, and signaling system using LEDs. The system detects cracks using an IR sensor and stops the vehicle immediately while sending a text message to the maintenance department with the GPS location. The system is inexpensive, has low power consumption, and reduces analysis time compared to manual inspection. By detecting cracks automatically, railway tracks can be repaired quickly, improving safety and saving lives.

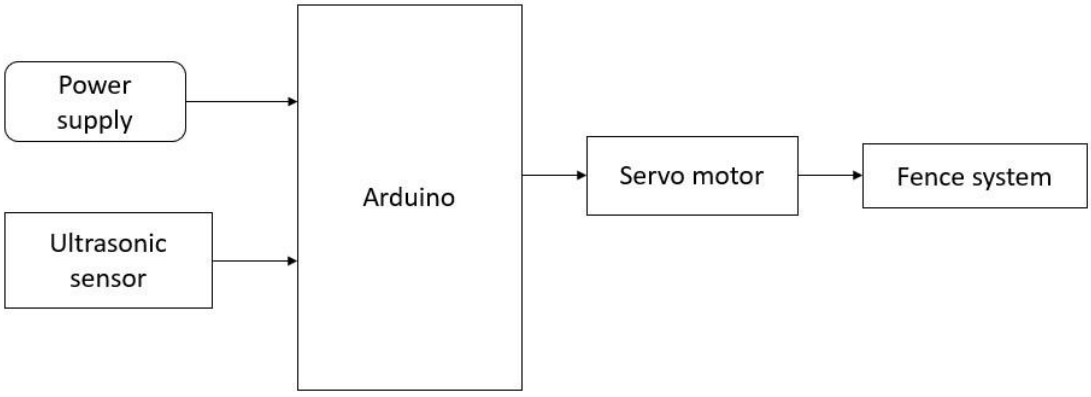
[5]. Automation of animal, fault detection in railway track using PLC designed by M.Balamurugan, T. Prathinban, V. Kilivalavan, S. Manoj Kumar. This paper proposes an automated fault detection system for railway tracks, using PLCs, vibration and ultrasonic sensors. The system detects cracks and breakages, triggers an IR camera, and sends information via GSM to warn nearby trains and railway stations. The system aims to reduce accidents and loss of lives by providing a reliable and userfriendly automated fault detection system with minimal human intervention.

3.BLOCK DIAGRAM

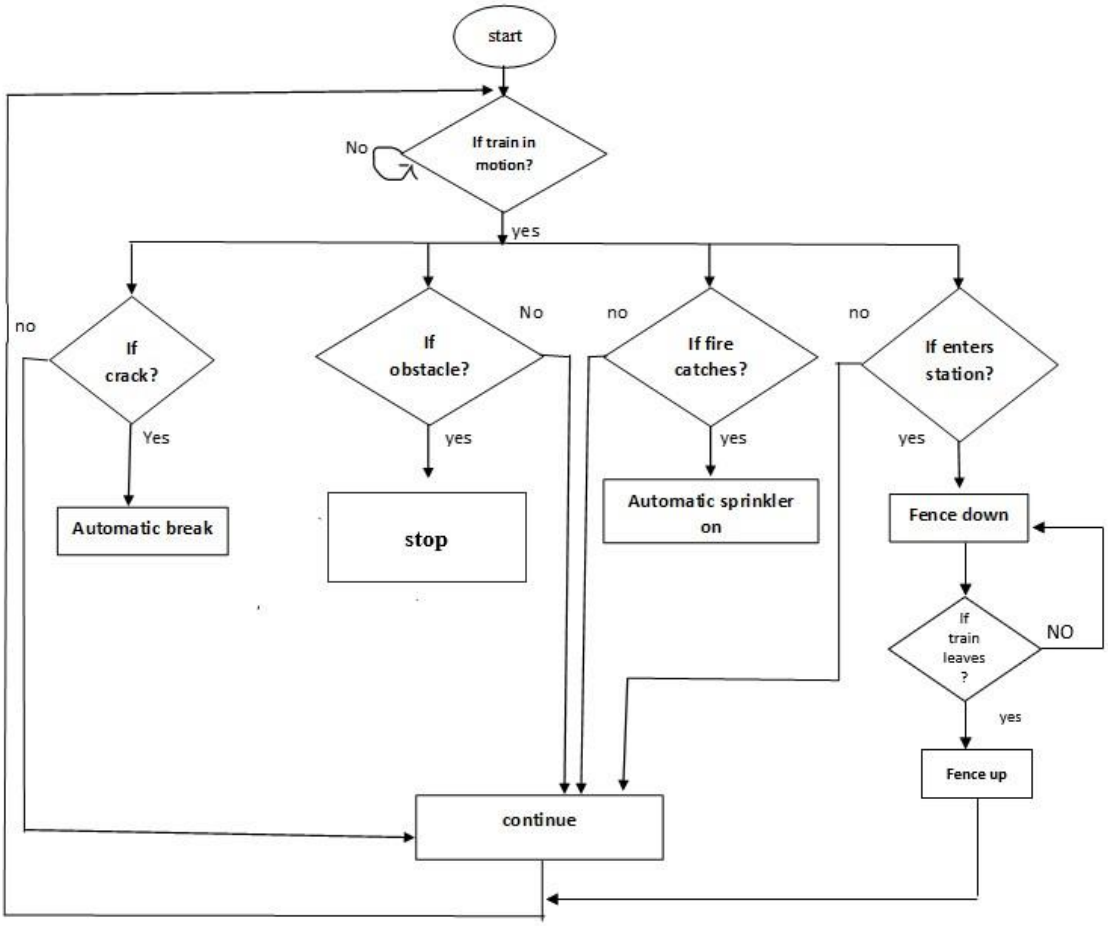
TRAIN MODULE



STATION MODULE



4.FLOW CHART



5.METHODOLOGY

Crack detection: The proposed model works on a simple principle i.e. IR sensor is connected to the bot which is fixed at the front end of the train in such a way that the transmitter of IR sensor points the train track. The length of the bot is of about 30cm length from the train. When the train is in motion ,IR sensor continuously transmits the IR rays on track and reflected rays are received by receiver. Infrared (IR) sensors for crack detection typically work by emitting infrared light and analyzing the reflected signal. When the emitted IR light encounters a crack or discontinuity, it reflects differently, allowing the sensor to detect these variations. The change in reflected IR light helps identify cracks or irregularities in surfaces, enabling their detection. And whenever the IR sensor detects the crack on track the it intimates the Arduino and the emergency breaks are put automatically the trains stops.

Obstacle detection: The ultrasonic sensor is used for the obstacle detection. The ultrasonic sensor firstly sends the sound waves and whenever any obstacle occurs front of it ,it reflects the sound waves back and according to the time required to return the waves back the distance of obstacle is detected. And further the user is notified about it and trains speed is automatically reduced. And there is a camera module included in the front

face of the train which used to monitor whether there is any obstacle or to decide what type of obstacle(whether movable or immovable),so that the locopilot can take necessary actions like whether to stop or continue the train.

Fire detection: There is a flame sensor placed in every compartment in the train ,and whenever any flame is detected it sends signal to the Arduino and the Arduino activates the relay module which acts as switch to turn on sprinkler and hence controls the fire.

Automatic fencing system: At the station module we have attached a automatic fence between the platform and train. The fence in default is always in the upright position to prevent passengers getting into the tracks in the station. Whenever the IR sensors in the station detects the arrival of the train the fence automatically goes to horizontal position allowing the passengers to get into the train. And when the train leaves the station and again the fence goes back to upright position. Here we use servo motor for the movement of the fence.

Zigbee communication: It is basically a wireless communication technology which has a range of about 200m and works in 2.4GHz frequency and consists of transmitter and receiver via which message can be sent and received . In our project we use this technology for sending alert messages that consists of distance of the obstacle from the train and GPS location of the obstacle. And we also use it for sending alert messages during crack detection and fire detection.

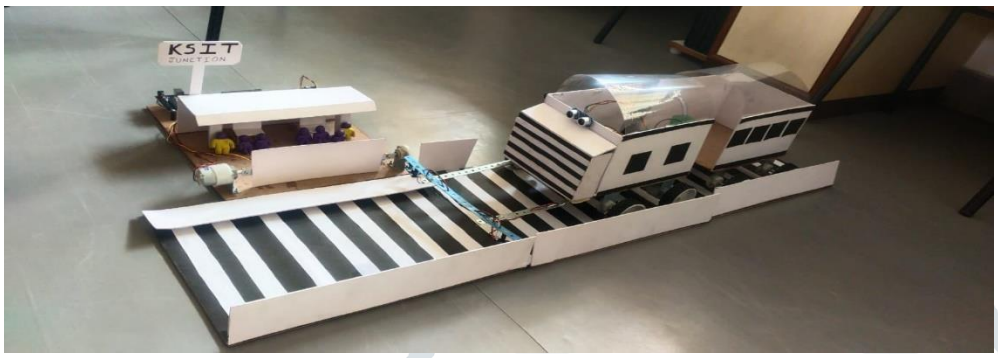
6.CONCLUSION

The paper proposes an accident prevention system for railways to detect cracks in railway tracks, obstacles on tracks, and fires in train bogies. In conclusion, the proposed accident prevention system has the potential to improve railway safety by automatically detecting issues and notifying authorities to take timely action. It can also b e implemented for other vehicles to reduce accidents.

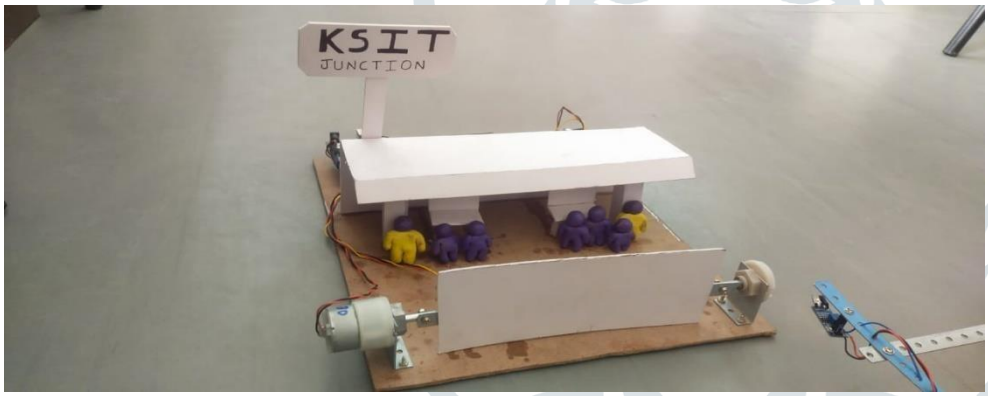
7.FUTURE SCOPE OF WORK

The future of accident prevention systems in railways entails advanced technologies like AIdriven predictive maintenance, real-time monitoring through IoT sensors, and autonomous train control. Integrating machine learning algorithms for anomaly detection and risk assessment, coupled with robust communication systems, will enhance safety measures. Predictive analytics will forecast potential hazards, allowing proactive measures. Implementing drones for aerial surveillance and deploying smart sensors along tracks will enable swift response to emergencies. Additionally, fostering collaboration with research institutions and industry experts for continuous innovation will be pivotal. Ultimately, these advancements will revolutionize railway safety, ensuring passenger security and operational efficiency.

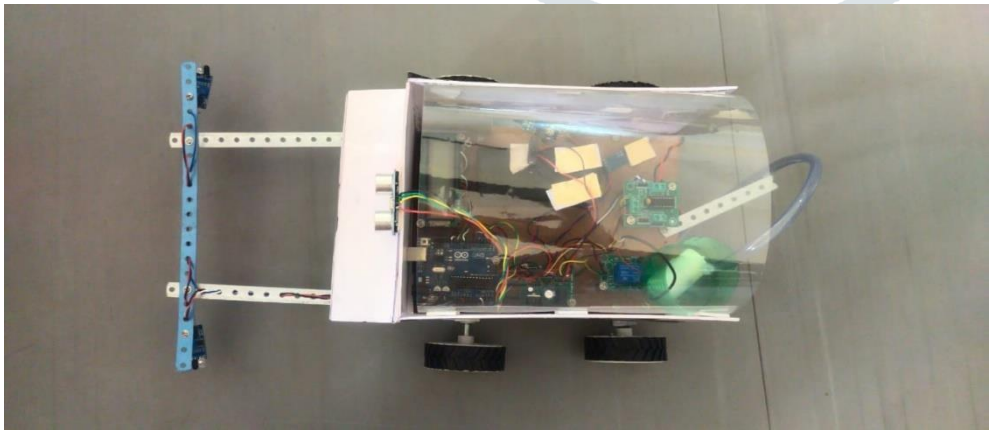
8.RESULTS



DEMONSTRATION MODEL

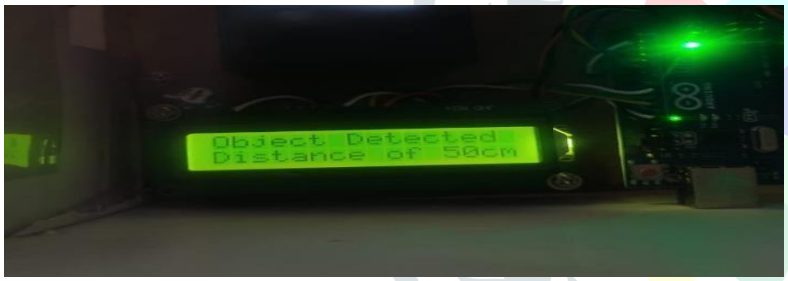


STATION MODEL

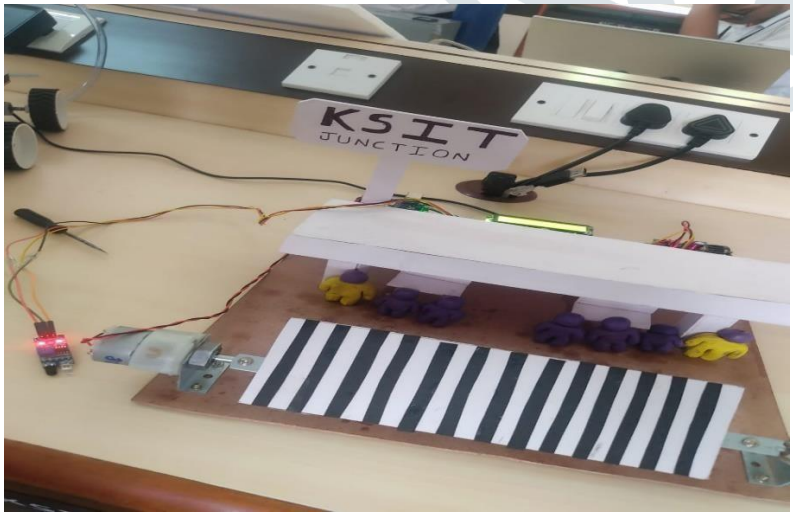


TRAIN MODULE

LCD DISPLAY AT STATION



LCD DISPLAY AT THE TRAIN MODULE



FENCING UP

9.REFERENCE

[1]. “Railway Track Crack and Break Detection System with Onboard Signalling "Chethan S, Vivek Purushotham, Raghu J, and Vineeth, 2019 JETIR May 2019, Volume 6, Issue 5

[2]. Prevention of wild-life collision in railway tracks, Kalaivani A, Hemalatha J, Sathyabama Institute of Science and Technology

[3]. Railway track tracer system for creature detection, Chunyan Rong, Jiahui Zhu, Fabio Giardina et al. To cite this article: M Deepa et al 2021 IOP Conf. Ser.: Mater. Sci. ETrain [4]. Accident Prevention System (T.A.P.S), Yash Verma, Vineet Kesharwani, Tushar Kesharwani, Vaibhav Agrawal, JETIR, May 2022, Volume 9, Issue 5.

[5]. Automation of animal, fault detection in railway tracks using plc. M. Balamurugan, T. Parthinban, & S. Manoj Kumar International Journal of Current Research and Modern Education (IJCRME) 2455 – 5428

[6]. M.D. Anil, Sangeetha.S, Divya.B, Niranjana.B and Shruthi.K.S,," Advanced Railway Accident Prevention System Using Sensor Networks", International Journal of Advanced Research in Computer and Communication Engineering Vol. 3, Issue 5, May 2014

[7]. Hongyu Zhang, zhiming Liu, Chunxiao Fan, "Monitoring System for Disaster and Accident Prevention in Railway PassengerDedicated Lines" IEEE Electronics Society (IECON), Nov. 5-8, 2007, Taipei, Taiwan.

[8]. C. W. Li, C. C. Chu, W. L. Fong, and H. C. Wang, "Intelligent level crossing safety control system," Proc. - 2014 10th Int. Conf. Intell. Inf. Hiding Multimed. IIH-MSP 2014, pp. 799– 802, 2014.

[9]. R. Iqbal and D. Saeed, "Safe railway crossing system based on Zigbee communication," Proc. Comput. Conf. 2017, vol. 2018January, no. July, pp. 1243–1246, 2018.Z `