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IOT Based Remote Surveillance for Animal Tracking Near Railway Tracks

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ABSTRACT : The Abstract Introduces the, In India, a huge country with the largest railway network in the world at almost 1,20,000 kilometres has a huge problem of railway collisions. There have been multiple news stories ranging from the death of 13 children in Uttar Pradesh, India to 5 elephants dying due to railway related accidents. Most of these issues are due to the lack of management at railway crossings. Human monitoring has been a proposed solution, however, due to India's sheer scale, it is very difficult to monitor railway track, especially in the rural and forested areas. Plan on finding out the most frequented railway track and fixing ultrasonic sensor, PIR sensor and camera at the scene, which can monitor the track. Once the object has been detected, the object will be monitored and if the object has been on the track or in the vicinity of the tracks. An alert will be sent to the train pilot to the trains needs to slow down in this area. The object detected will be transferred to the operator as well who can give the loco pilot an idea for humans and slow down for animals. This will effectively reduce the collisions and solve the problem of railway collisions.

KEYWORDS: IOT, WiFi Module, Sensors.

I. INTRODUCTION

Railway tracks pose a significant challenge when it comes to ensuring safety, not only for trains and passengers but also for wildlife inhabiting the surrounding areas.Collisions between trains and animals on the tracks can lead to devastating consequences.To address this issue, an Internet of Things (IoT)-based monitoring system has been conceptualized to detect the presence of animals on railway tracks promptly.This system leverages a combination of sensors, and communication technologies to provide real-time alerts to railway authorities, mitigating the risk of collisions and promoting both human and wildlife safety.

1.1 PROBLEM STATEMENT

The interaction between trains and animals on railway tracks poses a significant threat to both the well-being of passengers and the conservation of local fauna. Collisions between trains and animals not only result in tragic consequences for wildlife but also lead to operational disruptions, financial losses, and safety concerns for passengers and railway personnel.The existing methods of animal detection on railway tracks often lack the required speed and precision to provide timely alerts to railway authorities.The need for a more advanced, automated, and reliable system to detect and alert authorities about the presence of animals on railway tracks is evident.

1.2 OBJECTIVE

This system mainly focuses on some areas where creatures are always seen on the railway tracks. Using the cameras, the presence of creatures can be easily identified and thus the accidents can be prevented. The system contains details of train, loco-pilot, alert system and camera. In the system, the images were captured using the camera and recognized.

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1.3 SCOPE AND STUDY

The scope of an IoT-based remote surveillance system for animal tracking near railway tracks encompasses the deployment of sensor networks along railway corridors to detect and monitor animal presence. This includes employing various sensors such as motion detectors, infrared cameras, and acoustic sensors to detect the movement and sounds of animals approaching the tracks. Animals are equipped with GPS trackers to monitor their movements in real-time, facilitating the tracking of their proximity to railway lines. Data from sensors and GPS trackers are transmitted through reliable communication networks to a centralized monitoring system. This system employs machine learning algorithms to analyze the data and predict animal behavior, enabling the generation of alerts when animals are detected near the tracks. The system's design also considers efficient power management techniques and environmental monitoring to ensure continuous operation and address factors influencing animal behavior. Field testing and validation are integral parts of the study to assess the system's performance and effectiveness in mitigating the risk of wildlife collisions, thus promoting railway safety and wildlife conservation efforts.

II. COMPONENTS

2.1 COMPONENTS AND SPECIFICATIONS:

- Arduino UNO
- ESP8266 Wi-Fi Module
- Ultrasonic Sensor
- PIR Sensor
- LCD Display
- ESP32 Cam
- Arduino IDE software

III. BLOCK DIAGRAM

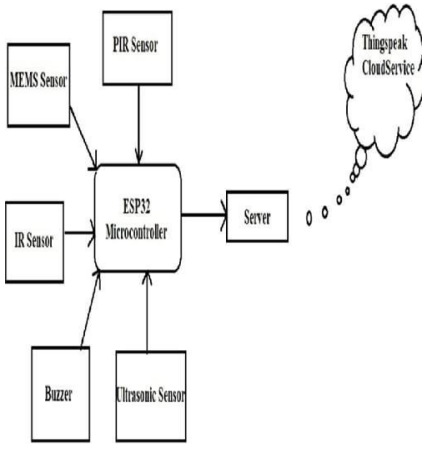

FIG-1 Block Diagram of animal tracking

3.1 WORKING

The IoT-based remote surveillance system for animal tracking near railway tracks operates by deploying a network of sensors along the railway lines, strategically positioned to detect animal presence and movement. These sensors, including motion detectors, infrared cameras, and acoustic sensors, continuously monitor the surrounding area for any signs of wildlife activity. Simultaneously, animals in the vicinity are equipped with GPS trackers, enabling real-time tracking of their movements. The sensor data and GPS coordinates are transmitted via a reliable communication network to a centralized monitoring system. This system employs machine learning algorithms to analyze the incoming data, identifying patterns and predicting animal behavior. When animals are detected nearing the railway tracks, the system generates alerts, notifying railway authorities or wildlife conservationists to take appropriate action. Additionally, the system incorporates efficient power management techniques to ensure continuous operation of sensors and trackers, along with environmental

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monitoring to factor in variables such as temperature and noise levels. Through its seamless integration of sensors, communication technology, and data analysis, the system effectively enhances railway safety by mitigating the risk of wildlife collisions and contributes to wildlife conservation efforts in railway ecosystems.

IV. CIRCUIT DIAGRAM

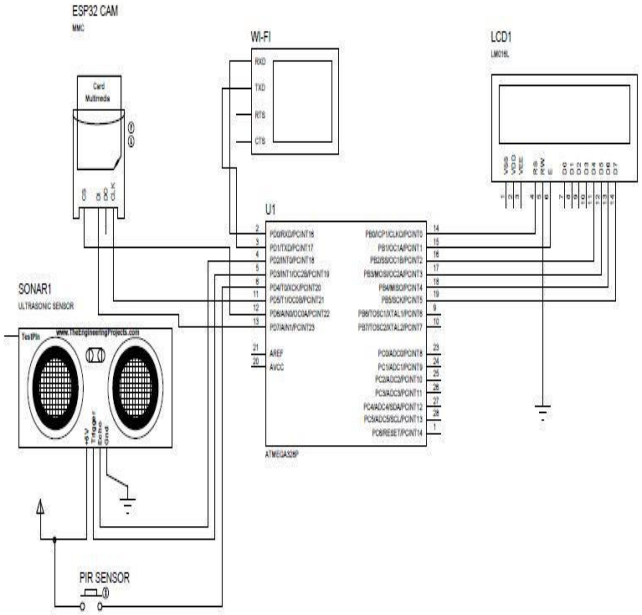

Fig -2: Circuit Diagram of animal tracking

V. RESULT AND DISCUSSIONS

The implementation of an IoT-based remote surveillance system for animal tracking near railway tracks yields several significant results and discussion points. Firstly, the system enhances railway safety by providing early detection of animals near the tracks, thus reducing the risk of collisions and potential damage to trains and infrastructure. This proactive approach can prevent accidents and minimize disruptions to railway operations. Additionally, the real-time tracking of animal movements allows for better understanding of wildlife behavior patterns, aiding in the development of targeted mitigation strategies. Discussion points include considerations for system scalability, reliability, and cost-effectiveness, as well as ethical implications regarding animal welfare and privacy. Collaborative efforts between railway authorities, wildlife conservationists, and technology providers are essential for the successful deployment and maintenance of such systems. Overall, the adoption of IoT-based remote surveillance for animal tracking near railway tracks represents a promising approach to enhancing railway safety while promoting coexistence with wildlife in railway ecosystems

VI. CONCLUSION

The Proposed work is an advanced alternative solution to replace the manual method of animal detection of railway track with an Arduino based automated animal detection system. This system completely eliminates the human intervention for detecting animal. It provides a high speed detection system that automatically communicates the predicted information immediately to the concerned train at the time and railway traffic control room by using Wi-Fi system; hence this will reduce the accident rates and loss of precious life of animals. The Arduino used as a controller in this system, makes the entire system as a user friendly and highly reliable that carries out control functions of many types and levels of complexity.In the future, there will be a large scope for this system. The IR sensors and Ultrasonic sensors are used to collect the information and transmitted through Wi-Fi. This project is further enhanced by wireless sensor network. In future

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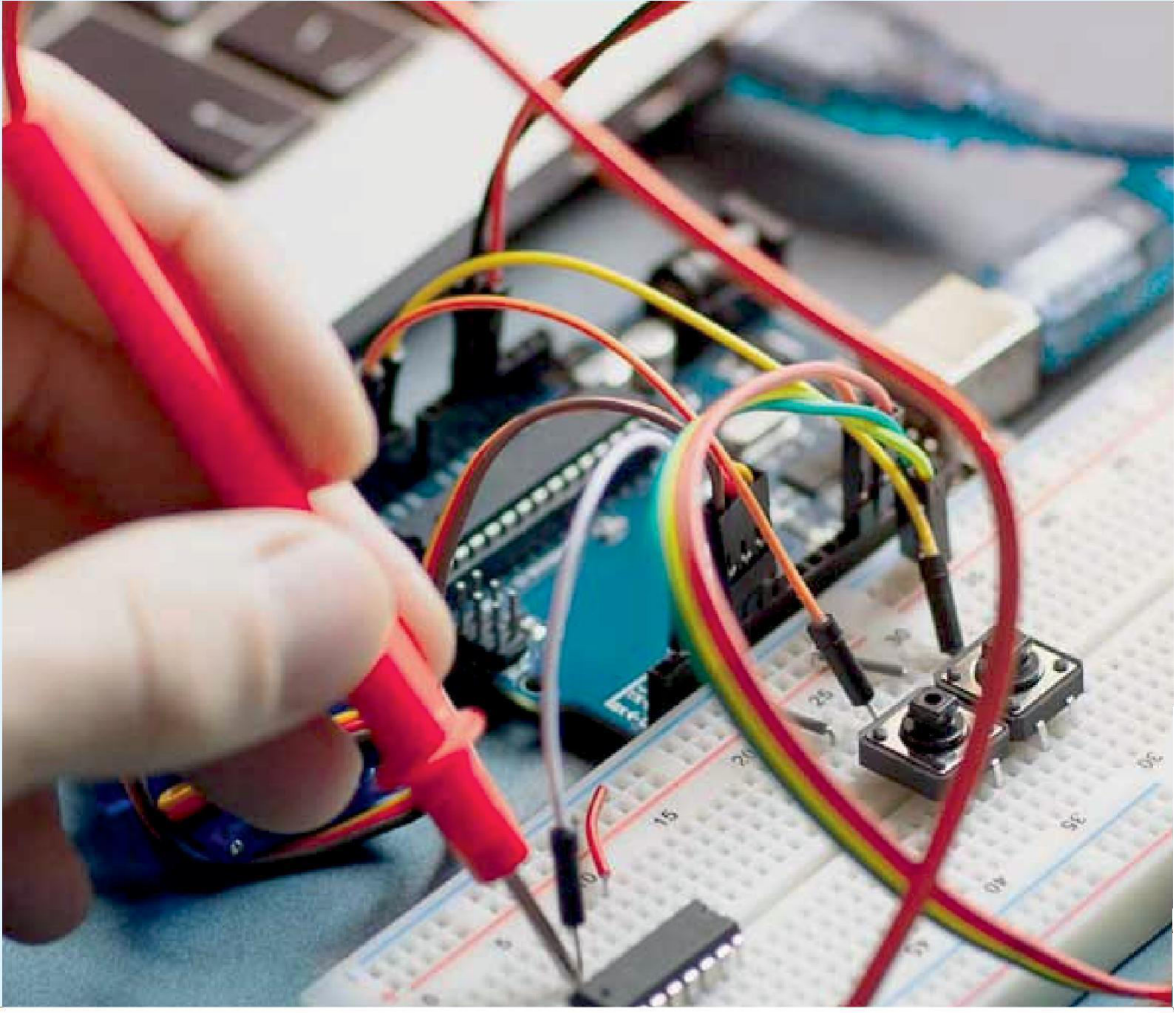
this prototype can be taken into production level. Further, most of the modules can be embedded along with the microcontroller in a single board and thereby reduce the size of system. Ultrasonic Sensor and Infrared Sensors are used for detecting cracks and obstacles in the track. This can increase the security for both rails and passengers from crime and terrorism. This system detects single crack after which it must be reset manually. So provisions to control microprocessor remotely that allow reset automatically must be provided.

REFERENCES

1. Dent M and Marinov M, (2019) "Introducing automated obstacle detection to British level crossings" in Sustainable Rail Transport, Cham, Switzerland:Springer, pp. 37-80.
2. Ferlin A et al., (2018)"An automated method for the study of human reliability in railway supervision systems", IEEE Trans. Intell. Transp. Syst., vol. 19, no. 10, pp. 3360-3375.
3. Hao W et al., (2017) "Effects of foggy conditions on driver injury levels in U.S. Highway-rail grade crossing accidents", Case Stud. Transp. Policy, vol. 5, no. 4, pp. 627-633.
4. Minaeian S, Liu J and Son Y, (2019) "Effective and efficient detection of moving targets from a UAV's camera", IEEE Trans. Intell. Transp. Syst., vol. 19, no. 2, pp. 497-506.
5. Nemtanu F. C. and Marinov M, (2019) "Digital railway: Trends and innovative approaches" in Sustainable Rail Transport, Cham, Switzerland:Springer, pp. 257-268.
6. Ristić-Durrant D, Franke M and Michels K, (2021) "A review of vision-based on-board obstacle detection and distance estimation in railways", Sensors, vol. 21, no. 10, pp. 3452.
7. Sabu B and Marinov M, (2018) "An obstacle detection system for freight yards", IF Ingegneria Ferroviaria, vol. 73, no. 6, pp. 539.



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