IOT BASED REMOTE SURVIELLANCE FOR ANIMAL TRACKING NEAR RAILWAY TRACKING

[1]Boga Rishith, [2] Gorla Sai Teja, [3] Sharun kumar

[4]G.Samatha

[1,2,3]B. Tech final year Student, ECE department, J B Institute of Engineering and Technology, Hyderabad, Telangana.

[4]Assistance Professor, ECE Department, J B Institute of Engineering and Technology, Hyderabad, Telangana.

rishith65@gmail.com sharungoud5@gmail.com saitejagorla@gmail.com

samata.gaddam99@gmail.com

ABSTRACT

Every year, many resources are lost and animal life is in danger due to railroad accidents. To prevent the entry of wild animals near railroad tracks, they have to be monitored all the time. In this project, we propose a system that will monitor a railroad track for humans and animals. For the first round of surveillance, we have a PIR sensor for motion detection, a MEMS sensor for vibration. Both data-driven Intelligent Transportation Systems (ITS) and the nascent Internet of Vehicles (IoT) services, like railroad barrier tracking at railroad crossings, railroad warnings, and light signaling systems, have the potential to be considerably improved by the use of IoT-based solutions. The train is the most well-liked and environmentally sustainable mode of transportation in the biggest cities on earth. For a convenient, secure, and affordable travel option, the train is the most popular. It is affordable to people in various vocations. One of the most effective ways to prevent train accidents is the subject of this project, which uses an Microcontroller to create a multi-sensor railway track geometry surveying system. All the sensors are controlled, and information is transmitted and received. It can prevent accidents and safeguard animals and people. This system continuously monitors the status of the track and updates its time and its information to the IoT cloud platform, known as Thing speak. This information is observed in the mail or on the mobile phones of nearby railway officers so that they can take immediate action in order to prevent railway accidents.

Keywords: ARDUINO, DC – DC BACK CONVERTOR, IR SENSOR, PIR SENSOR, ESP8266-WIFI, ADXL-335

I.INTRODUCTION

We know that the railways are the most convenient and cheapest mode of transportation because of its capability, speed and safety. Indian Railways are the largest railway in Asia and the second largest network in the world. The small improvement in this sector will lead to a great development in the country. Due to its huge size, there is a system to monitor and maintain the rails properly and the poor maintenance will create accidents in the rails. Many lives are affected due to the lack of carelessness. To avoid this, we were introduced a system that can

avoid many of the accidents occur on rails. 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 proposed system, the images were captured using the camera and recognized using the process of image processing. If it detects an object in the image, then another image will also be captured within fractions of seconds and again the processing takes place. Both the images will be then compared and if it detects the image in both images, then the alert message will be immediately created by the application and send to loco-pilot and also to nearby control room

II. LITERATURE SURVEY

.Vikram (2017) developed an animal detection aimed at safeguarding farm areas using sensor-based technology. Their work highlight the effectiveness of early detection in preventing crop damage and ensuring farm security.

. Divya, Usha Kiran, and Praveen M. (2018) proposed an IOT – based wild animal intrusion detection system utilizing sensor networks and real-time alert mechanisms. Their work emphasized improving safety and minimizing human-wildlife conflicts through efficient monitoring and timely interventions.

. Pawar, Chopde, and Nandre (2018) presented a motion detection system using PIR sensors to identify movement effectively. Their study highlighted the systems low power consumption and reliability, making it suitable for security and automation applications.

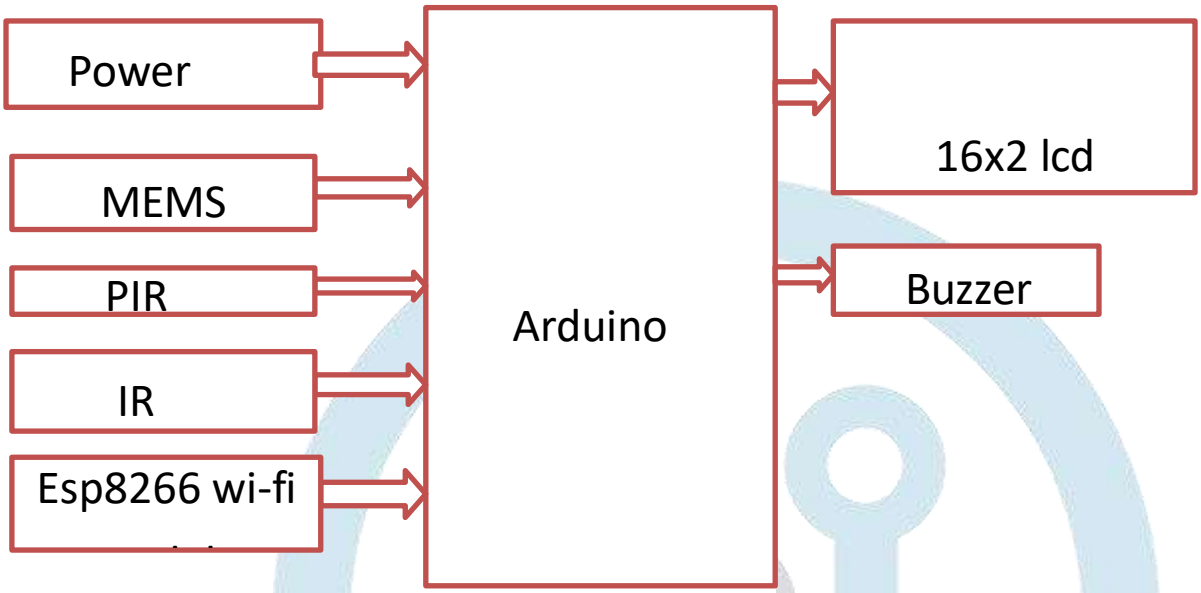
. Haldorai, Murugan, and Balakrishnan (2024) proposed a modified AI model for the automation and precise monitoring of wildlife in forest areas. Their system aimed to improve wildlife conservation efforts by providing real-time data and accurate tracking of animal movements using AI-driven analytics.

. Rajan (2023) developed an IOT based remote surveillance system for animal tracking near railway tracks aimed at reducing wildlife related accidents. Their work showcased the integration of real time monitoring and automated alerts to enhance safety and wildlife protection near railways.

III. METHODOLOGY

A proposed system that will monitor a railroad track for humans and animals. For the first round of surveillance, we have an IR sensor and a PIR sensor for motion detection, a MEMS sensor for pressure and vibration, and ultrasonic sensors for distance. One of the most effective ways to prevent train accidents is the subject of this project, which uses an controller to create a multi-sensor railway track geometry surveying system. All the sensors are controlled, and information is transmitted and received. It can prevent accidents and safeguard animals and people. This system continuously monitors the status of the track and updates its time and its information to the IoT cloud platform, known as Thing speak.

3.1 BLOCK DIAGRAM



IV. HARDWARE DESCRIPTION

4.1 Ultrasonic Sensor

Ultrasonic sensors measure distance by using ultrasonic waves. The sensor head emits an ultrasonic wave and receives the wave reflected back from the target. Ultrasonic Sensors measure the distance to the target by measuring the time between the emission and reception. An optical sensor has a transmitter and receiver, whereas an ultrasonic sensor uses a single ultrasonic element for both emission and reception.

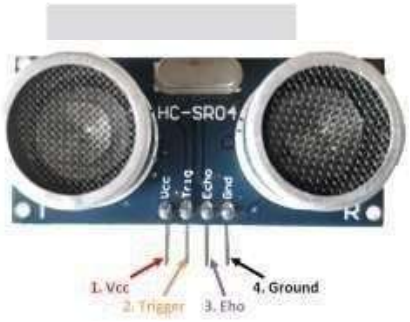


Figure - Ultrasonic Sensor

4.2 Power Supply

The power supply section is the section which provide +5V for the components to work. IC LM7805 is used for providing a constant power of +5V.The ac voltage, typically 220V, is connected to a transformer, which steps down that ac voltage down to the level of the desired dc output. A diode rectifier then provides a full-wave rectified voltage that is initially filtered by a simple capacitor filter to produce a dc voltage. This resulting dc voltage usually has some ripple or ac voltage variation.A regulator circuit removes the ripples and also retains the same

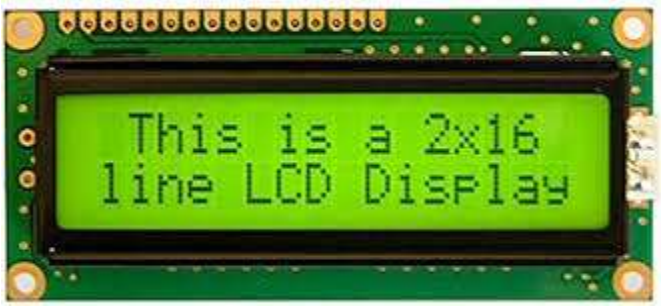
dc value even if the input dc voltage varies, or the load connected to the output dc voltage changes. This voltage regulation is usually obtained using one of the popular voltage regulator IC units.

4.3 Arduino uno

Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online. You can tell your board what to do by sending a set of instructions to the microcontroller on the board. To do so you use the Arduino programming language (based on Wiring), and the Arduino Software (IDE), based on Processing

4.4 LCD Display

The LCD display is used to provide real-time feedback to the system operator. It shows the operational status of the system, such as the battery level, current mode (e.g., surveillance or notice announcement), and other relevant information. This helps in monitoring the vehicle's performance and ensuring smooth operation.



4.5 PIR Sensor

. This PIR (Passive Infra-Red) Sensor is a pyroelectric device that detects motion by measuring changes in the infrared (heat) levels emitted by surrounding objects. This motion can be detected by checking for a sudden change in the surrounding IR patterns. When motion is detected the PIR sensor outputs a high signal on its output pin. This logic signal can be read by a microcontroller or used to drive a transistor to switch a higher current load.

4.6 IR Sensor

An Infrared (IR) sensor is a type of sensor that detects infrared radiation (heat) emitted by objects. It works by sensing the light spectrum that is beyond the visible range (typically between 700 nm to 1 mm). IR sensors are widely used in various applications like proximity detection, motion sensing, temperature measurement, and object counting.

4.7 Buzzer

A Buzzer or a Beeper is a signalling device usually electronic typically used in automobiles and house hold appliances .It most commonly consists of a number of switches or sensors connected to a control unit that determines if and which button was pushed or a preset time has lapsed, and usually illuminates a light on the appropriate button or control panel, and sounds a warning in the form of a continuous or intermittent buzzing or beeping sound. Initially this device was based on an electromechanical system which was identical to an electric bell without the metal gong (which makes the ringing noise).

V. RESULT

When Arduino is connected to the supply, the lcd screen gets on. It displays ‘waiting for connection’. From mobile phone connect to esp with wifi. After successful connection, it displays the presence of wild animals or not.

VI . CONCLUSION AND FUTURE SCOPE

The proposed system for creature detection was used for the creature detection on the rails. The proposed system was placed in the accident prone areas where the accidents occur due to the wild animals crossing the rail, vehicle accidents, falling down of trees etc. will be monitored. According to the system, we were verified the system performance in real condition. Using Vibration Sensor we identify the train and using PIR Sensor we identify the creature. This information will be helpful for the loco-pilot to stop the train and avoid accidents that harm the creature in the track.

The future of surveillance for animal tracking promises significant advancements driven by technological innovation and evolving research methodologies. Miniaturization of tracking devices will lead to the development of smaller, lighter, and less invasive tags, expanding the range of species that can be monitored. Integration of multiple sensors, including GPS, accelerometers, and environmental sensors, will provide a more comprehensive understanding of animal behavior and habitat use. Data analytics and artificial intelligence techniques will enable efficient processing and analysis of large tracking datasets, uncovering patterns and insights that were previously inaccessible. Real-time monitoring capabilities, coupled with remote sensing technologies like satellite imagery and UAVs, will facilitate broad-scale monitoring of wildlife populations and habitats. Ethical considerations and animal welfare

concerns will continue to guide research protocols, ensuring that tracking methods prioritize the well-being of study animals. Ultimately, these advancements will contribute to more effective wildlife conservation and management efforts in the face of global environmental challenges.

VII. REFERENCES:

[1] S Oh, S Park, and C Lee, "Vision based platform monitoring system for railway station safety," in 2007 7th International Conference on ITS Telecommunications, IEEE, 2007, pp. 1–5.

[2] A Parvathy, M G Mathew, S Justus, and A Ajan, "Automatic rail fault track detection for Indian railways," 2nd International Conference on Communication and Electronics Systems (ICCES). IEEE, 2017, pp. 144–147.

[3] P Lad and M Pawar, "Evolution of railway track crack detection system," 2nd IEEE International Symposium on Robotics and Manufacturing Automation (ROMA). IEEE, 2016.

[4] Manikandan, R., M. Balasubramanian, and S. Palanivel. "An Efficient Framework to Detect Cracks in Rail Tracks Using Neural Network Classifier." International Journal of Pure and Applied Mathematics 116.10 (2017): 461-470.

[5] Naresh Kumar D, Uday M, Brahmini G, Mounika Reddy A, and Sagar Kumar M 2017 Railway Track Crack Detection System IJSDR Volume 2 Issue 4

[6] Sharma, Kamini, and Laxmi Goswami. "RFID based Smart Railway Pantograph Control in a Different Phase of Power Line." 2020 Second International Conference on Inventive Research in Computing Applications (ICIRCA). IEEE, 2020.

[7] Min, Yongzhi, et al. "Real time detection system for rail surface defects based on machine vision." EURASIP Journal on Image and Video Processing 2018.1 (2018): 3.

[8] Aliza Raza, Pervez Rauf Khan, and Shafeeq Ahmad. "Crack detection in railway track using image processing." International Journal of Advance Research, Ideas and Innovations in Technology 3.4 (2017): 489-496.

[9] Raji, C. G., and SS Vinod Chandra. "Prediction and survival analysis of patients after liver transplantation using RBF networks." International Conference on Data Mining and Big Data. Springer, Cham, 2016.

[10] Raji C G, Vinish, Ganesh Gopakumar and Shahil K, Implementation of Bitcoin Mining using Raspberry Pi , 2nd International Conference on Smart Systems and Inventive Technology, ICSSIT 2019, 27-29 November, 2019.