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Railway Track Crack & ObjectDetection Using GSM & GPS

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Abstract *- The main cause of the accidents happened in railways are railway track crossing and unrevealed crack in railway tracks. Nowadays in Indian railways they use manual system for tracking the cracks in the railways but this process will leads to take more time for detecting the cracks. Therefore, there is a need to have new technology which will be robust, efficient and stable for both crack detection as well as object detection. This paper discusses a Railway track crack & object detection using sensors, it is a dynamic approach which combines the use of GPS tracking system to send alert messages and the geographical coordinate of location.*

Keywords — GSM, GPS Module, Arduino Microcontroller, IR sensor, Ultrasonic sensor.

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I. INTRODUCTION

To test the cracks in railway tracks, communication, and identification using GPS module, GSM modem and IR sensor and PIR sensor. The GPS module and GSM modem were utilized to identify and transmit railway geometric parameters related to crack detection to a nearby railway station. The PIR sensor is used to detect moving objects crossing railroad tracks. This device may work both at night and during the day [1]. The proposed broken rail detection system automatically detects the faulty rail track without any human intervention. This paper proposes a cost effective solution to the problem of railway track crack detection utilizing LED-LDR assembly which tracks the exact location of faulty track which then mended immediately so that many lives will be saved [2]. This system is proposed for detecting railway track cracks using image processing. this method is used for both crack detection in railway tracks and object detection, a new method that is robust, efficient, and steady has been developed. This study presents a system for detecting defective train tracks and objects. It's a dynamic strategy that combines the usage of a GPS tracking system and a WIFI module to transmit alert messages and the location's geographical coordinates. To control and coordinate the operations of various devices, a Raspberry Pi 3 is employed [3]. This system is designed to find the cracks Using an op amp and a microcontroller, the suggested system provides a simple approach for detecting railway track cracks. The SMS is also sent to the main branch via GSM. The operation of his system includes when we apply reference voltage it gives predefined voltage when there is no crack detected or if any crack detected then the voltage levels will regulate and the op-amp output will be given to microcontroller, and the information will be sent through GSM module using software which is designed in vb6.0. at the end of the software can find out the location of the crack. Along with this there is an led used for indication purpose it will change its color from green to red when crack is detected [4]. In this paper they use IR sensors for detection of the crack in railway tracks. Whenever the crack is detected based on its latitude and longitude values the message will send to mobile phone. Then IR sensor is used for the detection purpose. This system is designed using Arduino Uno (ATmega328), IR sensors and Bluetooth to perform railway safety monitoring system. Here an IP based camera is also used for monitoring visual videos captured and photos captured from the railway tracks [5].

In this paper discusses a Railway track crack detection and object detection using IR sensors & Ultrasonic sensors. Whenever any crack or object detected and on the track buzzer sound will be generated and the sensor will send the information to the controller, then controller processes the whole information and it gets the location of crack or object using GPS and sends the detection SMS to the authority mobile numbers using GSM. For driving the robot on the railway track we here we are using DC motors and L293D Motor driver. So by using this robot we can reduce the accidents to a great extent and can prevent not only the loss of precious lives and can save the property as well.

The paper is organized as follows : section II is an Overview of the proposed system. The results of the proposed system have been discussed in section III followed by conclusions in section IV.

II. PROPOSED SYSTEM

In this paper Interfacing of two IR sensors with the Arduino Uno are used to check damage or crack present in the track of the railway line. A GPS receiver is also interfaced with the microcontroller to determine the exact location of the crack on the railway track. Two DC motors are used to move the robot in forward & backward directions. The architecture of the proposed system also consists of a 16x2 LCD display, interfaced with the microcontroller for the display purpose.

Another feature that is being added in this paper is along with crack detection is Object detection . An ultrasonic sensor is used to detect the object which present in front of the robot. After finding any object first the robot will generate the buzzer sound for 15sec after the delay it will again check whether the object still present or not if still the object is detected then the message of object detection will be send using GSM and GPS modules. After finding any crack or object it will send message along with location to the controller of the robot, Near by station & to the train which is coming on that track.

Fig.1. shows the block diagram of "Railway track Crack detection and object detection using GSM & GPS". The system consists of Arduino Uno, LCD Display, GPS, GSM, Ultrasonic sensor, IR sensors, buzzer, battery source and DC Motor. The Arduino Uno microcontroller, which acts as a brain of the system.

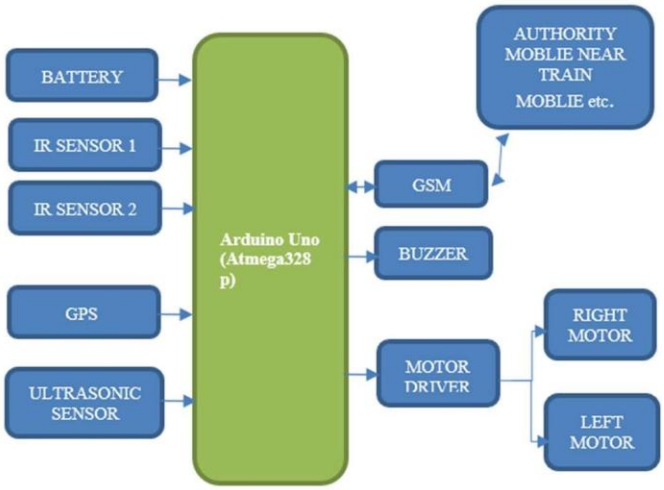

Fig. 1: Block Diagram

This microcontroller controls the circuit function. Various components are interfaced with this microcontroller. The hardware components used in this system requires regulated power supply for the operation. This power is provided by the rechargeable battery connected in the system. In this system we have interfaced two IR sensors with the microcontroller to check damage or crack present in the track of the railway line. ultrasonic sensor is used to detected the objects present on the tracks. A GPS receiver is also interfaced with the microcontrollerto determine the exact location of the crack on the railway track. Then through by using GSM microcontroller will send the message for near railway station and main authority. Two DC motors are used to move the robot in forward direction. The architecture of the proposed system also consists of a 16x2 LCD display, interfaced with the microcontroller for the display purpose, and a buzzer to generate beep sound after detecting any crack or object.

III. RESULT

Fig. 2 is the final result & Fig. 3 shows the outcome of the Robot which will be sent to the authority mobile numbers. Those messages are shown in Fig.3.

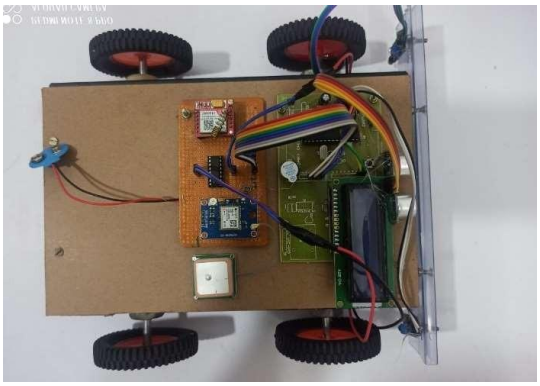

Fig. 2: Final Result

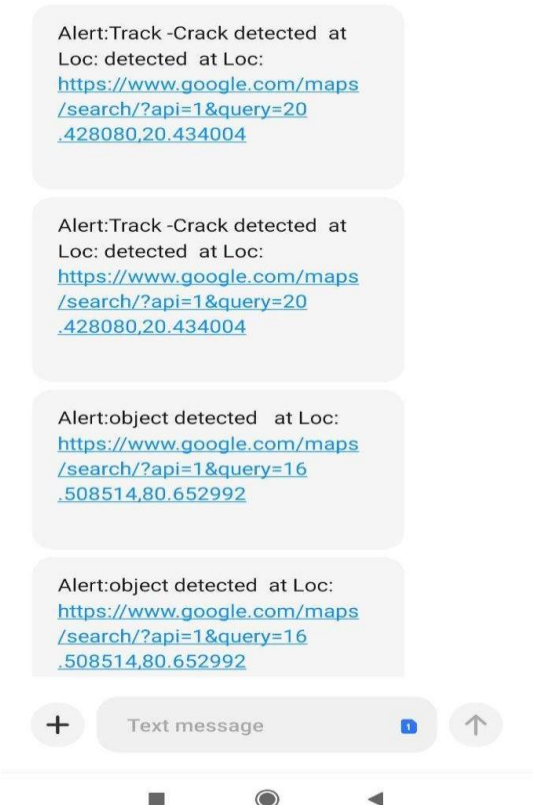

Fig. 3: Message to the authority numbers after detection of crack and object

IV. CONCLUSION

In order to improve the safety for transportation in railways this robot will help efficiently, which facilitates better safety standards of railway tracks for reducing rail accidents due to unrelieved cracks and obstacle on railway tracks. This robot is designed not only to detect cracks and objects but to work efficiently and accurately which leads to reduce the time and provides better results. this robot will help to find out the cracks and objects and the information of detection will be forwarded to the authority mobile numbers quickly By using GPS it will get the exact location of the crack or object and sends the message using GSM, and the buzzer will produce a beep sound whenever the crack or object detected. So by implementing this robotic vehicle will avoid accidents to a great extent and can save many human lives.

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