CRACK AND OBJECT DETECTION ON THE RAILWAY TRACK

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ABSTRACT

The Indian Railway is the life line of Indian people. The cress-cross tracks are almost present in every part of India. Keeping in mind the security of people also the free running railway without any problem. We have to focus in the safety part of this system. In countries like Japan and USA the safety of their people is important. The project railway crack and object detection is a forward step to improving the railway system. In this project we mainly focused on the safety. This project makes the Indian railway more reliable. The system performs two main functions. The first one is detecting the crack on the railway track by using the IR sensor and the second one is detecting the object by using ultrasonic sensor. Also, the location is send where the accidents occur by using the GPS and GSM module. The GSM will send the SMS to the mobile based application which is monitored by the authority. The authority get alert and send the man power as required according to the situation. This will increase the safety of Indian railway system.

KEYWORDS: *GSM module, GPS, microcontroller, IR sensor, ultrasonic sensor*

I.   INTRODUCTION

Indian Railways is one of the largest revenue giving assets. It is the biggest railway system of Asia. The Bruisers used railways system to carry the goods from different parts of India to different part but now in 21th century this system has a great importance for India. So keep in mind about the growth of this system. The safety of this system is must. About 12,000 trains go from one place to another place every day. So in this regard people life is important. We know that the current situation of Indian Railways regarding the safety is not pretty much good. The GSM and GPS (IR and Ultrasonic sensor) with microcontroller is used to identify the crack and objects on the rail track. In this system the IR sensor identifies the crack and Ultrasonic sensor identifies the object. The GPS pin point the location and GSM sends the message to the authorities and they alert the train driver and nearest station master about the problem. This technology is very effective and low cost and it will help to reduce the number of train accidents. Regarding life safety this is great system.

II.   WORKING

In our project, there are two set of IR sensor units fitted to the two sides of the robot. The ultrasonic sensor is mounted on the robot. The IR sensor is used to sense the track crack.

2.1 At Normal Condition:

The IR transmitter sensor is transmitting the infrared rays. These infrared rays are received by the IR receiver sensor. The Transistors are used as an amplifier section. At normal condition Transistor is OFF condition. At that time relay is OFF, so that the vehicle running continuously.

2.2 At Crack Condition:

During the crack detection the resistance of IR receiver and the transmitter is high. When track has crack the output becomes high. And when the crack is formed the reflection will be equal to zero, the robot stops automatically the GPS calculate the position of the robot and finding the latitude and longitude off the spot and by using the GSM module the message is send to the authorities.

2.3 At object detection:

The ultrasonic sensor emitted sound waves which is having the high frequencies. Then it waits for the sound to be reflected back and then calculate the distance based on the time required. When the object is found GPS gives the   location using GSM module and the robot will stop and authorities get alert.
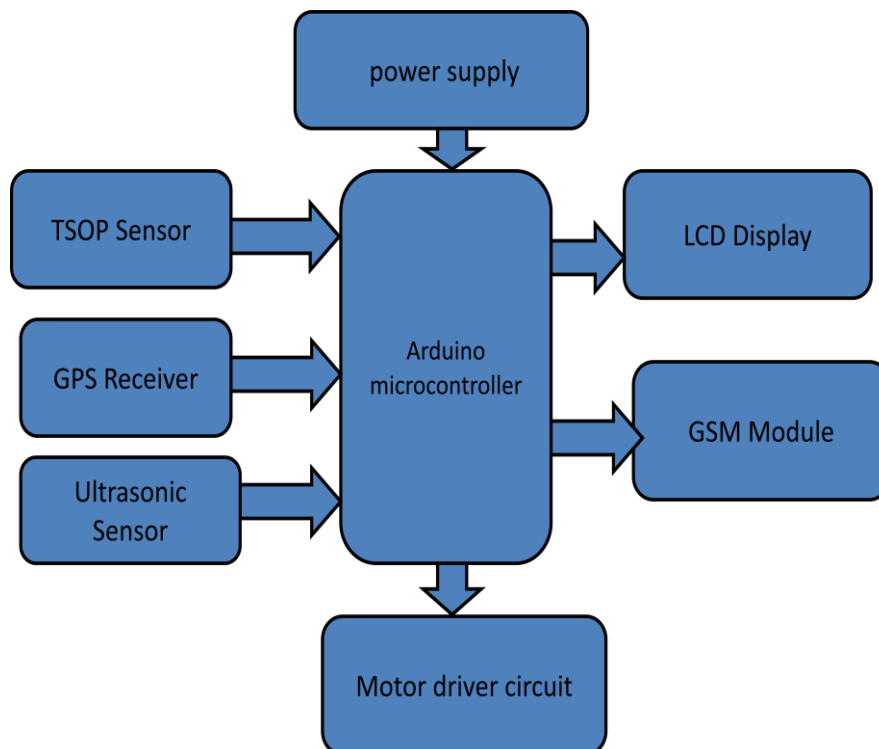
III.   PROPOSED ARCHITECTURE

Fig-1: Block Diagram of proposed architecture

Above diagram shows the block diagram of the proposed work. ''Railway crack and object detection''. In this we are using Adriano NANO microcontroller .The controller controls function. The components that are interfaced with microcontroller are TSOP IR sensor for the distance and detection of crack.

We using GPS module. It is used for current location (longitude and latitude). By the help of GSM message is sent to the authorities. The GPS give them the exact location if crack and object is found on the track. We used the dc motors for the movement of robot in forward direction. The architecture also consists of 16*2 LCD (Liquid Crystal Display) display. In this display we also see the message rather than on mobile.

IV.   FLOW CHART

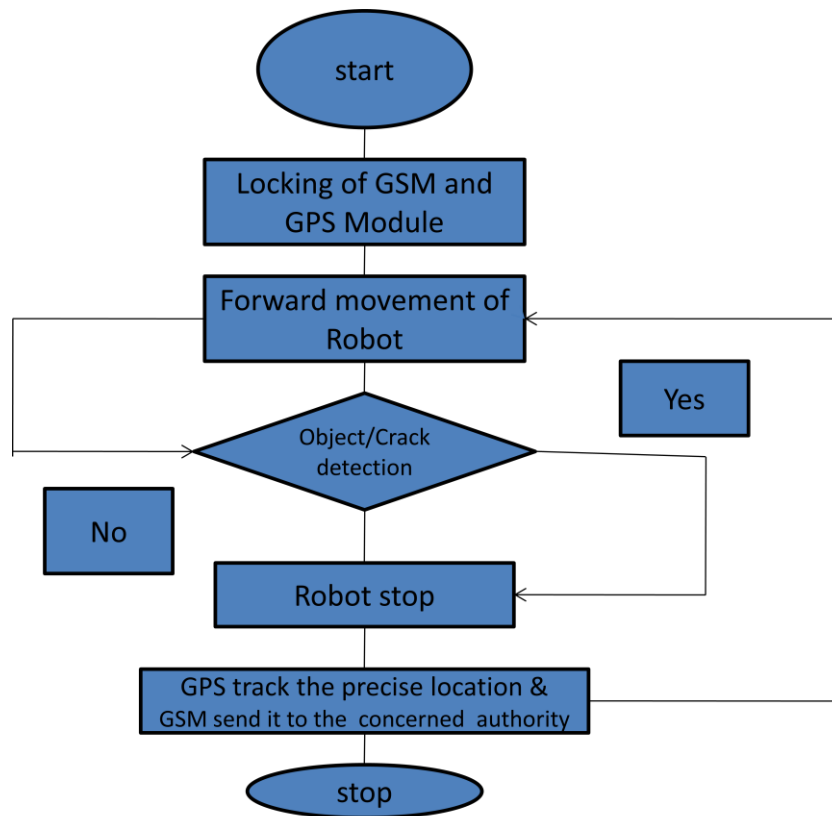Flow chart is very important parameter of every project.

Fig-2: Block Diagram of flow chart

Firstly the robot start, then the GPS and GSM module locked it. The forward movement of the robot starts. If crack and object is detected then the robot stops otherwise it starts moving. When the robot stops while finding the crack and object then GPS tracks the precise location and GSM sends message to the concerned authority.

V.   SIMULATION DIAGRAM

In this system Adriano UNO is used as a controller for controlling the sensors. We used Adriano UNO because it has more no. of pins than Adriano NANO. A battery of 12v is used for power supply.
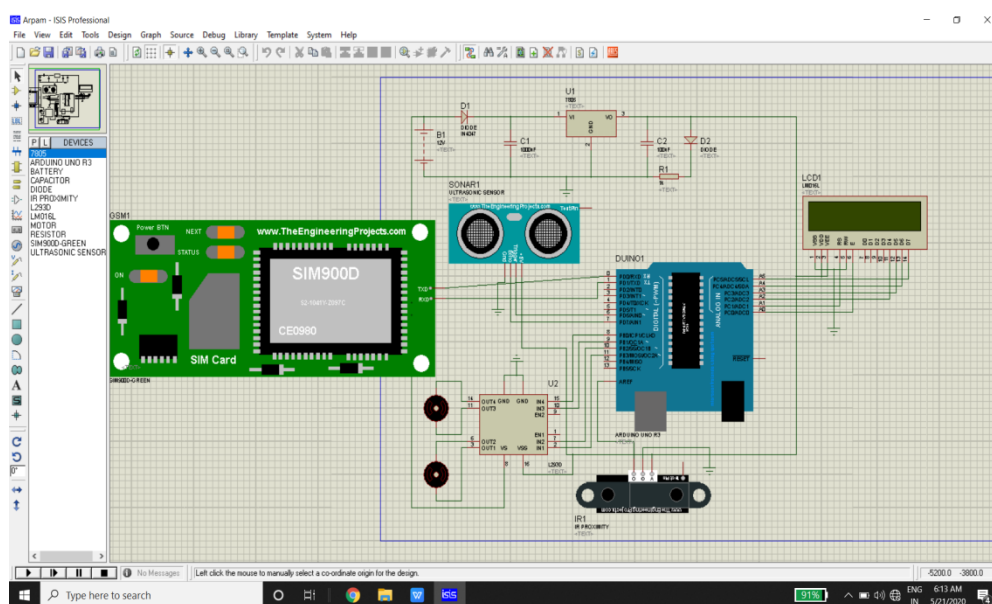

Fig-3: Simulation Diagram

Before the start of scanning of track the robot firstly collaborates itself. When it collaborates itself the robot waits for the particular time so that the GPS starts getting the coordinates.

The two TSOP sensors are used in as the receiver and the other as the transmitter. The ultrasonic sensor is also used. The hardware also used LCD (16*2) display this display gives the information of objects and crack on the track. The GSM module is also attached to the microcontroller.

VI. RESULT

- **Crack detection**- The first aim of this project is to identify the crack on the track and after identify the crack giving the exact location of crack with the help of GPS and giving the message with the help of GSM to the authorities.

- **Object detection**- Sometimes stray animal, human being and object (like-bus, car, and truck) stuck on the track. We saw many accidents in many parts of the country because of this reason. If the prior message is received to the authority then these accidents do not occurs.

VII. CONCLUSION

We have designed a cost effective low power system. The prototype of testing vehicle can efficiently detect crack and the object on the railway track. The system is capable of sending the alert message on the real time basis. It can also work in any environment condition without logging. We found that the system we are using (GSM and GPS with IR sensor) is effective and cheap technology. The accurate data helps in preventing the accidents. The main aim is to protect the people from accidents and to reduce the man power. When the prototype is industrialized it will definitely helpful for the Indian Railway. The result shows that this new technology will increase the reliability of the Indian Railway**.** This makes Indian Railway more competitive with other countries rail system.

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