Automatic Rail Track Security System

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ABSTRACT: Transport plays a vital role to carry the passengers and goods from one place to another. Among all the forms of transportation, railway is the most significant one. Now days the railway network has become highly prone to accidents.So, proper inspection is needed regarding this issue. Manuel observation of the track is quite impossible and impractical. So, we propose an automated system, which will identify collision between two trains on the same track using FSR, detection of any kind of breakage and obstacle using ultrasonic sensors. In case of any error, microcontroller will get the signal and the system will send message and location using GPS through GSM to the nearest control room

I.INTRODUCTION

Railways provide the cheapest and most convenient mode for passengers and it also plays an important role in the development and growth of industries. Railways help in supplying raw materials and other facilities to the factory sites and finished goods to the market. So ,safety and reliability should be highly considered in the case of railway. As it is playing a vital role in the growth of the economy, so the importance of having modern and improved railway system is increasing day by day. Railway maintanence is very tough to manage through any kind of manual system. So ,an automated system is an urgent need to stop all kinds of unwanted accidents of railway. Railway tracks of our country are very prone. That's why, a huge number of accidents are occurred every year due to this primitive type of rail tracks and as the consequences of those accidents we lose a huge number of lives every year. This type of incidents motivate us to think over the above mentioned issue and take necessary steps to protect those lives. Through our proposed system, we need to establish more modern and secure railway system. Besides this, there is no such type technology or system in our country to stop the collision between two trains coming from the opposite direction of each other on the same track.

Every year ,losing a huge amount of lives due to collision of two trains on the same track. There is no such system to stop the train engine immediately to avoid the collision in our country. Moreover, there is no system in the country to identify crack and obstacle. Firstly, there will be FSR sensors to sense, the train on the track and based on the data of FSR ,it will avoid collision between two trains. The system will send notification about collision. On the other hand, to detect breakage and obstacle ultrasonic sensors will be used. Our system is a modern and automated solution to inspect the railway tracks. It will reduce the sufferings of inspecting the conditions of the railway tracks manually. Our proposed system has three modules to make the inspection system modern. Our system will detect two trains on the same track to avoid collision between them. Besides these, it will detect heavy obstacle on the rail track and will detect breakage and missing rail on the tracks.

II.LITERATURE SURVEY

Firstly, we had a survey of existing technologies of automatic track security. This survey helped us to understand which technologies are suitable for our system which will make more efficient and easy to use. From all the developed or established system worked only one or two parts of the whole system. Here, we give a short review of the technologies which are already developed. Collision is one of the major issue of train accidents in every country. To make an anti-collision system, author provide a system by using DLSR (Digital Single Lens Reflex) sensor. This technology will identify the collision points and also send the distance of two train to the control room. It will monitor the system to slow down the speeds of trains. Author also used. LED and LCD panel to find if two trains are in same track or different track.

Obstacle detection is another important part of railway security system. For detecting obstacle system need to sense train arrival so author used vibration sensor. To sense the obstacle in the path of trains obstacle sensor is used and send signal to microcontroller. Author divided the rails into several blocks and all blocks consisted of laser sensors and microcontroller. The laser sensor mainly send signal to train either to stop or continue to run .Vision based method is used for automatic railroad track inspection. In this system, camera plays a vital role to capture and collect the images and videos. Author used image processing and MUSIC algorithm in this system. Image processing helped to process the frame image and MUSIC algorithm helped to detect number of signal in the presence of noise .

III.WORKING

In this system, FSR sensors will set after every 500m. Every FSR location and every train's unique identity number and phone number will set in system database. Every train has GPS which will give exact train location and save it in database. When the train starts running, the location of it will up-to-date after 500m.GSM will send a message that is online when system starts working. FSR sensor senses the force and identifies the train on track. Collision detection is one of the core objectives of this system. FSR sensors will detect collision to stop the trains. When FSR detects collision, system will search all the trains within 5km from the collided area. System will analyze which train's locations are equal to collided FSR's location from the database. After that, GSM shield will notify all the trains within 5 km from collided FSR to slow down the speed. Moreover, GSM will alert that exact two trains and control room by message. FSR will stop the particular two trains of the collided track to stop the collision and distance between them will be 1km.

Breakage and crack as well as missing rail on the railway track is a common reason for train accident. The proposed system can detect any crack and missing rail on the railway track and alert the control room with the location where breakage is detected. Ultrasonic sensors will be used to detect faults on the railway track and GSM shield will be used to convey the message with the help of a microcontroller**.** ultrasonic sensor is used to detect the crack in the railway track by measuring distance from track to sensor, if the distance is greater than the assigned value the microcontroller identifies there is a crack, also it tells the exact location of the crack by the formula " DISTANCE=SPEED*TIME ".Then system will send notification to the nearest control room.

The ultrasonic sensor is very compact and has a very high performance. The Testing train uses ultrasonic sensors with microcontroller for its movements. Ultrasonic sensor is most suitable for obstacle detection due to its high ranging capability and low cost. It is attached to the front part of the testing train. Whenever the testing vehicle is going on the desired path the ultrasonic sensor transmits the ultrasonic waves continuously from its sensor head. Whenever an obstacle comes ahead of it, the ultrasonic waves are reflected back from an object and that information is passed to the microcontroller and alert control room through gsmmodule.GPS will provide exact location**.**
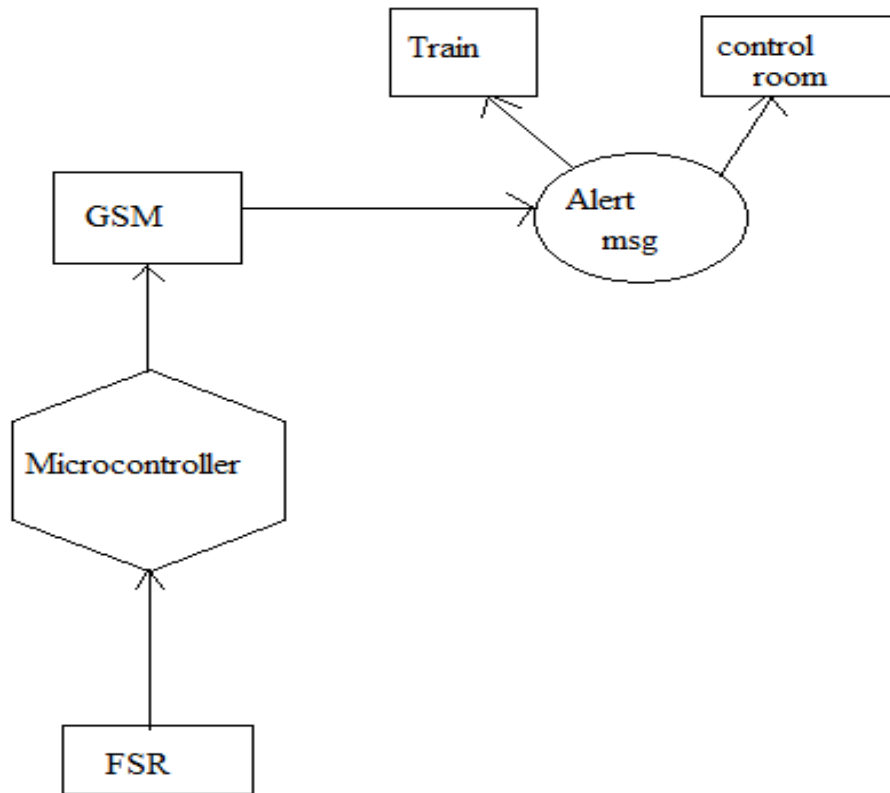
Fig 1: Block diagram of collision detection
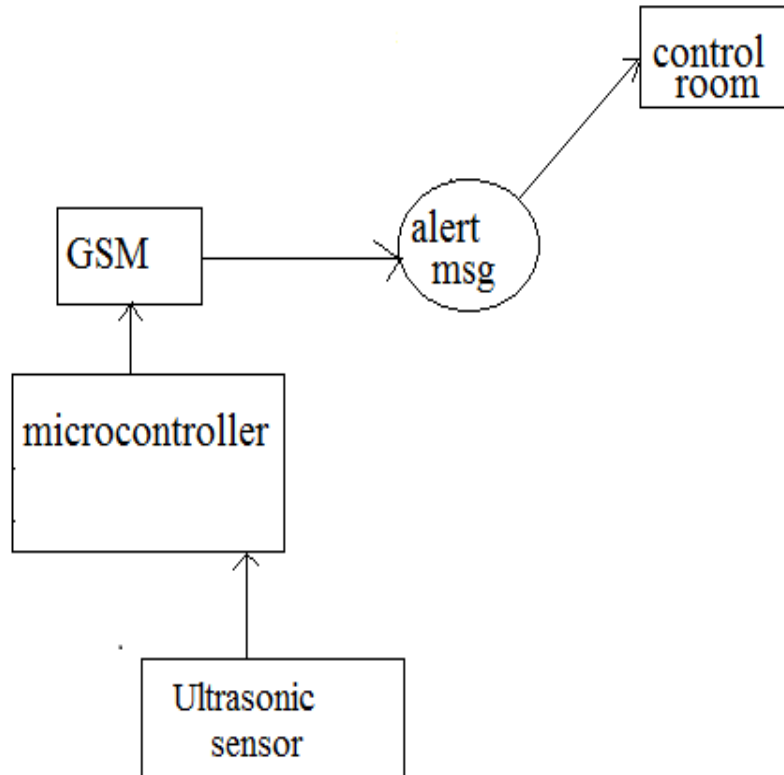
Fig 2: Block diagram of crack and obstacle detection

VI. RESULT AND DISCUSSION

Fig 3: Prototype of proposed system

Above figure is the prototype of our proposed system.This robot will find the crack on the track. Soon after the crack is detected the the location from the gps in the system send to control room using gps..GSM and GPS function effectively to notify the user.Similarly when obstacle is detected, location and alert message is send to control room.

VI.CONCLUSION

In this paper we have designed a cost effective, low-power embedded system, which facilitate better safety standards for rail tracks for preventing railway accidents due to cracks and obstacles on railway tracks. The Prototype of testing vehicle can efficiently detect cracks and obstacles on railway tracks. The result shows that this new innovative technology will increase the reliability of safety systems in railway transport. By implementing these features in real time application, we can avoid accidents up to approximately 70%.

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