Automatic Railway Track Crack Detection System Using GSM & GPS

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Abstract - *In India rail route is quite possibly the most widely recognized methods for transport, which is the fourth biggest rail route local area on the planet. Despite the fact that Indian rail routes has an extraordinary blast, it remains tormented in view of a portion of the significant issues like issue in door crossing, fire mishaps and issue in the track which remains unmonitored causing crash and derailment. The tracks contract and extend because of changes in season. Because of this crack may create on the track. This proposed framework distinguishes the breaks and the snags on the track utilizing sensors and alert the control room through an SMS utilizing GSM and GPS module.*

***Key Words*: Arduino, Ultrasonic sensor, GSM module, GPS module, DC motor, motor driver**

1. INTRODUCTION

In today's world, transport, being one of the biggest drainers of energy, its sustainability and safety are issues of importance. This is the fourth largest railway network in the world. The Rail transport is growing at a rapid pace in India. It is one of the major modes of transport but still our facilities are not that accurate, safer as compared to international standards. Improper maintenance and the currently irregular and manual track line monitoring mistake from workers also a problem in railway. The major problem is that there is no efficient and cost-effective technology to detect problems in the rail tracks and the lack of proper maintenance. Hence, it is not safer for Human Life. This is need to be at the utmost attention. These goes unnoticed and the properly maintenance of tracks is not done. In previously existing system, the work is to be done manually, but the proposed system has a vehicle which will run on the tracks. This model says about a proposed proto type of testing train for detecting obstacles and crack. This system has GSM and GPS module which will give the real time location or coordinates in the form of Short Message Service (SMS) to the nearest railway station. With this proposed system the exact location of the faulty rail track can be easily located, so that many lives can be saved. Proposed system is small and is efficient to use.

2. OBJECTIVE

The rule objective is to identify the breaks on the rail line track and to recognize the snags passage on the track to maintain a strategic distance from train mishaps and crash. This model proposes a reasonable response for the issue of railroad track break acknowledgment utilizing ultrasonic sensor gathering which tracks the specific area of flawed track. The GSM module will advise to close control room through SMS and sign arrangement of rail route will be stop consequently.

3. EXISTING SYSTEM

The current framework rail route tracks are studied physically. LED (Light Emitting Diode) LDR (Light Dependent Resister) sensors can't use on the chunk of the tracks. Visual investigation is the most seasoned strategies wherein the parts are filtered outwardly. In India this technique is utilized broadly in spite of the fact that it produces least fortunate outcome. Picture handling input pictures are boisterous framework and it's not getting exact yield. This examination doesn't give the ideal yield under the awful climate condition. The current framework is delay in passing the data. The current framework utilizes telephonic correspondence which isn't so quick and exact.

4. PROPOSED SYSTEM

The proposed framework defeats the limits of the current framework that are utilized for the recognition of flawed tracks. In proposed framework our venture is utilized to distinguish the break in the tracks by methods for sensor and Arduino microcontroller, estimating distance for two rail street. In this task we utilize ultrasonic sensor to recognize the break. It uses to quantify the distance between the two tracks. In the event that any break are happened in the track implies longitude and scope directions of the spot are to be shipped off the closest station or control room and ultrasonic sensor estimated the distance between the two track if there is any little change found the message which contains directions of that specific spot will be shipped off the closest station or control stay with the assistance of GPS and GSM module. This venture is to be made to change the arrangement of break identification in railroads.

5. LITERATURE SURVEY

Indian railroads is one of busiest organization in the world covering track organization of 1, 27,000 sq.km. Right around 2/3 of the population utilize the rail route network in India. Practically 60% of the mishaps are happening at rail route track crossing and because of break in railroad tracks bringing about loss of valuable life furthermore, loss of economy. So in current situation this issue has enormous potential in having an ideal answer for this issue. Presently I need to put some light on existing frameworks that railroads

to counter this issue. Along these lines, essentially we have the manual studying and support of tracks done by individual and other is frameworks that they use like SPURT Car and USFD manual machine that are utilized in identifying and observing of breaks. Fundamentally in the both the techniques, reviewing and location of breaks is been done however the constraint is fundamentally support individuals are needed for both techniques to screen the break in the track. Likewise this technique is restricted for specific courses and not all courses also, divisions of rail lines can be covered .We have deduced the thoughts in planning railroad break discovery framework utilizing. Arduino UNO R3 and sensors to identify the breaks and area of breaks been given by GPS module and caution through messages through GSM module. We are submitted in building such framework which will give an ideal answer for the break identification issue and furthermore reach in accomplishing higher exactness and accuracy than existing frameworks. Likewise our venture points in giving wellbeing confirmation to railroads, though the current frameworks slack it totally.

6. BLOCK DIAGRAM

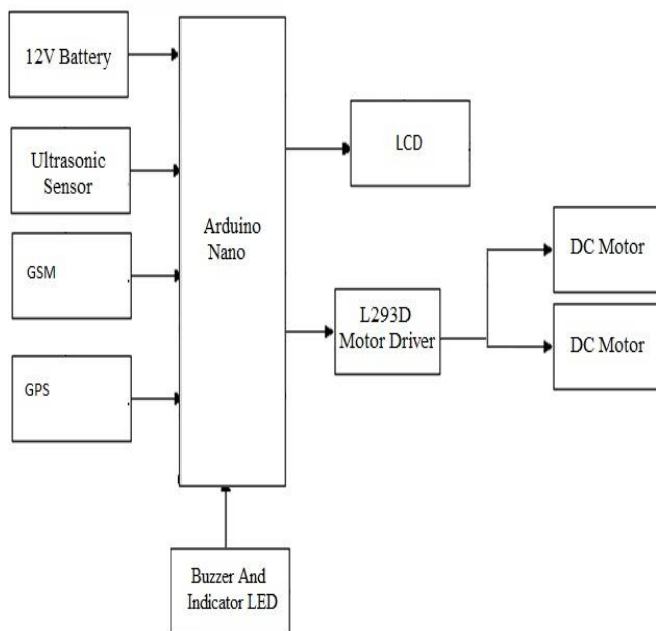The fig 1 shows the block diagram of the proposed system.
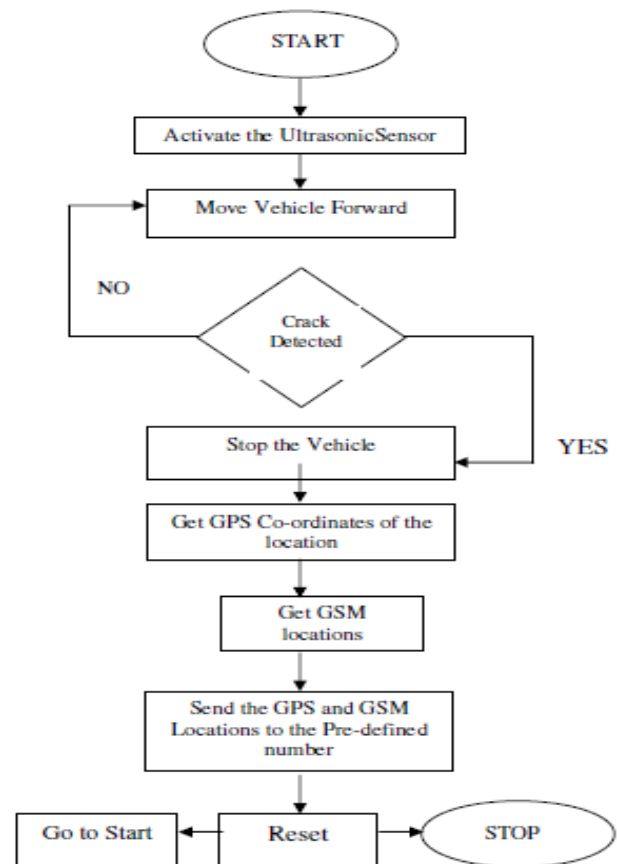

Fig -1: Block Diagram

Fig -2: Program Algorithm

The program algorithm shown in Figure 3 is explained as follow:

a) Initially the motor starts.
b) It will initiate the Ultrasonic sensor.
c) The motor will move the vehicle ahead.
d) The ultrasonic sensor will scan the tracks persistently.
e) When the crack is recognized.
f) It will stop the vehicle.
g) Then the GPS will get the co-ordinates of the area.
h) Further the GSM will communicate something specific as "Obstacle Present' to the registered number.
i) When both the messages are send.
j) The program will go again on the underlying stage also. The motor will turn over once more.
k) It will again scan the track.

7. ARDUINO NANO R3

The Arduino Nano is a little, complete, and breadboard-accommodating board dependent on the ATmega328P delivered in 2008. It offers similar network and specs of the Arduino Uno board in a more modest structure factor. The Arduino Nano is outfitted with 30 male I/O headers, in a plunge 30 like arrangement, which can be modified utilizing the Arduino Software incorporated improvement climate

(IDE), which is basic to all Arduino sheets and running both on the web and offline.
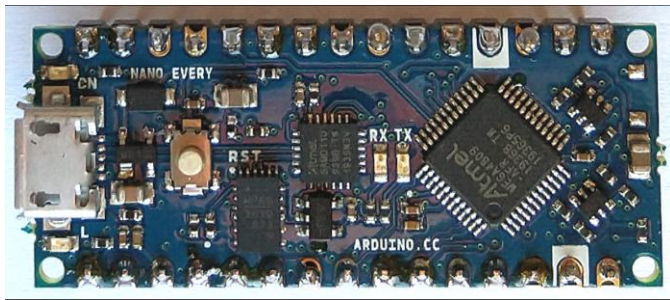

Fig2- Arduino Nano R3

8. L293D MOTOR DRIVER

L293D is a normal Motor driver or Motor Driver IC which permits DC engine to drive on one or the other course. L293D is a 16-pin IC which can handle a bunch of two DC engines all the while toward any path. It implies that you can handle two DC engine with a solitary L293D IC.
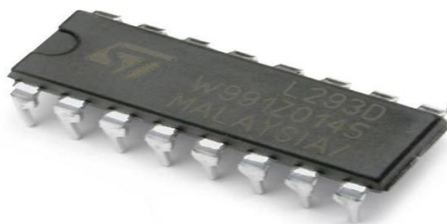

Fig3-Motor Driver IC

9. ULTRASONIC SENSOR

A ultrasonic sensor is an electronic gadget that actions the distance of an objective article by transmitting ultrasonic sound waves, and converts the reflected sound into an electrical sign. Ultrasonic waves travel quicker than the speed of discernible sound (for example the sound that people can hear). Ultrasonic sensors have two primary segments: the transmitter (which discharges the sound utilizing piezoelectric precious stones) and the beneficiary (which experiences the sound after it has headed out to and from the objective).

Ultrasonic sensors are utilized principally as nearness sensors. They can be found in vehicle self-leaving innovation and against crash security frameworks. Ultrasonic sensors are additionally utilized in automated obstruction discovery frameworks, just as assembling innovation. In contrast with infrared (IR) sensors in vicinity detecting applications, ultrasonic sensors are not as vulnerable to impedance of smoke, gas, and other airborne particles (however the actual segments are as yet influenced by factors like warmth).
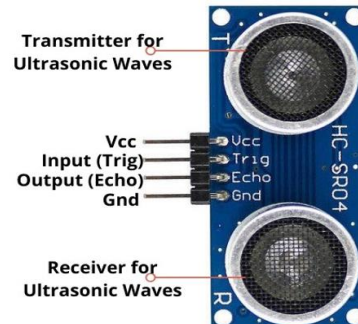

Fig-4 ultrasonic sensor

10. GSM MODULE (900A)

This is a ultra-reduced and dependable remote module. The SIM900A is a finished Dual-band GSM/GPRS arrangement in a SMT module which can be implanted in the client applications permitting you to profit by little measurements .Featuring an industry-standard interface, the SIM900A conveys GSM/GPRS 900/1800MHz execution for voice, SMS, Data, and Fax in a little structure factor and with low force utilization.

Fig-4 GSM Module (900A)

11. GPS MODULE

The NEO-6MV2 is a GPS (Global Positioning System) module and is utilized for route. The module just checks its area on earth and gives yield information which is longitude and scope of its position.It is from a group of independent GPS beneficiaries highlighting the elite u-blox 6 situating motor. These adaptable and savvy recipients offer various network alternatives in a little (16 x 12.2 x 2.4 mm) bundle. The smaller engineering, force and memory choices make NEO-6 modules ideal for battery worked cell phones with extremely severe expense and space requirements. Its Innovative plan

gives NEO-6MV2 amazing route execution even in the most difficult conditions.
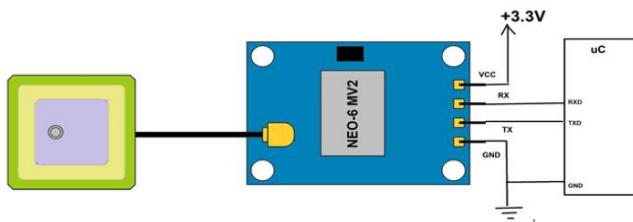

Fig-6 GPS module (NEO6MV2)

12. LCD Display

The term LCD represents Liquid Crystal Display. It is one sort of electronic showcase module utilized in a broad scope of utilizations like different circuits and gadgets like cell phones, adding machines, PCs, TV sets, and so forth these presentations are primarily liked for multi-section light-radiating diodes and seven fragments. The principle advantages of utilizing this module are modest; basically programmable, movements, and there are no impediments for showing custom characters, exceptional.
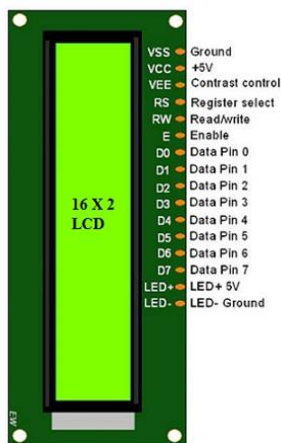

Fig-6 16X2 LCD Display

13. RESULT

Here the proposed module comprises of equipment that was clarified above in framework plan equipment depiction.
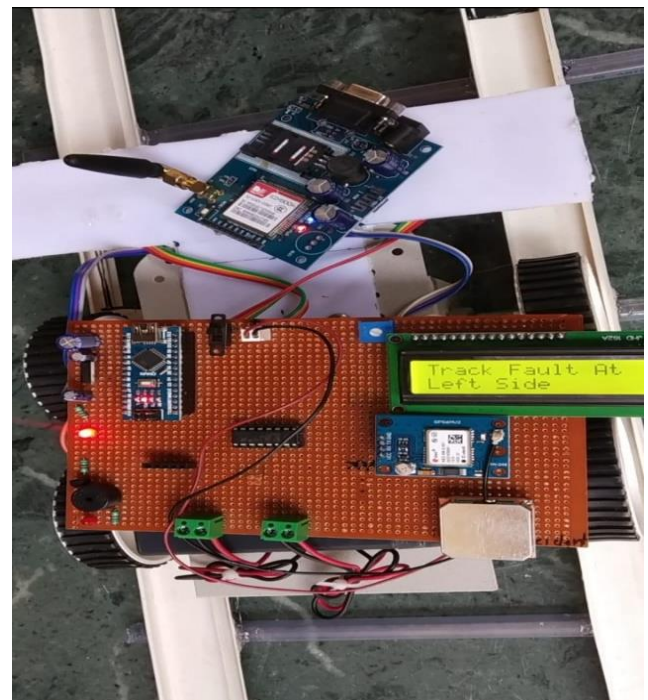

Fig -7: Hardware module

The below figure shows the SMS got on the cell phone alongside the latitudinal and longitudinal situation in the spot a crack or obstacle is detected.
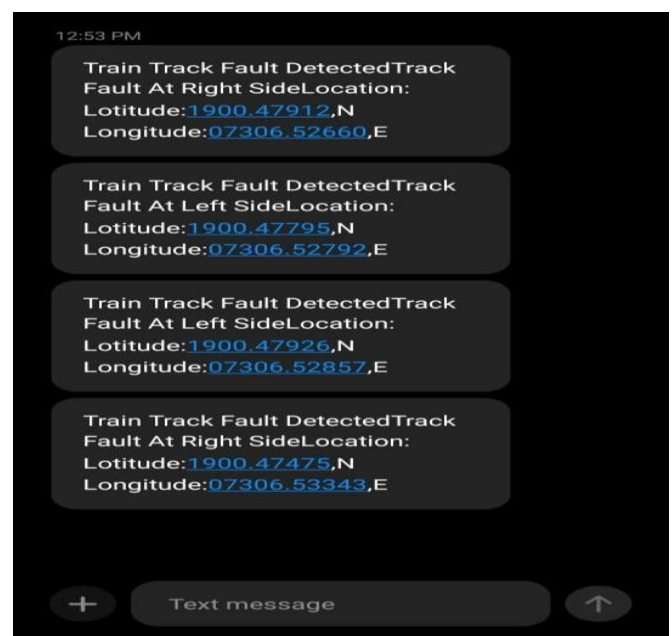

Fig -8: SMS with location

14. CONCLUSION

As we came to know that existing systems are time-consuming as well as uneconomical. The proposed system

overcomes these issues as well as improves accuracy and crack identification in rails. It is the most efficient solution provided in order to achieve good results of rail routes of our country to limit the details of mishaps caused. In this way to save precious lives of passengers and loss of economy. It additionally saves time and money for the identification of crack.

15. REFERENCES

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