Railway Tack Monitoring and Accident Avoidance

[1]Rahul Gharat, [2]Satyam Mundada, [3]Rahul Vishwakarma, [4]Rajeshri Aneesh
[1]Student, [2]Student, [3]Student, [4]Assistant Professor
[1]Department of Computer Engineering,
[1]Pillai HOC College of Engineering and Technology, Rasayani

Abstract: The expanded development in the railroad area has brought about an expansion in the train activity thickness over the world. This has brought about the expansion in the quantity of mischances including trains. In this paper, the proposed framework incorporates a few elements which forestall train mishaps. It incorporates flame recognition, water level identification, Railway track split discovery, this framework makes utilization of IR sensors, fire sensors, GSM and other inserted frameworks Rail mischances have been expanded because of the surge streaming over the Railway tracks. We are proposing a surge identification framework to overcome such mischances. Here, at whatever point we distinguish that there is a flood over tracks, we will send a sign to the train through GSM which will stop the train furthermore send messages to higher powers of south focal railroad.

Key Words **– ARM7 Microcontroller, Display, GSM Module, Sensors.**

I. INTRODUCTION

In India railway network is the main source of transportation and therefore as any problem occurred during transportation the major damage id getting occurred to the economy-non with standing a social life. At present railways are using manual methods of crack detection through human inspectors. Taking all this to account it will be necessary to develop an automatic obstacle system which is also used to find the detection of breakage in the railway track. The Transportation of train always depends on railway tracks only. If there is a crack in these rails, it creates a major problem. Most of the accidents in the train are caused due to cracks in the railway tracks, which cannot be easily identified. Also it takes more time to rectify this problem. The most of the commercial transport is being carried out by the railway network and therefore any problems in the same has the capacity to induce major damage to the economy-non with standing the societal impact of loss of life or limb. The project presents a cost effective yet robust solution to the problem of railway crack detection utilizing a method that is unique in the sense that while it is simple, the idea is completely cost effective. The project the proposed discusses the technical and design aspects in details and also provides the proposed robust crack detection algorithm. The project also presents the details of the implementation results of utilizing simple components inclusive of IR LED-PHOTODIODE based crack detector assembly. First train accident occurred due to natural crises & human negligence. Second accident occurred due to human error. To overcome all these limitation, we develop new system such as "Railway Track Monitoring and Accident Avoidance". In the year 2016 India Railway budget announced two safety measures, first is Train Collision Avoidance System(TCAS) on High Density Network and the second is Elimination of Unmanned Level Crossing in a phased manner. By using Automated Screening System(ASS) we can avoid train accidents. It gives information about tracks 24*7 through online information systems.

II. LITERATURE SURVEY

In Noninvasive rail track detection system using Microwave sensor [1], In this paper, we learned as fuel costs continue to rise, efficient public transport, especially rail will play increasingly important role in the UK and worldwide. For the safe operation of the rail system, it is necessary that the condition of the rails can be monitored on a continual basis. In this research a new crack detection method has been investigated which utilizes microwave sensors to inspect the rail surface.

In the Manual Inspection and detecting a crack on these railways [2], Railways provide the cheapest and most convenient mode of passenger's transport both for long distance and suburban traffic. Also, most of the transport in India is being carried out by railway network. Still, accidents are the major concern in terms of railway track crossing and unidentified crack in rail tracks in Indian Railways. This project discusses a Railway track crack detection using image processing and is dynamic approach which combines the use of GPS tracking systems and WIFI module to send message and the geographical coordinates of location.

As per Fast crack detection method for large-size concrete surface images using percolation-based image processing [3], The detection of cracks on concrete surface is the most important step during the inspection of concrete structures. Conventional crack detection methods are performed by experienced human inspectors who sketch crack patterns manually; however, such detection methods are expensive and subjective. Therefore, automated crack detection techniques that utilizes image processing have been proposed.

In Review Paper on Rail Track Flaw Detection using Matlab [4], The purpose of this is to provide readers with in-depth presentation of the rail track flaw detection using matlab. This is achieved through a step by step process starting from the basic rail track inspection in railway maintenance. This self-contained volume will be valuable to all engineers, scientist and practioners interested in the analysis and processing. The system provides real-time monitoring and structural conditional for railway track using vision based method and calibration to search the fault location on the track.

In Design and Prototype of Efficient Railway Track Management [5], Study of crack and the obstacle detection are calculated based on the information available from the UV sensor and IR sensor respectively. Based on the information provided by robot section to control station vis ZigBee module, the control section controls the signal light and the barricade at the railway crossing. The implementation results of the RRCDS utilizing simple components inclusive of a GPS module, GSM modem and LED-LDR based crack detector assembly.

III. EXISTING SYSTEM

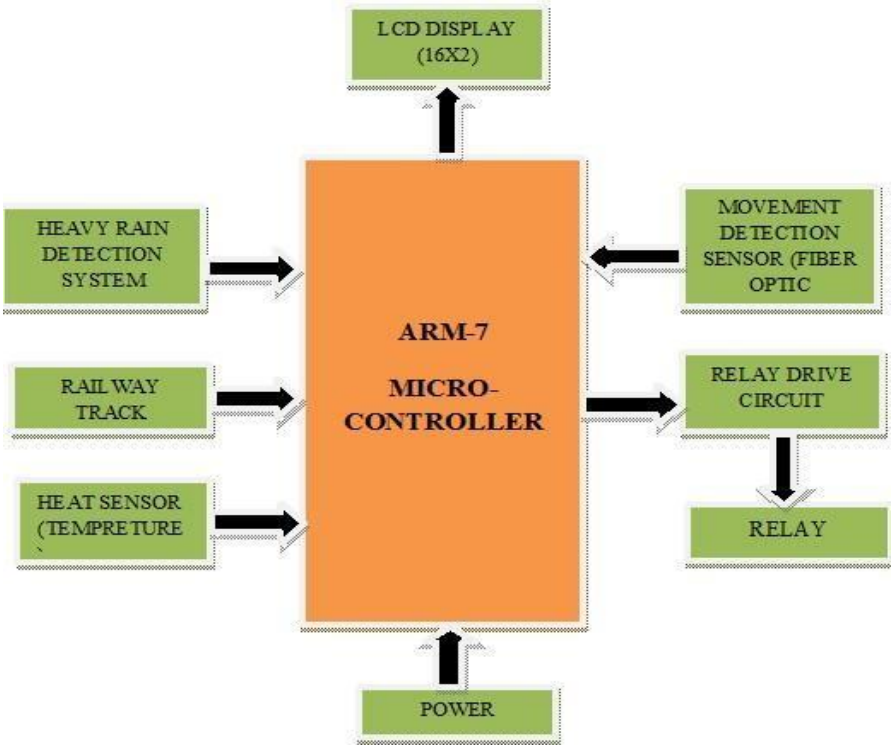
The existing conventional signaling system most of the times relay in the oral communication through telephonic and telegraphic conversation as input for the decision making in track allocation for trains. There is large scope for miscommunication of the information or communication gap due to the higher human interference in the system. This miscommunication may lead to wrong allocation of the track for trains, which ultimately leads to the train collision. The statistic sin the developing countries showing that 80% of worst collisions occurred so far is due to either human error or incorrect decision making through miscommunication in signaling and its implementation. IR sensors are used to identify the cracks in the railway. IR sensors have limitations due to identify the crack in the railway.

- Pushing Trolley
- Rail cycle with 2 or 3 wheels
- Oral communication through telephonic and telegraphic conversations.

At present laser proximity detector is used for collision avoidance, IR sensors identifies the cracks in the railway track an d inform using GPRS GSM module. Surveying manually, Infrared sensors are not suitable for external disturbance. It can be operated in tunnels but with interruption. IR sensors are also used to identify the cracks in the railway. IR sensors have limitation due to geographic nature of the tracks. The Anti-collision device system also is found to be ineffective as it is not considering any active inputs from existing Railway signaling system, and also lacks two ways communication capability between the trains and the control centers or stations. Later geographical sensors have also been used which makes use of satellites for communication. But the system is costly and complicates to implement.

At present laser proximity detector is used for collision avoidance. IR sensor identifies the cracks in the railway track and gate control is done by manual switch controlled gate. But there is no combined solution for collision between trains, train derailment in curves and bends and the automatic control of railway gate.

HOW it works?



IV. PROPOSED SYSTEM

The purpose of this project is to reduce the physical interface of the working railway department with greater reliability, efficiency, better adaptability, security and cost effectiveness. The entire system works with the sole purpose of providing convenience by continuously monitoring every activity on the track and thereby providing real time details and updates to the control station. The project has been successfully monitoring the activities which include conditions likes crack detection, obstacle detection and railway crossing management. However, this project has been in the initial stages but can be optimized in near future with enhanced features and better quality communications between the robot and the control station, which reduces their intimidation and responsibilities to the major extent. In previous time human effort where used to see the crack on the railway track and they have to fix it but now no human effort is used to fic this problem the sensor will take the picture of the crack and through GSM it will send the picture and location of the crack where it has to fix the problem.
In this proposed system we are going to implement or go through three cases:

Case1:
As in case 1, if there is some derailment between tracks than immediately the message will be send to the nearby control room and the concern area track engineer. After monitoring, the current status will be updated to the database.

Case2:
As in case 2, to avoid level crossing accidents, we use siren horn to stop people not to cross rail tracks when train is in running mode. This siren horn is having connection with ASS. Before 2 min ASS will send a message to level crossing siren horn.

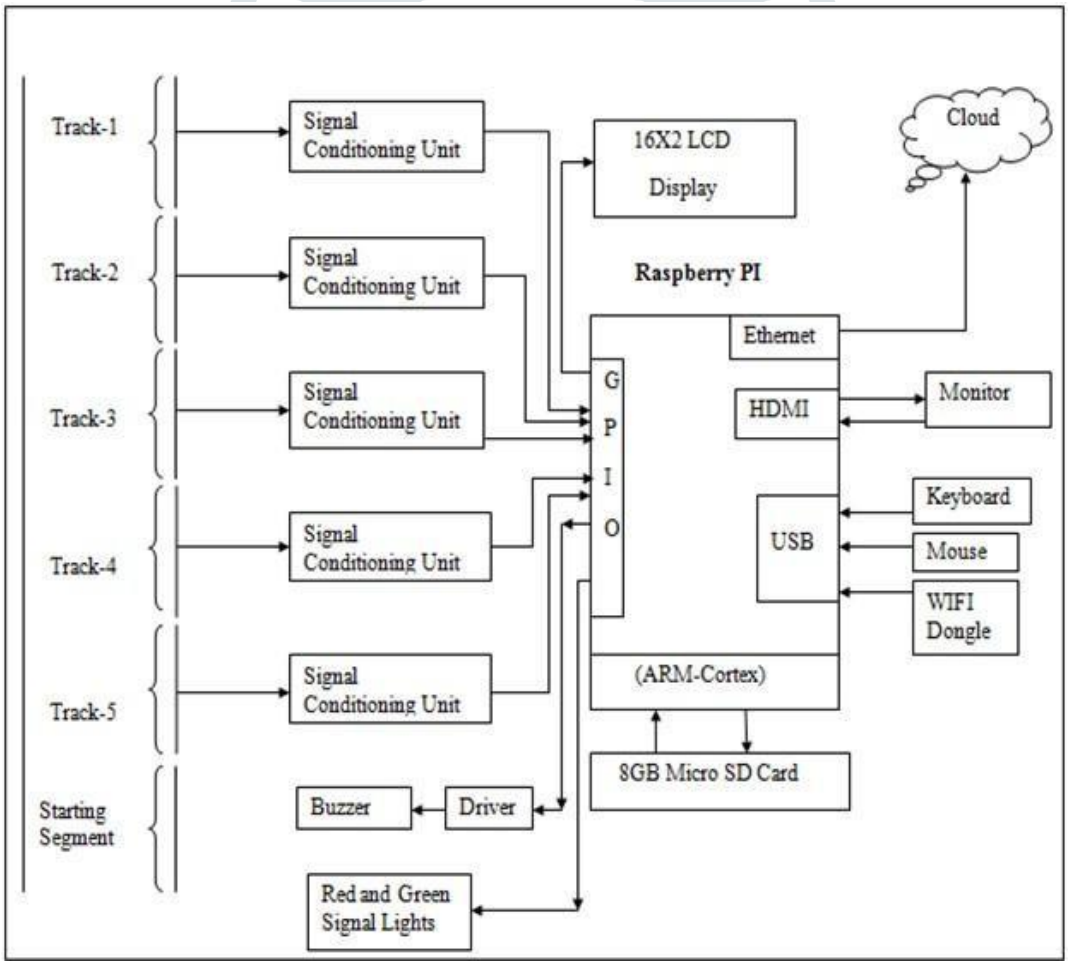


Fig. System Module

Case3:
As in case3, we are going to use water moisture sensor to detect the water level in case of the rainy season and we will alert the motor man about the water level using the buzzer. Heavy rain fall detection sensor is basically used at the station. The SMS is send to the station control room and railway driver when rain fall is exciding or over the safety level which is predefined. The rail fall is detected by the device named level sensor or heavy rain fall detection sensor.

- **Disadvantage of Existing System:**
  - Existing systems are not able to predict the cracks properly on the railway track.
  - Existing system are not able to manage when the cracks are small or the speed at which the train can pass safely on the crack.

- **Advantages of Proposed system:**
  - Establish management structure based on performance evaluation and monitoring process.
  - Enhance the percentage of efficiency.
  - Facility to send alerts/warning to particular train drivers on possible collisions, derailment through the system.

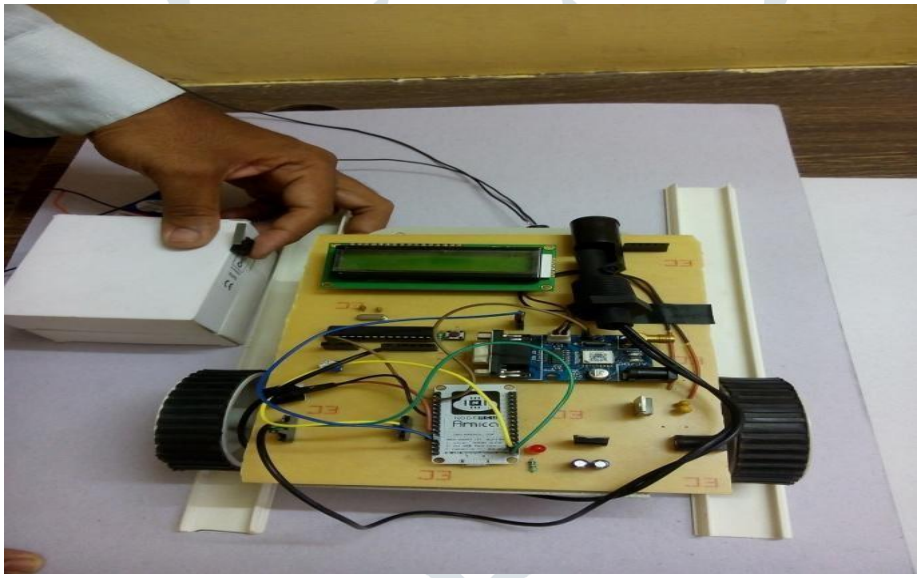


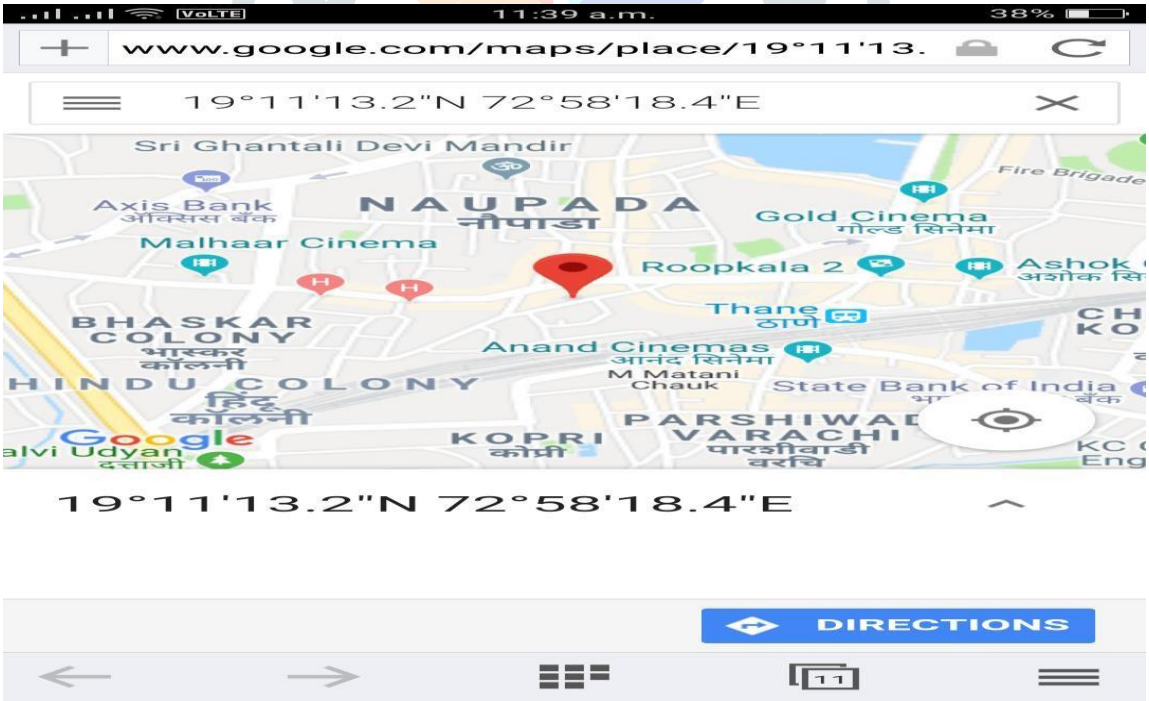
Fig. Model of Railway Monitoring

Railway Monitoring

Sr No.	Latitude	Longitude	Train id	Date-Time	Location
1	19.186998	72.97178	14632	2018-03-31 12:54:07	View Location
2	19.186927	72.971778	14632	2018-03-31 12:54:19	View Location
3	19.186927	72.971778	14632	2018-03-31 12:54:34	View Location
4	19.186927	72.971778	14632	2018-03-31 12:55:23	View Location
5	19.186927	72.971778	14632	2018-03-31 12:55:38	View Location
6	18.893658	73.175935	14632	2018-04-03 05:08:10	View Location
7	18.893778	73.176118	14632	2018-04-03 05:08:21	View Location
8	18.893693	73.175995	14632	2018-04-03 05:08:32	View Location
9	18.893653	73.175965	14632	2018-04-03 05:09:11	View Location
10	18.893653	73.175965	14632	2018-04-03 05:09:39	View Location

Fig 2 Online website

After all the readings are sent to the website it shows all the details location, train id, latitude, longitude, date and time



This fig shows location details on the map

V. CONCLUSION

The most important advantage of this proposed project is it gives information about the breakage of line to the loco pilot it also provides information in the control room of railway. As we know that there is a large number accident occur during winter season due to the fog so this project is help to prevent any denial in the railway. Cracks in rails have been identified to be the main cause of derailments in the past. Hence, owing to the crucial solution of this problem, we have worked on implementing an efficient and cost effective solution suitable for this application. There system automatically detects the faulty rail track without any human intervention. There are many advantages with proposed system when compared with the traditional detection techniques. The advantages include less cost, low power consumption and less analysis time. By this proposed system, the exact location of the faulty rail track can easily be located which will have mended immediately so that many lives can be saved. B y using LED-Photodiode assembly for railway track crack detection system we got accuracy up to 80%. But, the derailment could be controlled by detecting not presences of next compartment. Then an alert is given to driver and automatic emergency brake control is applied. If this system is brought in railways, the accidents could be controlled and the place of damage could be sent automatically to control room and since its completely automated system this can be used in village areas by which man power is reduced and time is saved.

VI. FUTURE SCOPE

Additionally, movements of the trains and their speeds can be stored on an SD card in real-time for future analysis, just like the Black-box of an aircraft. Finally, the system can be linked to the train brake system to halt the train should there be risk of collection in a pre-defined future time or distance. In future this prototype can be taken into production level. To going further, most of the modules can be embedded along with the microcontroller in a single board and their by reduce the size of system. For future we can use camera on board of the robot section to detect specially what's on the track, so by this the railway department can know status of the track.

VII. REFERANCES

[1] B.K. Konstantinos Domdouzis and C. Anuba, "An experimental study of the effects of different medium on the performance of advance system", Vol. 21. Advanced Engineering Informatics,2011
[2] Prof. Sachin D Anap, Mr. Prasanna.L. Ronge, Mr. Lalit P.Bhalerao, Dharme Sandip Railway Track Monitoring and Accident Avoidance Using Smart Sensor Network International Journal of Advanced Research in Computer and Communication engineering Vol. 5, Issue 4,April 2016
[3] K.M.R. Sudeep Dogra, "Radio Frequency Identification(RFID) applications: A brief introduction, advanced engineering informatics". The IUP journal of Electrical and Electronics Engineering, 2011.
[4] J. Trehag, P.Handel, M.Ogren, - Onboard estimation and classification of a railroad curvature || IEEE Trans. Instrum. Means., vol. 59, no.3.pp. 653-660, Mar. 2010
[5] Pranav Lad, Mansi Pawar "Evolution of Railway Track Crack Detection System" IJACT volume 2, March-2015