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Automatic Railway track Inspection for early warning using Real time image Processing with GPS

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***Abstract*—** Railroad assessment assumes an indispensable part for the correct working of the rail line frameworks; in the past its done manual investigation yet has a few ambiguities. Modified vision based audit systems are engaged to look at the stipulation of rail track. Thusly system fabricates the capability of audit, reduces the required time and giving a more exact and ceaseless information of the railroad track. To give the continuous screens and assistant condition for railroad track using "vision based" and "vibration based" strategy for wellbeing reason. Thusly we can bolster exactness, adequacy and steadfastness. PC vision frameworks have been especially made to be used with the model. The structure delineated in this suggestion makes use of different standard and balanced picture get ready systems, not simply to facilitate the necessities for manual examinations, furthermore to allow steady checking and taking after of any blemishes or varieties from the standard in a rail track. Hereafter to keep up a vital separation from deferments, our propose structure will thusly survey the railroad track by using vision based and vibration based technique. The system gives continuous watching and essential condition for railroad track using vision based procedure and change in accordance with look for the inadequacy range on the track. An examination join perceiving disfigurements on tracks, missing shocks, stay, tie plate and fastens et cetera.

Keywords- *Railroad Inspection, Vision based and Vibration Based Method, GPS, Data Acquisition.*

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I. INTRODUCTION

For rail group show all around the globe have noteworthy issues with respect to identification and keeping up of rail deformities. The deformities, for example, weld issues, squats, head checks, interior imperfections, and so forth are the significant issues [3]. Normal review of rail tracks is required for safe operation. All assessments are required to be done under Federal Railroad Administration (FRA) regulations. Machine vision innovation in paper [1] has been utilized for exploring the attainability of the machine. In Indian Railways investigation of rail tracks is a noteworthy errand to recognize surrenders or splits present in the tracks with the goal that it can be changed in advance. This will lessen the quantity of mischance's happening because of this issue. A prepared human administrator is required for the same. For assessing the tracks another methodology i.e. Programmed Railway Track Inspection for Early Warning Using Real Time Image Processing with GPS has been executed. Constant observing is done utilizing this technique. Along these lines productivity of the framework increments furthermore decreases the ideal opportunity for assessment. Recordings of railroad tracks are caught utilizing cameras and upgrade is done utilizing picture preparing as a part of Vision based technique. But in Vibration based method calibration of the railway track is done. For this vibration sensors are used. Track is defected only if the track vibration is outside the predefined standard values [1, 2]. The damaged area or component is broadcast through wireless media to the base station. The proposed methodology tracks the railway tracks for any cracks. Real time image processing is done using GPS. GPS is used for giving the exact location of the crack present anywhere in the track. Image is sent using 2.4GHz band RF Communication. One image is sent and is processed

II. LITERATURE REVIEW

We initially composed a review of existing innovations of programmed visual assessment of railroad track and track segments. There are a few routines which in view of investigation innovation are as take after:
One such strategy is assessment of railroad track review with the assistance of vision based Automatic railroad track investigation with the assistance of vision based system. Vision based framework there are a few cameras for gathering the pictures or recordings of rail track and process the edge picture by utilizing picture handling [4]. In such way it could improve the productivity of the conventional techniques. The System challenges the following addressed: detection, fragmentation, and deformity evaluation of track components that's physically appearance change crosswise over number of tracks and the recognizable proof and investigation of track ranges, for example, track turnouts. A MUSIC (various sign arrangement) calculation is utilized to distinguish number of sign in the vicinity of clamor. Another strategy is to educate the train if there should be an occurrence of any disengagement in the track or change in

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quality of the dirt. The vibrations on the track are detected by these sensors and this strategy can handle the information from the sensor arrange and illuminate the train giving adequate time to stop [7]. Security in railroads is one of the significant issues for open transportation association and a quick and productive assessment framework is indispensable to guarantee the wellbeing of railroads. Creators had attempted to give viable arrangement on the issue. Give us a chance to talk about issue and arrangement. Past, rail assessment systems incorporate damaging strategies, for example, coring, and non-dangerous procedures, for example, mallet sounding. In any case, these techniques simply "cover restricted space and have constrained viability in distinguishing the issues. Further non-damaging assessment methods for rail track examination had created. These advances incorporate visual review, ground entering radar (GPR), infrared, X-beam and laser light.

III. OBJECTIVE OF OUR WORK

The automated inspection of Railway track is done with a motive to remove the manual inspection effort, it is so because it's not worthy and it also consumes human effort in high scale. The inspection may leave some considerable part, so automation is done through the machines but there are also some major drawbacks in the system. So objective of our work is to develop a system which automatically captures the video of the system and sends it to the server where it is controlled specifically through the MATLAB coding where image is taken of the required section if it is found faulty.

IV. PROPOSED WORK

Our experimental setup is hardware based developed which can't be categorized easily because it contains of several parts but if we go through the basic parts then Figure 3.1 demonstrate it, the system mainly contains a camera, wheels and PCB board. Function of the complete system will be discussed later.

This hardware module is categorized in the following different sections:-

- In the first section, Tracking of railway track is done as shown in the figure with the help of the hardware system.
- Then in the second step Image is captured by the camera which is attached at the top and is tilt at an angle of 45 degree on the track.
- The camera used to capture the image of the cracked or damaged track.
- Send image of the defect through RF communication and details of the location through GPS.
- Image is sent to server and it is being processed by the server and faults are analyzed and suitable action is done.
- Then in the final step, manual correction action is being taken

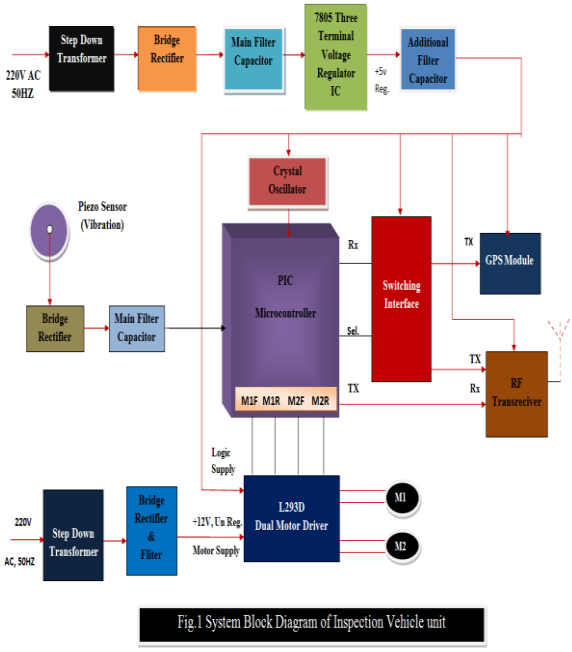

Fig .1.1 System Block Diagram of Inspection Vehicle Unit

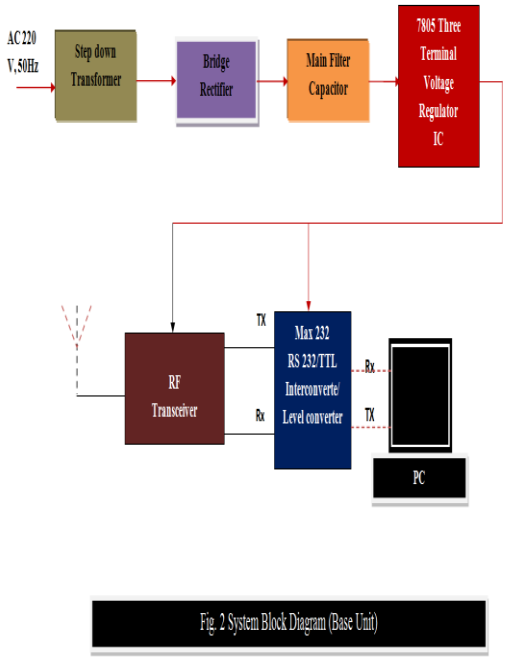

Fig .1.2 System Block Diagram of Base Unit

V. IMPLEMENTATION AND RESULTS

After going through the several procedures and adopting a sequel work flow result of our research project has been achieved in MATLAB GUI where we can study about the faults and misbehavior of the system which is described below with the help of images.

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Fig.1.3 Project Model of (Inspection Vehicle unit)

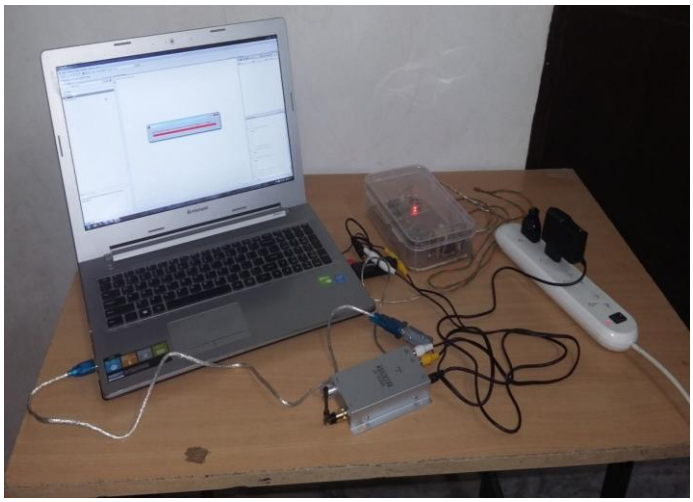

Fig. 1.4 Project Model of (Base Unit)

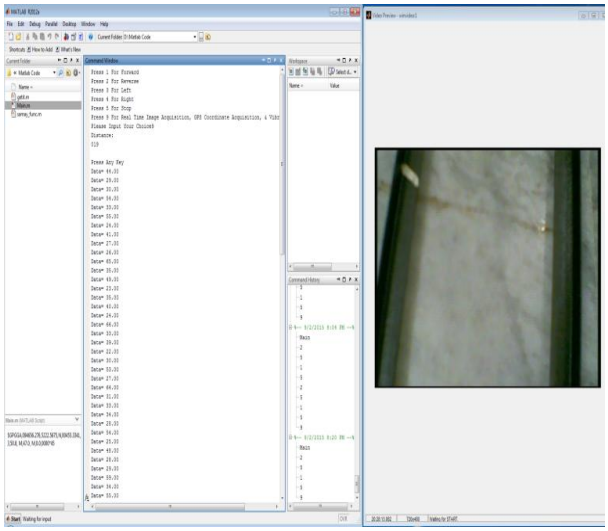

Fig. 1.5 It gives the distance data travelled by the machine.

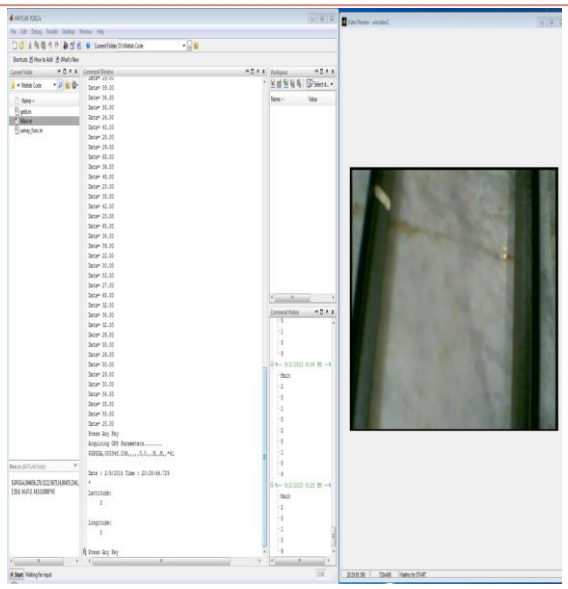

Fig. 1.6 It gives GPS data.

In Fig. 1.6 we can clearly see the errors are present in the railway track with specific longitude and latitude. Data will give the complete information of the faults which are found in the track and exact location of the fault that were present in the track with its specific longitude and latitude, which helps the server to locate the place and for the further action that should be taken for the improvement of the railway track.

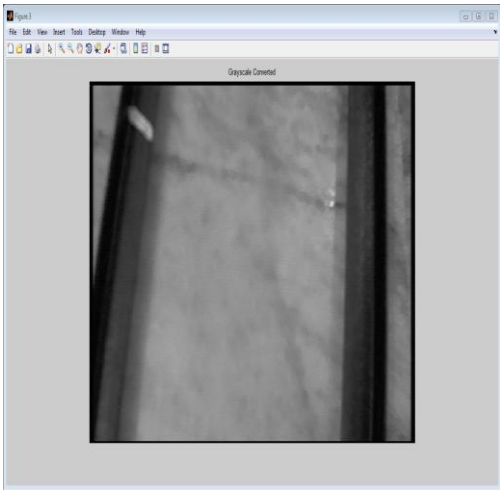

Fig 1.7 Binary Image of the defected track

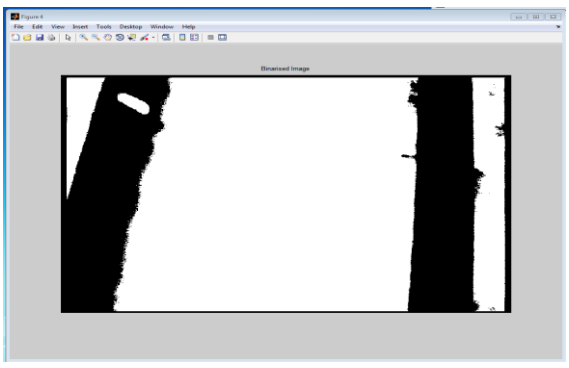

Fig 1.8 Grayscale converted Image of the defected track

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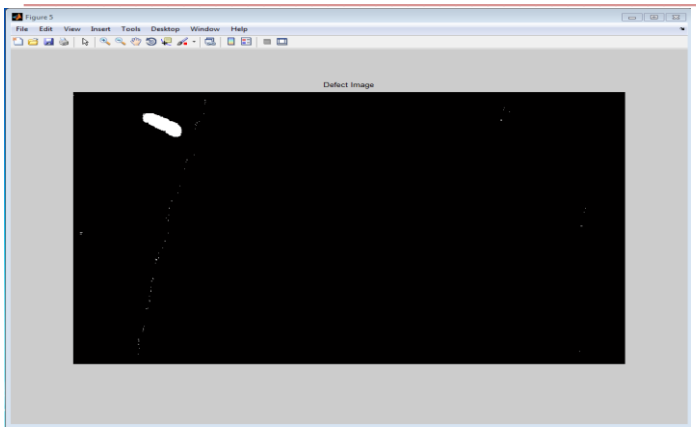


Fig 1.9 threshold converted Image of the defected track

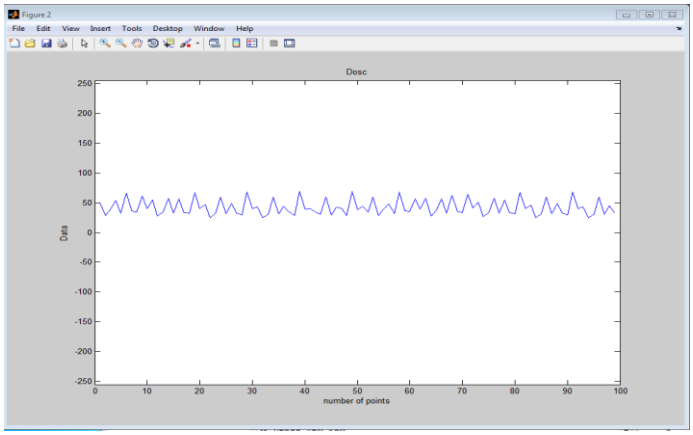
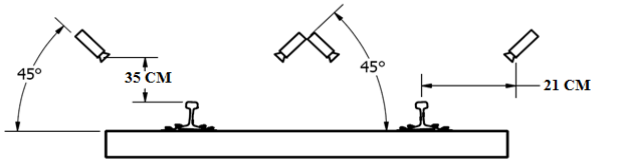


Fig 1.10 Waveform of Track Graph showing the no. of crack points

VI. CONCLUSION

Our proposed system will automatically inspect the railway track by using Real Time Image Processing with GPS module; in this paper the system is presented to detect the cracks in the railway tracks. By using real time image processing through wireless module. And the information is passed to the control section. And the location can be found out by using GPS module in the system. Hence this will reduce the accident rates and loss of precious life.



VII. FUTURE WORKS

(i) Transmission can be made Digital.
(ii) IP camera can be done.
(iii) Data Logging can be done.
(iv) Early warning system can be integrated.
(v) Transmission distance can be increased

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