RAILWAY MONITORING USING IOT

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ABSTRACT: This work describes an Internet of things (IoT) based track and wheel monitoring system for increasing the comfort of rail track transportation. Usually, rail tracks are inspected only at midnight and also the inspection is carried out only once in a month or lesser. Unfortunately, any emergency issues not detected within the stipulated time leads to train derailment and other safety concerns. Hence in-service vehicle has been introduced to increase the safety of train transportation. In this work , track irregularities are detected using vibration and metal sensor with arduino controller . The proposed system is compared with the conventional track geometry measurement system. The monitoring and control information can be sent through IoT. Implementation results are performed and it shows that the proposed system produces better results than the traditional track geometry measurement system and the effectiveness of the proposed method.

Key points

Arduino controller, GPS, IOT, Vibration sensor, Proximity sensor, Motor

INTRODUCTION

Indian Railways which is a boon of economic growth of the country and the largest network in our whole continent is deprived of safety of people. Out of (31,846) crossing in our country in which around 42% i.e. (13,530) crossings are unmanned crossings [1]. This is due to a fact that with such huge system it is difficult to keep an eye on every level crossing manually and due to this many railway crossings remains unattended. Moreover, this usually happens in rural and extreme remote areas and people have to suffer with their precious life.

The use of vibration measurements for structural health monitoring has attracted significant research attention during the last three decades [1, 2]. However, the majority of maintaining operations still relies on the direct inspection by experienced workers, such as in the railroad transportation industry. Considering that rail transport has become one of the most employed means of transportation, efficient monitoring devices are crucial to reduce maintenance costs and improve the safety of passengers and goods.

RELATED WORK

B.Brailson Mansingh deals mainly with the automation in unmanned and manned railway crossings. In recent days the accidents in railway level crossing are increasing.

C.Sacchi aims at investigating an open problem in the implementation of video-based surveillance systems for transport applications, i.e., the implementation of reliable image understanding modules in order to recognize dangerous situations with reduced false alarm and misdetection rates.

C. Sacchi a distributed video-surveillance system for the detection of dangerous situations related to the presence of abandoned objects in the waiting rooms of unattended railway stations is presented.

S. Sushant mainly deals with the localization of a UAV and how it can be applied for detecting cracks in a railway track using the concepts of image processing. The algorithm used for localizing the UAV is called Monte Carlo or Particle filter localization algorithm.

Bharti S. proposes an unmanned gate crossing and faulty rail track detection. Unmanned level crossing is a IR

sensors base system and crack detection is an dynamic approach which combines the use of GPS (global positioning system) tracking system and GSM (global system for mobile communication) modem to send geographical coordinate of location.

Koppany Máthéperform a thorough comparison of several object detection approaches before selecting a preferred method. M. Boronahin analysis to data processing in inertial track monitoring system (ITMS) during multiple runs on the controlled track section are considered.

Onder Halis Bettemirstudy a heuristic algorithm, which detects railway track from the images acquired by unmanned vehicle, is developed. Rails and sleepers of the railway track is detected with high accuracy from the images acquired in nadir direction. Images are de-noised by Gauss filter and edges are detected by Prewitt Edge Detection algorithm.

Elod Pall ; Koppany Mathe focus on controlling an AR.Drone UAV in order to follow the railway track.

Young-Hoon Leedeveloped differently and independently from other countries. The national standard specifications and guidelines have been established and maintained for the TCS in Korea. As the requirements of the high-efficient and economic operation of the urban transit system is getting higher, the unmanned operation of the train is moving to the limelight.

M. Muhaidheen proposes a novel approach is that an application of the high technological advance in the field of communication and computation allows a new form of machine interconnectivity- wireless machine to machine (M2M) technology in railway network. A.M. Gorlov proposes a mechanical system against car-bomb attack for the protection of unguarded railroad crossings

PROPOSED SYSTEM

In this project, a new type of satellite signaling based autonomous train is developed. The localization system is constructed with GPS and GSM device. Currently, three tasks, including collision detection and following, object detection, and obstacle avoidance, fire detection, door opening and automatic lifting of carriage has been implemented on this platform.

Developing on-board automotive driver assistance systems aiming to alert drivers about driving environments, and possible collision with other trains has attracted a lot of attention lately
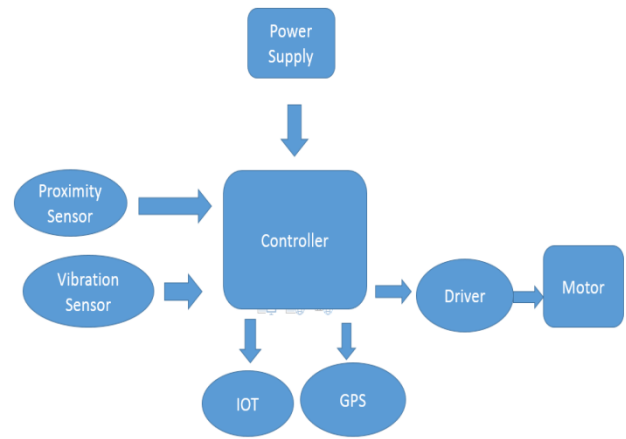

Fig: proposed system

ARDUINO

Arduino is an open source computer hardware and software company, project and user community that designs and manufactures microcontroller -based kits for building digital devices and interactive objects that can sense and control objects in the physical world. The project is based on microcontroller board designs, manufactured by several vendors, using various microcontrollers. These systems provide sets of digital and analog I/O pins that can be interfaced to various expansion boards ("shields") and other circuits. The boards feature serial communications interfaces, including USB on some models, for loading programs from personal computers.

GPS

Global Positioning System or GPS receiver used in this project is GR87 which make use the broadcast signals comes from GPS satellites. It provides the three-dimensional location such as longitude, latitude and altitude values from every position in all weather conditions. The main features of this receiver are low power consumption, on-chip 1MB SRAM, 0.1Sec reacquisition time and multi-path mitigation hardware.

RESULT
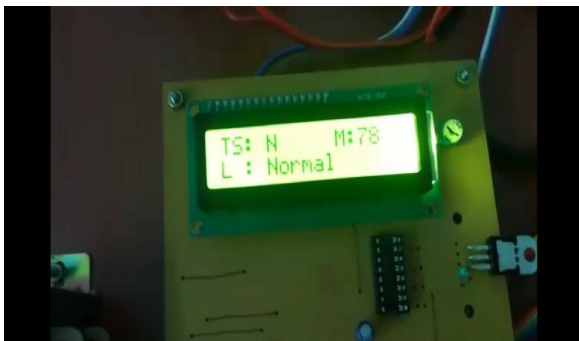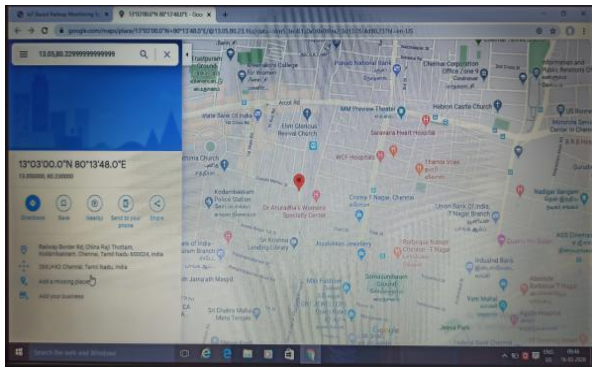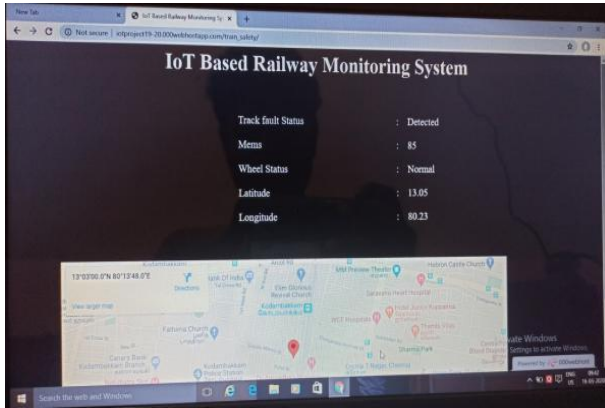
CONCLUSION

The project Embedded Based Train wheel defect detection and safety System" has been successfully designed and tested. Integrating features of all the hardware components used have developed it. Presence of every module has been reasoned out and placed carefully thus contributing to the best working of the unit. Secondly, using highly advanced IC's and with the help of growing technology the project has been successfully implemented.

Future work

Visual based approach to detect animals, obstacles and barriers in presence of tacks will identified by image processing algorithms. Efficient detection and classification algorithm has been introduced

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