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IOT BASED SMART RAILWAY CROSSING SYSTEM

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Abstract— Implement new technology in order to reduce accidents map. The main purpose of this paper is to provide safety at unmanned railway crossing and detection of faulty tracks. Unmanned level crossing is IR sensors base system and crack detection is a dynamics approach which combines the use of GPS (global positioning system) module to collect geographical coordinate of faulty tracks and GSM (global system for mobile communication) modem to send geographical coordinate of location. Here, we have introduced IOT (Internet of Things) which controlled the crack detection system dynamically. Delay in the opening and closing of the gate could lead to railway accidents. In order to avoid the human errors that could occur during the operation of gates and derailment due to crack , the proposed paper introduces the concept of railway gate automation and crack detection system has been modified by using IR sensors and IOT (Internet of Things) technology which performs automatic gate operation and helps in detecting of the faulty track. The IOT represents the coordination of multiple vendors' machines, devices and appliances connected to the Internet through multiple networks.

INTRODUCTION

Railways are one of the most common used modes of transportation in India. Error free railway operations are very rare these days due the human negligence and miscommunications which leads to accidents and delay in advent of the train; the path or the area where roadway and rail lines meet is known railway cross. A gate is placed for controlling the movement of the vehicles which requires human effort and coordination, mistiming in this leads to accidents. Gates are manually operated, errors which may give rise while closing and opening, the technique suggested here paper introduces a whole new way of automating the things. These are usually handled by a concerned person and he/she will be communicated by some way of communication from station's controlling department. Percentages of incorrectness are high at Railway crosses are at the peak because of the human errors and also due to the lack of the knowledge of train timings. If detainment happens in lifting and shutting gate and irresponsibility may cause big disaster. Current proposed work here tries to develop a mechanism which does the automation of gate operations (opening and closing) using Arduino, Raspberry Pi, IR sensor and using Motor for closing and

opening of a gate. Some of the challenges faced by the Railway Department with regard to this is the increase in percentage of accidents near crossing. Present mechanism consists of human operations which happen based on communication messages got from the Railway station. Mistakes in sending the information/signal to the gate operator regarding train's arrival, some delay or problem with respect to the closing and opening of the gate or regarding anything which might have got between the tracks which in turn cause the mishap near the crossing. Our system helps in dealing with some issues i.e. Lessens the overall waiting duration spent by people near crossing and it guarantees protection of the humans near crossing during the passing of the train when near crossing. As the human involvement is present in operation of gate which will be reduced which reduces probability of mishap and colliding of trains coming at the same time from opposite direction near crossing. Sensors play a major role in automating the process of gate lifting and closing. This paper shows an automated Smart way of controlling the gates at crossing which provides reliability, security when compared to current system.

LITERATURE SURVEY

Acy M. Kottalil, Abhijith S, Ajmal M M, Abhilash L J, Ajith Babu [1]. The research work carried out by above mentioned authors mainly focus on preventing of skilled worker to operate railway gate near Level crossings by establishing AT mega 16A microcontroller and IR sensors based systems to control gate opening and closing by receiving the signals accordingly.

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Volume: 04 Issue: 08 | August-2015, Available @ http://www.ijret.org 42 J. Banuchandar, V.kaliraj, P.Balasubramanian, N.Thamilarsi [2]. The paper written by these authors mainly put a spot light on two things; one is the reduction of time for which the gate is being kept closed. And secondly, provide a safety to the road users to reduce the accidents by using unmanned way of opening the railway gate. Hnin Ngwe Yee Pwint, Zaw Myo Tun, Hla Myo Tun [3]. The paper describes automatic railway gate systems by using PIC 16F877A Microcontroller for saving precious Haman lives. Here Inductive and IR sensors used as input components while buzzer, light indicator, DC motor and LCD display are the output components Krishna, Shashi Yadav, and Nidhi [4]. The paper deals with control the railway track by using an anti-collision technique, the entire system is modeled and controlled by 8952 microcontroller to avoid the railway accidents.Some of the previous systems related to the railway gate automation are found in .The automation of gate was first tried in Korea. This System was efficient in reduction of mishap level near crossing. Magnetic sensors played an important role in the Korea's automations of crossing gates. Sensors which were deployed under the ground were unaffected by the changes caused in environment and they help in

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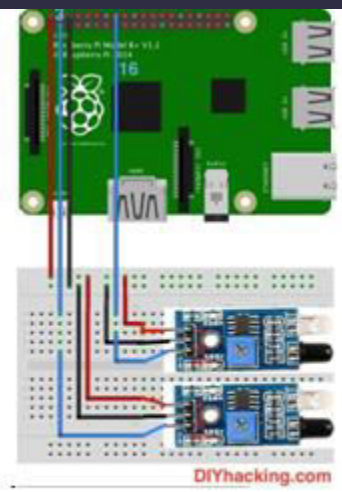
recognizing vehicular direction. In current Railway's Technology is tried to introduce here and discussed about the disadvantages of manual system. The train's detectors here sensors play a prominent component in automating the system and also cost effective.

PROPOSED SYSTEM

Lifting and shutting of bars located at crossing works on sensors. The structure of the system comprises of sensors which detects advent and going of train in order to operate gate using Infra-Red Sensors. Suggested structure of system consists of two IR sensors. One for identification of arrival and another for departure of train. Raspberry PI (Wi-Fi module) is used for controlling the system as well as it in turn sends the arrival and departure of the train i.e. its data to the cloud. System built here consists of the sound and signal alert which help in the warning the people near the railway crossing. IR Sensors and servo motor are controlled by the Raspberry PIcollectively. The motor are controlled by the technique of PWM and driver, which helps in the speed and angle of rotation of the gate. The major components are used in the Automating the Railway Gate are sensors. A sensor is the one which detects the objects which are near. Here we have used IR sensor, servo Motor Driver for controlling the motors which help in controlling the operation of the lifting and shutting up bar of gate



Circuit Diagram of Proposed System

THING SPEAK

Thing speak Cloud, for the better analysis of the system, the system is monitored using Cloud i.e. Thing speak cloud, the cloud is an open IoT platform with analytics which lets to store and collect sensor data. Each advent and departure of railway is stored in cloud. Graph shown below gives analysis of the trains arrival and departure at one particular railway crossing gate. In graph 1 indicates that train has been departed and 2 indicate train has arrived. Based on this the frequency of arrival and departure of the train at a particular station will give the railway department information regarding the level of security need to undertake at that particular point. Analysis of Arrival and Departure of train on Thing speak cloud the analysis helps in analyzing the severity of the actions to be undertaken at the railway level crossing. Live analysis can be seen so that to take effective measures immediately. This is how analysis of the data helps in further improvement of the system. Analysis is not restricted to this itself; based on the

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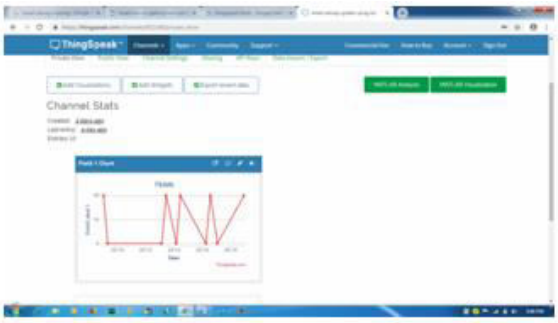
need, the system can always customized to required settings and analysis can be done



RESULTS

In this work, a smart railway crossing system is proposed based Internet of Things. We developed a prototype for this and successfully verified the opening and closing of the gate during train arrival. It is user friendly, and has required options, which can be utilized by the user to perform the desired operations.

The goals that are achieved are:

1. Less human involvement
2. Efficient management of railway gates
3. Cost effective
4. Easy construction of the sensors on the track
5. Reduced errors due to human intervention
6. Portable and flexible for further enhancement. This work offered a very quick and enhanced working model of a SMART RAILWAY GATE. This is very helpful to the people living in the remote areas with unmanned railway gates.

CONCLUSION

The proposed unmanned railway gate crossing system perform automatic opening and closing gate function without help of human participation and also railway track broken system automatically detects faulty railway track without human intervention. There are many advantages with the proposed system when compared with the traditional system. The advantage include less cost ,low power ,high accuracy, low power consumption ,less analysis time and main advantages in crack detection is that we can centrally manage this system using internet of things technology and we can find the exact location of the faulty track using hosted website (IOT) so that many lives can be saved.

FUTURE SCOPE

Automation of the railway gate control system is implemented in order to reduce interaction oflifting andshutting the crossing gate which allows and avoids vehicles and people from passing the crossing. Rail crossing has been the root cause for of mishap and many fatal issues. Automation of the crossing gates makes easy and secure to control the gates. Humans may make incorrect or mishaps which may be very dangerous, automation of whole thing will shorten possibilities of the mishaps and incorrectness. Automation of the lifting and shutting of the railway crossing gate with the usage of Arduino using sensor and using motors will help in controlling the gates. This can be implemented in the remote area where it is difficult for humans to work in like in the places of extreme weather. As everything in this world has a limitation our put forth system poses some limitations which usages of Infra-Red sensors are. Irrespective of train or any other object in its coverage area it will detect as an object is detected which is inaccurate. Second limitation happens to be while lifting and

shutting of crossing gate but this fails in avoiding the movements of the vehicles trespassing. We only control crossing gate here. In order to resolve this issue, we take help of pressure that acts as add on to the put forth work. Along with Infra-Red sensors it would be good to use load sensors. Here the load sensor usage is limited as it is not economically feasible for small area but when implemented in a larger extent this will provide a huge impact. Future implementation can be made by resolving the current issues using the above said suggestions and incorporating them in the system

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