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A study on Automatic Railway Gate Control System

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Abstract

The Railroad related accidents are more dangerous than other transportation accidents in terms of injured and death rate etc. Therefore more efforts are necessary for improving safety and security. There are many railways crossing which are unmanned due to lack of manpower needed to fulfill the demand signal is sent to the control room and the gate is closed and stays closed until the train crosses the gate and crossing side sensors. Many accidents occur at such crossing since there is careless of the functioning of the railway gate when a train arrive the crossing. The main aim of this paper is to manage the control system of railway gate using microcontroller and various types of sensors. The proposed model has been designed using x-bee sensor and microcontroller to avoid railway accidents occurring a unattended railway gates if implemented detection of train approaching the gate can be sensed by means of two sensors placed on either side of the gate. This work depends on the two sensors placed on either side of the gate. This work utilizes two powerful magnetic sensors is fixed at incoming and similarly the other magnetic sensor is fixed at outgoing side of the train direction. Sensors are fixed on both sides of the gate. We call the sensors along the train direction as foreside sensor and the other as after side sensor. When foreside sensor gets activated the sensed side sensor activated and the signal about the departure is sent to the microcontroller motor turns in opposite direction and gate opens and motor stops automatically.

1. Introduction

Railways preferred the expensive mode of transportation over all the other means. This project is creating using x-bee sensor to avoid railway accidents happening at railway gates where the level crossings. Microcontroller sends the signal to the Motor driver IC L293D which drives the dc motor for the gate closing and opening operation [1, 2]. As the train approaches the specified range, the dc motor rotates clockwise which closed the railway gate and if the train goes out of the specified range the dc motor rotates anticlockwise which opened the railway gate [2]. This system was operated after signal received from the cloud. This signal is used to trigger the microcontroller for operating the Motor driver IC. The abstraction of this system is to provide the advanced control system available to every where [2].

Classification of accident by their effect derailment, head on collision one type of train accident is when two trains collide front face with each other or train colliding on the same track from opposite ends called head on collision(3). Rear end collision the other kind is when a train collides into the other that is in front of it called a rear end collision. When the train arrives in a particular direction the transmitter IR senses and generates appropriate signal then at the same time the IR receives the signal and generates an interrupt. When interrupt is generated the stepper motor rotates in clockwise direction. When the interrupt ends the stepper motor rotates in anti clock wise direction [3].

2. Literature Survey

Information systems on railway stations are variously referred to as a Passenger Information System and passenger information display system. Professional railway staffs often refer to them as Train Describers. Whatever it is called, there must be a reliable way of informing the passengers where the trains are going and incoming to the station. Passenger information systems are essential for any railway (1). One of the most common complaints by passengers on railways is the lack of up to date and accurate information. When asking the staff for information, passengers expect an accurate and courteous response with the latest data. There is nothing different than the guess is as good as mine when a train is delayed or has not appeared on time. This means that staff must have access to the latest information and they must be trained to use it properly and to pass it on to passenger's response when a member of staff is asked what is happening [1].

Information displays publish in public areas must be visible in all weather conditions and be updated regularly with correct information. There are two types of information - constant and instant. Constant information is described as that which describes the services and fares available and which changes only a few times a year or less. This information can be displayed on posters and fixed notices. There also must be special offers which can be posted from time to time. Instant information is that which changes daily or minute by minute. This is better displayed electronically or mechanically for the public - both systems can be seen around the world. For instant systems, it can be assumed that passengers require knowing.

3. Comparison between Indian and World Rail System

3.1. Indian survey

Now a days, India is the country which having world's largest railway network. Over hundreds of railways running on track every day. As we know that it is definitely impossible to stop the running train immediately, there is

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some critical situation or emergency comes. Train accidents having serious results in terms of loss of human life, injury, damage to Railway property. The concept of the model is to control the railway gate using anti-collision technique [4].

Status of present Indian Railway is that railway-crossing gates are operating manually. At presently, in level crossings, Gate keeper operates the railway gate normally after receiving the information about the train's arrival. When a train starts to leave a station, stationmaster of the particular station delivers the information to the nearby gate. The above procedures are followed for operating the railway gates. Sometimes the road traffic is so busy that it becomes very hard for the gatekeeper to close the gates in correct time In many remote areas, railway-crossing gates are open and no person is located for the operation of gates and hence leading to accidents. Many times gates are shutdown too early leading to wastage of time of people stuck at crossing

Presently as such no control centralized system is there through which we can track the location of trains from any canter point. As trains cannot be central located, often more than one train runs on the same track in opposite direction leading to accidents.

Presently in Indian Railway only semiautomatic railway gate operation is followed in certain areas. Signals are located in both sides of the railway gate along with gate master broad and a marker light. If barriers remain closed for excessive periods on crossings carrying a high volume of road and rail traffic, the build-up of road traffic will increases the capacity of the crossing to safely discharge this build-up before the next train arrival at the crossing. A number of train accidents happened due to a manual system of signals between stations [4].

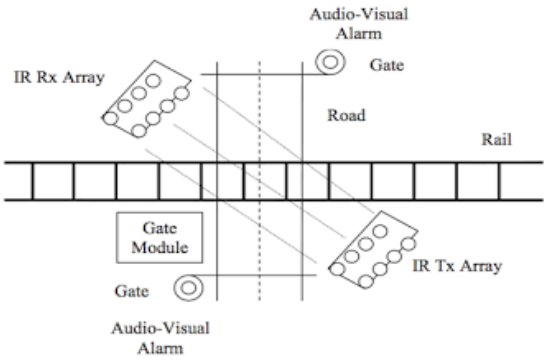

Fig. 1: Block diagram of Indian railway gate crossing.

C) Presently signals are controlled by means of interlocking system and for this system require regular maintenance and upgrading. Hence here we proposed an automatic railway gate control.

The system based on IR sensors, track circuits etc. demands extension of power supply for remote places to run long cables from sensor to the system. Also it requires maintenance so it is costly and reduces reliability. The android based railway gate crossing is wireless system so it does not require large power supply.

The system based on infrared link is wireless but it has complicated hardware as it consist of sensors, CPU and transmitters. Also it has high cost in starting but low maintenance cost. Both system consisting sensors require more time for their working and android based system consume less time, gives faster result also system is cheaper and does not require maintenance [5].

3.2 World survey:

In the fast flourishing country like India accidents in the unmanned semiautomatic level crossings are increasing day by day. No important secure and safety steps have been taken so far in these areas. our paper deals with automatic railway gate operation (i.e.,) automatic railway gate at a level crossing replacing the gates operated by the gatekeepers, It deals with two things, Firstly it deals with the reduction of time for which the gate is being kept closed and secondly, to provide safety to the road users by reducing the accidents [5].

By employing the automatic railway gate control at the level crossing the arrival of the train is detected by the IR sensor placed near to the gate. Hence, the time for which it is closed is less compared to the manually operated gates (5).

The operation is automatic; error due to manual operation is prevented. Automatic railway gate control is highly microcontroller based arrangements, designed for use in almost all the unmanned level crossing in the train (5).

When the train arrives in a particular direction the IR sensor sense the signal generates appropriate signal, then at the same time the microcontroller receive the signal and generates an interrupt when the interrupt is generated the stepper motor rotates in clockwise direction. When the interrupt ends the stepper motor rotates in anticlockwise direction [5].

This system can be referred as an enhancement of the current railway system converting the manned as well as unmanned railway gate into an automated railway gate controlling unit [6-7]. Automatically switching between railway tracks and running the train automatically. In 1988 Waheed, MA Sethuraman, SK Deans, ND developed the phenomenon of controlling devices in real time using a microcontroller chip. This concept is the backbone of our project. The proposed project contains of IR sensors which greater signals for microcontroller to control the loads connected to the controller [8]. During the period of 1969-1973 Dennis Mac Alistair Ritchie and Ken Thompson developed the C programming language, using the basis of c programming language a software program in embedded c is developed for our project. Embedded C programming is very useful in many ways as it is a combination of assembly language programming and c language programming [8]. In C language programming stack memory cannot be directly whereas in assembly language programming stack can be easily called, combining assembly and c language an embedded c language was developed for real time application programming [6].Infrared sensors being the most efficient sensor to detect any real time object is used in the proposed project to detect arrival and departure of train. In 1936 W.B. Ellwood invented a reed switch at the bell telephone laboratories which is an electrical switch [6]. It is

a magnet sensor which senses a magnet and can be used as a proximity sensor.

4. Conclusions

A new phenomenon for improving safety at LCs and train collision on IR has been suggested. Formats have been given to maintain records of LC inventories accident/incident reports. A regular assessment of safety performance should be done. This approach should be able to bring down the rising trend in accidents at LCs and train collision accident. This project uses the present infrastructure of railways e.g. present signaling method and meets all the requirements to have an automatic controlling of the railway traffic. It provides the supervision and control system provide the mean for real time inspection review and data collection fo the purpose of maintenance on the movable and fixed facilities for the guarantee of operation safety and maintenance efficiency as well as the safety appraisal decision-making system based on the share of safety data.

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