Automatic Railway Gate Control with Web Analysis Using IOT

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Abstract - **In the rapidly flourishing countries accidents in the unmanned level crossings and due to obstacle on track are increasing day by day. No fruitful steps have been taken so far in these areas. Our project deals with automatic railway gate control at a level crossing replacing the gates operated by the gatekeepers and detection of obstacle on track By employing the automatic railway gate control at the level crossing the arrival of the train is detected by the sensors placed in the side of the tracks. Hence, the time for which it is closed is less compared to the manually operated gates. Detection of obstacle on railway track deals with two things, Firstly it senses the any obstacle on the track by using sensors placed on the front end of the train and The review of train accidents of the last 5 years (2009-10 to 2013-14) for which the data is available indicates that a large number of accidents happen because of derailments & at level crossing. NCRB says a total of 2,547 railway crossing accidents led to 2,575 deaths and 126 injuries across the country in 2014. This motivated us to take up this project.**

Keywords: Railway Gate, Internet of Things, Railway Crossing, Micro Controller, Arduino, Sensors.

I. INTRODUCTION

In today's scenario Railway safety becomes the most important aspect of railways all over the world. As we know the Railways are the cheapest mode of transportation, and due to manual operation, accidents are likely to happen. There are 30348 level crossings on Indian Railways across the country. 18785 are man handled and 11563 are non-man handled level crossings out of 303048 level crossings. To avoid accidents over previous five years 4792 level crossings have been removed by the respective Zonal railways of Indian Railways. The Indian ministry of Railways made a decision focusing on eliminating all level crossings on availability of railway funds, which could be.

The Internet of Things (IoT) is the system of physical objects like gadgets, vehicles, buildings and different things which are connected with electronics, programming, sensors, which empowers these objects to gather and exchange information [3]. The Internet of Things permits objects to be detected and controlled remotely over existing system structure.

Making open doors for more straight forward combination of the physical world into computer based frameworks leads to enhanced productivity, precision and financial advantage. When IoT is expanded with sensors and actuators, the innovation turns into a case of the more broad class of digital - physical frameworks. Everything is particularly identifiable through its embedded control system however is capable to inter operate inside the current internetworking framework.

In future all the cell phones might be associated with the home appliances like windows, doors, electrical outlets, etc.,

We have at our home. These can be examples of utilization of IoT in future. For example, E-health i.e., Remote monitoring of patients, diagnosis and drug delivery; home automation; Automatic activity administration; traffic estimation and directing; disaster management; etc.

This paper presents a framework mainly used to prevent railway accidents by using the IoT technology. The accidents can be prevented while crossing railway gate without human power. The sensor senses the arrival of a train and sends a signal to the micro-controller. Upon receiving that, the microcontroller closes the railway gate.

II. METHODOLOGY

In the proposed framework, different sensors are used to detect the train arrival and departure. This framework uses three different sensors to control the rail arrival and departure. We programmed different sensors and motors using Arduino and AT89C52 micro-controller. The functional diagram of the proposed framework is shown in Fig. 1. The following materials and components are used in the proposed automatic railway gate control system.

A. Sensors

The sensor recognizes and responds to events from the physical environment. They are placed at both ends of railway crossing and sense the arrival and departure of the train. The input a sensor can be a light, heat, motion, moisture, pressure,

or etc. Sensors that detect the arrival of a rail can be classified into the following types.

- Infra Red (IR) sensors operates on the principle of heat being emitted by the object."

B. Arduino board

The Arduino version is 1.0.5 used to send the information about the train status with the help of sensors. It consists of the Arduino code in c programming. The system should contain certain software to run and accept the code.

C. Stepper motor

The stepper motors are used for mechanical control of the gates that rotate forward or reverse direction. The multiple coils in the motor which are get activated in sequence; the motor will rotate one step at a time. With the automated stepping we can achieve an accurate positioning and/or speed control.
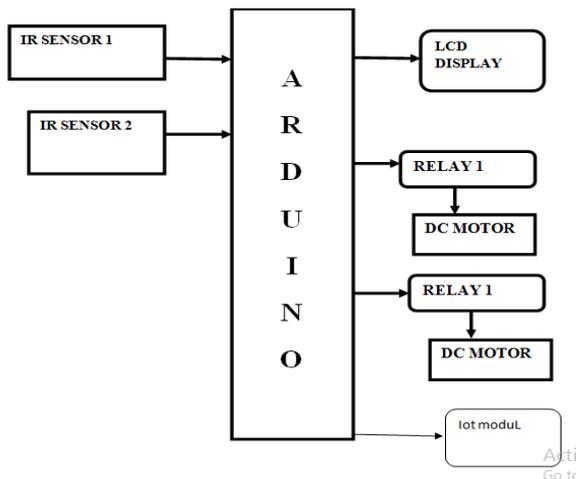

Figure 1: System Architecture

D. LCD Display, Buzzer, Power supply

LCD display is used to displays the warnings regarding the gate open or close message for road users. Buzzer and light signal are used to inform the user regarding the arrival of train. Power Supply is required to provide 5V DC to micro-controller and 12V DC for stepper motor.

E. Arduino Integrated Development Environment

Arduino software is different from windows to windows. The software should be downloaded the code of Arduino is encrypted as shown in the Fig 1. The task that should be done is given to the Arduino software. The code is in c program. IP address and password should be entered and saved according to the internet source we using. The saved changes should be uploaded.

"The Arduino Integrated Development Environment (i.e., Arduino IDE) contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. It connects to the Arduino and hardware to upload programs and communicate with them".

Fig. 2 shows the flowchart of the proposed prototype. In this work, one AT89C52 microcontroller is used to operate the following function of the railway gate control system:

- To detect the train arrival and departure
- To open and close the railway gate automatically by using the stepper motor
- Buzzer and light signal for warning the road users regarding the train arrival
- Display the status of the railway gate system with LCD modules

Following are few of the advantages of the proposed secure railway crossing system

- Accident avoidance
- Less Human intervention
- Safety and quality of services
- Accurate gate open/close
- Using the artificial intelligence
- To avoid errors happening due to manual operation of the system)

III. RESULTS AND DISCRIPTIONS

This section explains the results observed from this project. We written the code using code bender dumped to the Arduino as shown in Fig 1. Smart railway gate technology we have used IR sensors. When a train arrives these sensors send an input signal to the micro controller. Then the micro controller will activates the railway gates when train arrives and passes without any delay. Programs are written in Embedded C for opening and closing of the railway gate and code is dumped into the Arduino board using Arduino IDE. In this block, the code is dumped. Through which we can verify code, whether it is running properly or not. The complete prototype work in this way, where the sensor senses the value and gives the signal through the alarm, where we can get a smart railway gate system (Fig 2).

When the train passes through the first sensor the gate closes giving the alarm for the vehicles to stop (Fig 3). When the train passes through the second sensor the gate opens allowing the vehicles to pass through the railway crossing automatically.

IV. CONCLUSION

Automatic railway gate control system is centered on the idea of reducing human involvement for closing and opening the railway gate which allows and prevents accidents near level crossing. The railway gate is a cause of many deaths and accidents. Hence, automating the gate can bring about a ring of surety to controlling the gates.

Human may make errors or mistakes so automating this process will reduce the chances of gate failures and reduces the errors made by gate keepers. The accidents are avoided at place where there is no person to manage the railway crossing gates. Here we use the servo motor to open and close the gates automatically when it rotates clockwise or anticlockwise direction to operate the gate automatically.

REFERENCES

[1] G. V. Kishore, L. B. Anthony, and P. J. Jayarin, "Prioritized traffic management and transport security using rfid," in ICT and Critical Infrastructure: *Proceedings of the 48th Annual Convention of Computer Society of India*-Vol I. Springer, 2014, pp. 757–764.

[2] Q. Han, S. Liang, and H. Zhang, "Mobile cloud sensing, big data, and 5g networks make an intelligent and smart world," *IEEE Network,* vol. 29, no. 2, pp. 40–45, 2015.

[3] C. Perera, C. H. Liu, S. Jayawardena, and M. Chen, "A survey on internet of things from industrial market perspective," *IEEE Access,* vol. 2, pp. 1660–1679, 2014.

[4] E. Aboelela, W. Edberg, C. Papakonstantinou, and V. Vokkarane, "Wireless sensor network based model for secure railway operations," *in Performance, Computing, and Communications Conference, 2006. IPCCC 2006. 25th IEEE International. IEEE,* 2006, pp. 6–pp.

[5] D.W. Matolak, D. G. Michelson, and C. Briso-Rodriguez, "Challenges toward wireless communications for high-speed railway," *IEEE Transactions on Intelligent Transportation Systems,* vol. 15, no. 5, pp. 2143– 2158, 2014.

[6] A.Pascale, N. Varanese, G. Maier, and U. Spagnolini, "A wireless sensor network architecture for railway signalling," in *Proc. 9th Italian Netw. Workshop,* 2012, pp. 1–4.

[7] B.B. Mansingh, K. Selvakumar, and S. V. Kumar, "Automation in unmanned railway level crossing," *in Intelligent Systems and Control (ISCO), 2015 IEEE 9th International Conference on. IEEE,* 2015, pp. 1–4.

[8] A.S. Al-Zuhairi, Mahdi, "automatic railway gate and crossing control based sensors & microcontroller," *International Journal of Computer Trends and Technology (IJCTT),* vol. 4, no. 7, 2013.

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