AUTOMATIC RAILWAY GATE CONTROL AND MANAGEMENT SYSTEM

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Abstract

An automatic railway gate at the level crossing replacing the gates operated by the gatekeeper by detecting train and stuck on the level crossing, generating corresponding alert signal and controlling the gate. Developing a train detection module, a stuck detection module, a signal light module, an alarm module, a railway gate controller and a controller module would provide the solution. The train detection module has only four ultrasonic sensors and one ultrasonic sensor in the stuck detection module. Both the train detection and the stuck detection module produce through the ultrasonic sensors a high frequency signal and detect the presence of the object if the sensors receive the echo back. Then the controller unit determines whether the obstacle is train or stuck and takes necessary steps by controlling the gate, alarm generator and signal lights. Experimental studies show that the proposed methodology provides a more cost effective, reliable and simpler railway gate controller than existing dominant work.

Keywords: *GSM technique, Ultrasonic Sensor, Stuck, Detection, Level Crossing, RFID technique, Alarm generator.*

I.   INTRODUCTION

Railways are one of the cheapest & safest transportation modes which are favorite over all the other means of transport Such as Bus, Flights & many more. That's why it is necessary to improve & maintain the present safety level of railways. A safe railway is more efficient, efficient as well as a more attractive choice of transportation, enabling society to address the environmental and economic challenges of the 21st century. Railway safety is an important parameter of rail operation over the world. There is regular news in newspapers or on television reports about accidents occurring at different railway crossings & many people lost their lives in that particular railway crossing accidents [1].

Millions of passengers are served and tons of goods are transported every day as a large part of the public transport system railway. By being energy efficient, railways offer a safer alternative to other forms of transport, since they can accommodate large quantities of people and goods at the same time. As a consequence, over the years, the railways and the number of people using them have increased. This adds a lot to our economy. It is their duty to provide a successful customer service management scheme. It is therefore important to make the train journey safe and secure for the management. However, the recent train crashes, especially head on collisions, make the passengers think otherwise [2]. Old signaling and operating systems often work incorrectly, causing major train accidents with a large number of casualties and enormous financial losses. In our study, the definition of the soul was to design a device to prevent the head from train collisions due to either disoperation or maliciousness. The device will operate automatically and send the information for further processing to the central control authorities. Some sensors have been used to detect the train position and communication line to communicate from the rail track to the main control room. Software will monitor and maintain the whole process to secure the safety of the train. By analyzing cost, efficiency, reliability the system is found better than the existing system.

There is a fault in modern management because railways failed to provide adequate incentives to attract suitable talent. In addition, it could not make economic analysis for prospective planning tariffs. The rolling stock technology is presently becoming outmoded technology. The railway system is afflicted with excessive employee & manpower development and has not kept quickness with up gradation of technology. This has made the railways system incapable of coping with increasing demand of transport and improving the traffic system and flows at lower unit cost efficient operation [3].

The block diagram of the proposed system consists of a microcontroller, Ultrasonic sensor & Infrared sensor as shown in Figure 1 .The IR Sensor-Single is a normal purpose proximity sensor. Here the proposed system used for detection of collision. The designed module discloses of an IR emitter & IR receiver pair. The high accuracy IR receiver used to detect an IR signal. The proposed system consists of comparator IC. The status of the detector is checked with the help of LED which is present on the Arduino without taking the help of any additional hardware. The proposed system has low power consumption, the system provides digital output. For the alert signals the proposed system uses a piezoelectric buzzer [4].
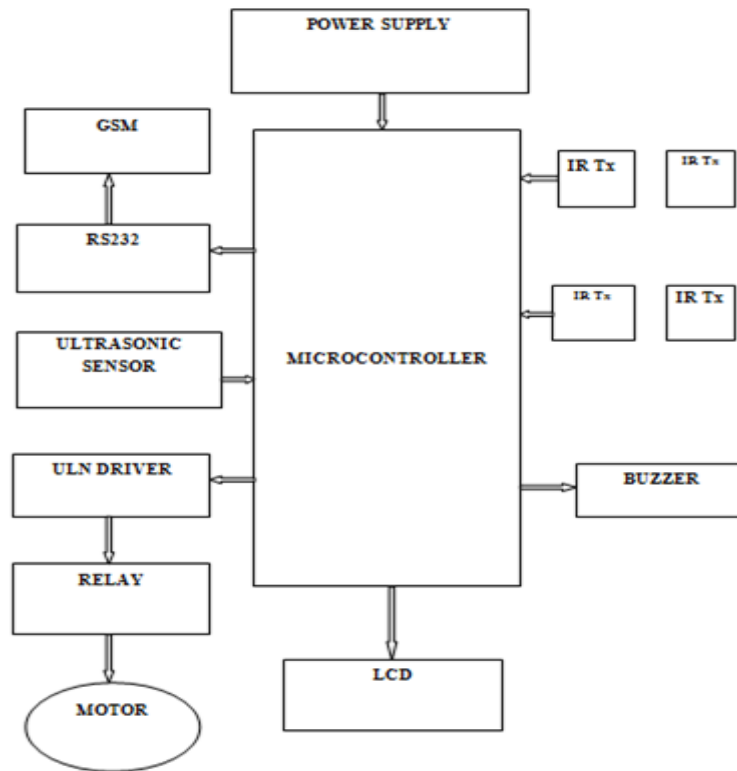
Fig. 1 Block Diagram of Railway System

Automatic railway gate control system is an arrangement of physical components which sense the arrival of the train and make the gate pull up and pull down automatically. As a train approaches at the railway crossing from either side, the sensors placed at a certain distance from the gate detect the approaching train and accordingly control the operation of the gate. Sensors mounted at a certain distance from the gate detect the departure of the train to prevent accidents [5]. The departure signal is sent to the microcontroller, which controls the motor and opens the gate in turn. Thus, because the gate is closed based on the telephone call of the previous station, the duration during which the gate is closed is less than the manually operated gates. Reliability, since it is not prone to human errors, is also strong. Research on automatic gate controller systems has historically been performed for the railway industry. It concentrated on two main areas: the transmission of information and gate control. Problems related to the transmission of information include the identification of trains and the quick transmission to the control unit of this information. Problems related to the operation of the gate are very sophisticated and complicated. They include train appearance, immediate closing and gate opening. There are several complexities in the current solutions and they need study to help railways [6].

An electronic system for controlling railway gates. By analyzing the reflected waves, the device senses the train further stuck, generates alarms, and regulates light signal and doors. The gate

is opened when the entire train reaches the level crossing, the warning generator has stopped and the indicator light has turned to a green signal. The lower equipment, reduced expense, simplified design and high performance of the proposed system show the efficacy over current work if there is a stuck on the level crossing the stuck signal is turned on. Many automatic railway gate controllers with advanced technology are introduced to make the level crossing risk free. A Railway Gate and Crossing Control system based on the Microcontroller was proposed [7]. They used an IR sensor and a microcontroller in their system.

IR sensors detect the presence of the train in their device and transmit the signal to the microcontroller. The Microcontroller controls the crossing gate based on the signal. Low precision is the key drawback of this method. In open space and sun, the IR sensor output is not adequate. Swift Response Anti-collision Device based pressure sensor for an automatic railway gate control system. The pressure switches built into this device detect whether or not any vehicle gets stuck at the level crossing. To detect the arrival and departure of the train, IR sensors were used [8]. The system is a little bit complicated and the performance is not acceptable due to the use of IR sensors. For this purpose a technology used to identify train positions, collision detection as well as the points at where collisions may occur has been used. The primary goal of this paper is an anti-collision system to identify such collision points and to report the error cases to the main control room, nearby station as well as grid control stations [9].

II.   CONCLUSION & DISCUSSION

The proposed system solves the problems of head to head collision of trains, an anti-collision with the help of a system which is used with the trains. The proposed system is referred to as an advancement of the present system of railway by changing the unmanned as well as manned railway gate into an automatic railway gate controlling system. Automatic switching between railway tracks & running the train smoothly & automatically. The system has many advantages: it will reduce the accidents occurring at the railway crossing, by removing manual operations it will increase the accuracy & reduce errors. It will reduce the collision of trains & also manage the route of a particular train to avoid any delay in reaching its destination. Trains will always be on time at the station no delay will be caused which occurs in manual operation. Security can be implemented by placing a tracker in the train in order to monitor the location of the train in case of any issue. Solar panels can be used to generate power for the system thereby increasing the efficiency of the system.

III.   REFERENCES

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