Automated Railway Crossing

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***Abstract*- The aim of this paper is to automate various operations related to opening and closing of railway gates in order to minimize the accidents at unmanned railway gates. The train has a RF transmitter attached to it and a RF receiver near the gates which operates the gate automatically . It also identifies unwanted obstruction in the track and gates by ultrasonic sensors . This automatic railway system reduces the waiting time of road passengers at the railway crossings since it will identify the arrival of the train and there by closing the gate when needed as well as reducing accidents.**

Index terms- Arduino Nano, RF Transmitter, RF Reciever, Ultrasonic sensor

1. INTRODUCTION

Unmanned level crossings are accident prone railway sections. The idea is to use various sensors and a set of boom barricades to prevent these mishaps .We are using RF modules at set distances from the railway crossing which will detect the oncoming trains and activate the barricades and close the crossing.

When the train would have cleared the crossing and the RF module post, it will trigger the barricade to open the crossing section. The radios will be using a set frequency and will trigger the barriers when they decode the coded signal emitted from frequency helping in securing the RF network.

In addition to this if we use transmitting and receiving module in all trains train can itself detect the train coming from opposite side and train accidents can be stopped. It also identifies unwanted obstruction in the track and gates by ultrasonic sensors.

2. RELATED WORK

1. Automated Railway Crossing System Using ZigBee/IEEE 802.15.4 Standard, This paper presents a development of an automatic railway crossing system using a wireless sensor network based on ZigBee/IEEE802.15.4 standard.

2. Automatic Railway Gate Control System Using Arduino & IR Sensor, The Automatic Railway Gate Control System using IR Sensor & Arduino focuses on systematic traffic control of railway gates that are both manned and unmanned.

3. METHODOLOGY

In this paper we are concerned of providing an automatic railway gate control at unmanned level crossings replacing the gates operated by gate keepers and also the semi-automatically operated gates. 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 that usually occur due to carelessness of road users and at times errors made by the gatekeepers.

By employing the automatic railway gate control at the level crossing the arrival of train is detected by the sensor placed on either side of the gate at about 5km from the level crossing. Once the arrival is sensed, the sensed signal is sent to the microcontroller and it checks for possible presence of vehicle between the gates, again using sensors. Subsequently, buzzer indication and light signals on either side are provided to the road users indicating the closure of gates.

Once, no vehicle is sensed in between the gate the motor is activated and the gates are closed. But, for the worst case if any obstacle is sensed it is indicated to the train driver by signals (RED) placed at about 2km and 180m, so as to bring it to halt well before the level crossing. When no obstacle is sensed GREEN light is indicated, and the train is to free to move.

The departure of the train is detected by sensors placed at about 1km from the gate. The signal about

the departure is sent to the microcontroller, which in turn operates the motor and opens the gate. Thus, the time for which the gate is closed is less compared to the manually operated gates since the gate is closed depending upon the telephone call from the previous station. Also reliability is high as it is not subjected to manual errors.

4. GATE CONTROL

Railways being the cheapest mode of transportation are preferred over all the other means .When we go through the daily newspapers we come across many railway accidents occurring at unmanned railway crossings.

This is mainly due to the carelessness in manual operations or lack of workers. We, in this project have come up with a solution for the same. Using simple electronic components we have tried to automate the control of railway gates.

As a train approaches the railway crossing from either side, the sensors placed at a certain distance from the gate detects the approaching train and accordingly controls the operation of the gate. Also an indicator light has been provided to alert the motorists about the approaching train.

5. AT328P MICROCONTROLLER

The Micro controller (AT328P) is a low power; high performance CMOS 8-bit micro controller with 8K bytes of Flash programmable and erasable read only memory (PEROM). The on-chip Flash allows the program memory to be reprogrammed in-system or by a conventional non-volatile memory programmer. By combining a versatile 8-bit CPU with Flash on a monolithic chip, the Atmel AT89S51 is a powerful microcomputer, which provides a highly flexible and cost-effective solution to many embedded control applications. By using this controller the data inputs from the smart card is passed to the parallel port of the pc and accordingly the software responds. The IDE for writing the embedded program used is KEIL software.

6. INFRARED CIRCUITS

IR CIRCUITS: This circuit has two stages: a transmitter unit and a receiver unit. The transmitter unit consists of an infrared LED and its associated circuitry.

IR TRANSMITTER: The IR LED emitting infrared light is put on in the transmitting unit. To generate IR signal, LM358 IC based operational amplifier is used.

IR RECEIVER: The receiver unit consists of a sensor and its associated circuitry. In receiver section, the first part is a sensor, which detects IR pulses transmitted by IR-LED.

7. STEPPER MOTOR

Stepper motors convert electrical energy into precise mechanical motion. These motors rotate a specific incremental distance per each step. The number of steps executed controls the degree of rotation of the motor's shaft. This characteristic makes step motors excellent for positioning applications. For example, a 1.8° step motor executing 100 steps will rotate exactly 180° with some small amount of non-cumulative error.

The speed of step execution controls the rate of motor rotation. A 1.8° step motor executing steps at a speed of 200 steps per second will rotate at exactly 1 revolution per second.

Stepper motors can be very accurately controlled in terms of how far and how fast they will rotate. The number of steps the motor executes is equal to the number of pulse commands it is given. A step motor will rotate a distance and at a rate that is proportional to the number and frequency of its pulse commands.

8. RESULTS AND DISCUSSION

The proposed work has many major advantages it will reduce the accidents occurring at the railway level crossing, it will increase the accuracy and reduce errors occurring due to manual operations. It will reduce the collision of train and will also manage the route of a particular train to avoid any delay in reaching its destination. Train will always be on time at the station no delay will be caused which occurs in manual operation. Security can be implemented by placing 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 there by increasing the efficiency of the system. As the system is completely automated, it avoids manual errors and thus provides ultimate safety to road users. By this mechanism, presence of a gatekeeper is not necessary

and automatic operation of the gate through the motor action is achieved. Arduino UNO performs the complete operation i.e., sensing, gate closing and opening operation is done by software coding written for the controller. The mechanism works on a simple principle and there is not much of complexity needed in the circuit. Thus the automatic railway gate control using Arduino UNO is work efficiently and its reduces the human work and time. This is the easy to control the railway gate operation and it reduces the occurrence of faults.

REFRENCE

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