



AUTOMATIC MOBILE PLATFORM AND GATE CONTROL AT RAILWAY LINES

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ABSTRACT

The aim of the paper is to avoid the railway accidents happening at unattended railway gates by using ATMEGA_328 microcontroller, if implemented in spirit. Radio frequency (RF) transmitters and receivers are used to detect the train arrival and train accidents. Normally the mobile platform connects the two platforms through which the passenger can walk on the platform to reach on the next platform. Sensors are placed on the two sides of track. If the train reaches one sensor the mobile platform will automatically close and allows the train to go through the tracks and then when the train leaves the second sensor the mobile platform will automatically open the bridging platforms. The microcontroller will sense the presence of train by using infrared sensor. So on sensing the train on one path controller will give pulses to the stepper motor to close the mobile platform automatically. The collision of two trains due to the same track also can be happened. This model is implemented using sensor technique. We placed sensors 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.

1. INTRODUCTION

Now a days, India is the country which having world's track every day. As we know that it is definitely impossible to stop the running train at immediate is some critical situation or emergency arises. Train accidents having serious consequence in terms of loss of human life, injury, damage to Railway property. Railway safety is a crucial aspect of rail operation over the world. Railways being the cheapest mode of transportation are preferred over all the other means. When we read newspaper, 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. This model 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. To avoid the accidents, sensors placed at some distance from the gate detect the departure of the train. 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. The concept of the model is to control the railway gate using microcontroller. The present railway systems in india are not automated which are fully manmade. In railway stations normally we use bridges. It is very difficult for the elderly persons or handicapped persons to use the bridge .This paper finds a good solution .Mainly the tracking of a train is sensed by sensor, this is used for automatically close/open the mobile platform. Sensors are placed on two sides of track to sense the motion of train .The microcontroller will sense the presence of trains by using infrared sensors. So on sensing the train on one path ,the controller will give pulses to the stepper motor to close the mobile platform automatically.

2. EXISTNG SYSTEM

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. 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.

3. PROPOSED SYSTEM

In the proposed system, to control the railway gate automatically using Arduino board . Magnetic sensors are placed at the first and last compartment of the train these can be indicate that the train arrival and departure at railway gate.To develop an automatic mobile platform for passengers navigation , using IR sensors placed at railway track apart 2km from railway station.

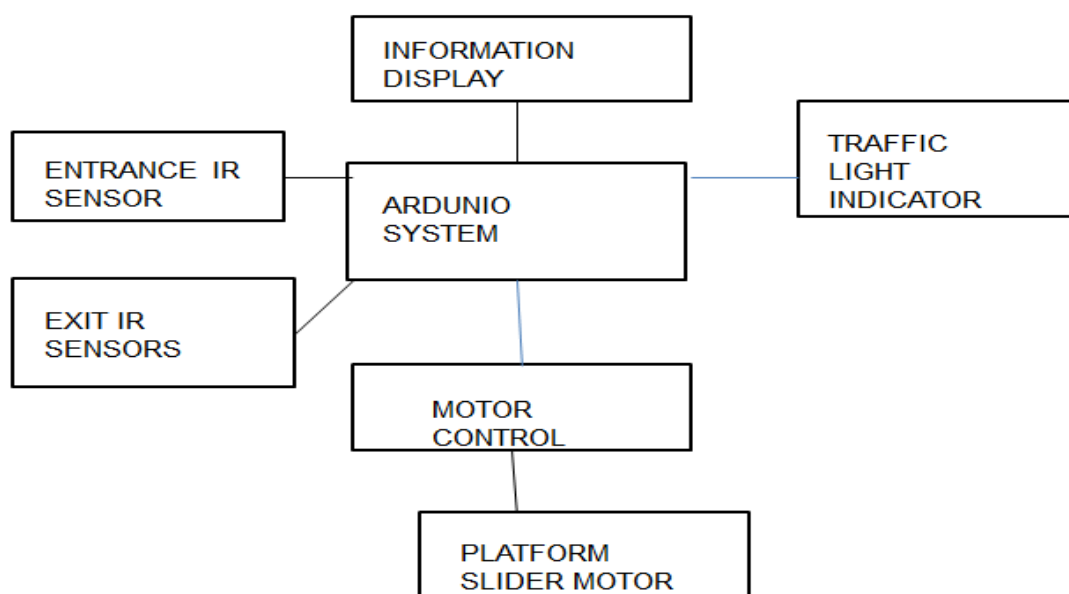


Fig.1. Moblie platform

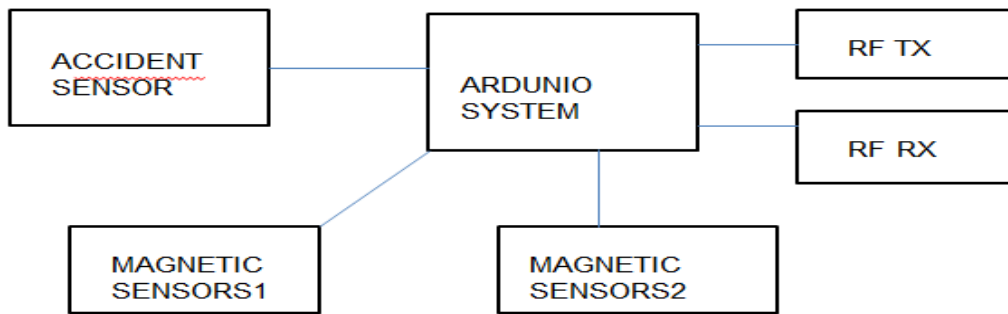


Fig 2: Train system

An infrared sensor is an electronic device that emits and detects infrared radiation in order to sense some aspect of its surrounding. It can measure the heat of an object, as well as detect motion. In a typical infrared sensor like a motion detector, radiation enters the front and reaches the sensor itself at the center of the device. Normally, a train has RF transmitters and receivers for continuous transmission and reception of information about the train's condition. Normally, a train has RF transmitters and receivers for continuous transmission and reception of information about the train's condition.

4. WORKING PRINCIPLE

Here, the counter value is used to calculate the velocity of the train, which means that every wheel of the carriage cuts the sensor pair within a small fraction of time based on its velocity. After the last carriage is passed, there is no obstacle to the sensor pair within that fraction of time; hence, it knows that the train has left.

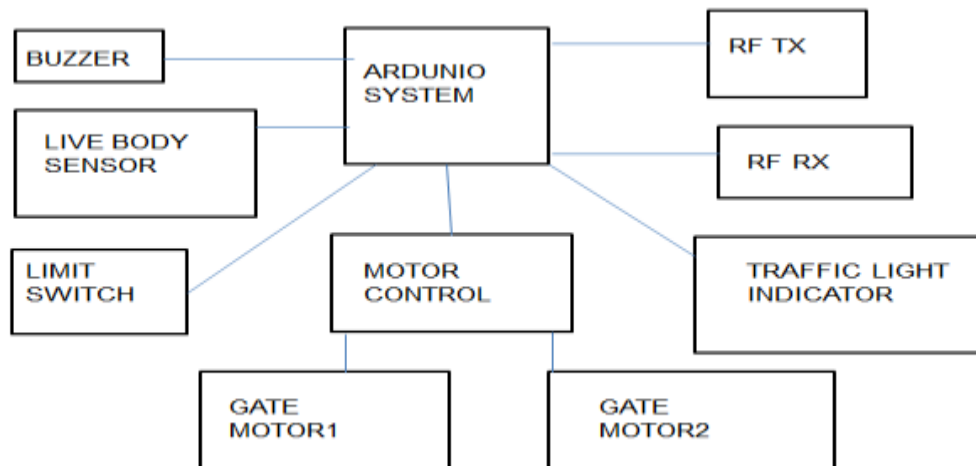


Fig 3: Gate control diagram

One more feature of this circuit is detecting a train accurately, i.e., there may be a chance that some obstacle (for e.g. some animal) may cut the sensor. In such a case, the counter is made to run for a certain period of time (this time period is set considering the possible lowest speed of train). If the obstacle does not cut the 2nd sensor before this predefined time, then this obstacle is not considered as a train and gates remain opened. One more advantage of calculating the velocity of the train is, if the speed of the train crosses a maximum speed, then the passengers are alerted by activating a buzzer. The system displays the time taken by the train in crossing this distance from one pair to the other with a resolution of 0.01 second, from which the speed of the vehicle can be calculated as follows:

$$\text{Speed (km/h)} = \text{Distance/Time}$$

This circuit has been designed considering the maximum permissible speed for trains as per the traffic rule. The microcontroller is used to process the inputs that are provided by the sensors and generate the desired outputs appropriately.

5. HARDWARE AND DESCRIPTION

A. MAGNETIC SENSORS:

Wide supply voltage, 1.9 V to 3.6 V is used. It has Independent IO supply (1.8 V) ± 4 / ± 8 / ± 12 / ± 16 gauss selectable magnetic full scale. Continuous and single- conversion modes are used. 16-bit data output and Interrupt generator are available. It has Self-test I2C/SPI digital output interface. Power-down mode/ low-power mode.

B. IR SENSORS:

HC-SR501 is based on infrared technology which acquires the information of train arrival. It has features of Voltage: 5V-20V is used. Power consumption: 65mA is available. TTL output: 3.3V, 0V. Sensor module is powered up after a minute, in this initialization time intervals during this module will output 0-3 times, a minute later enters the standby state. ° Should try to avoid the lights and other sources of interference close direct module surface of the lens, in order to avoid the introduction of interference signal malfunction; environment should avoid the wind flow, the wind will cause interference on the sensor. ° Sensor module with dual probe, the probe window is rectangular, dual (A B) in both ends of the longitudinal direction ° so when the human body from left to right or right to left through the infrared spectrum to reach dual time, distance difference, the greater the difference, the more sensitive the sensor, ° when the human body from the front to the probe or from top to bottom or from bottom to top on the direction traveled, double detects changes in the distance of less than infrared spectroscopy, no difference value the sensor insensitive or does not work; ° The dual direction of sensor should be installed parallel as far as possible in inline with human movement.

C. RADIO FREQUENCY:

Single-Chip RF Transmitter for 433 MHz ISM Band 420-MHz to 450- MHz is used. Operation FM/FSK for Transmit 24-Bit Direct Digital Synthesizer (DDS). With 11-Bit DAC Low Power Consumption. Typical Output Power of 7dBm Typical Output Frequency Resolution of 230 Hz Ultrafast Lock Times From DDS Implementation Two Fully-Programmable Operational Modes 2.2-V to 3.6-V Operation.

D. RF TRANSMITTER

RF433.92MHz transmitter Module connected with 4-bit encoder, user can evaluate RF interface in two ways (Standalone without MCU, user can give inputs through 4- way DIP switch SW35) while making switch SW35 to ON positions inputs low goes to the encoder. Data will transmit through the module. Also provided to configure address lines of the encoder.

E. RF RECEIVER:

RF433.92MHz Receiver Module connected with 4- bit decoder, user can evaluate RF signal with the help of LED indications. Whenever receives data through transmitter VT LED, indicates for valid transmission.

6. CONCLUSION

This paper is suitably fulfilled the basic things such as avoidance of accidents inside the gate and the avoidable of a gatekeeper. It avoids the railway accidents and provides safety. We have seen little improvement in railway accidents. We also observed stronger safety records in certain areas and believe they are the result of constant efforts to improve safety. We demonstrate that it is possible to improve the overall safety of the railway system in India. The proposed system provides the means for real time inspection, review and data collection for 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.

7. REFERENCES

- [1] Delmonte, E. and S. Tong (2011). Improving Safety and Accessibility at Level 29 Crossings for Disabled Pedestrians. Report Number T650. Rail Safety and Standards Board, London, United Kingdom, February 2011.
- [2] U.S. Department of Transportation, Federal Railroad Administration (2010). Railroad Trespassing, Vandalism, and Highway-Rail Grade Crossing Warning Device Violation Prevention Strategies. Office of Railroad Safety, December 2010.
- [3] Rail Safety and Standards Board (2010). Road- Rail Interface Special Topic Report. April 2010. London, United Kingdom
- [4] American Railway Engineering and Maintenance of Way Association (AREMA) (2010). Communications & Signal Manual, 2010 Edition, Volume 1 .
- [5] 26. Korve, H.W., J.I. Farran, D.M. Mansel, H.S. Levinson, T. Chira-Chavala, and D.R. Ragland (1996). Integration of Light Rail Transit into City Streets. TCRP Report Transportation Research Board, Washington, D.C.
- [6] U.K. Department for Transport –Rail Accident Investigation Branch (2006). Rail Accident Report –Investigation into Station Pedestrian Crossings. Report 23/2006, December 2006.
- [7] Ogden, B.D. (2007). Railroad-Highway Grade Crossing Handbook - Revised Second Edition 2007. Report No. FHWA-SA-07-010. Office of Safety Design Federal Highway Administration. San Francisco s “Advanced automatic warning signal system” in Proc. CERIE 2010, paper.
- [8] Krishna, Sashi Yadav et.al, Automatic Railway Gate Control Using Microcontroller, Oriental Journal of Computer Science & Technology, Dec’13.