

PLC BASED AUTOMATIC RAILWEY GATE CROSSING

^[1] Prof Manjusha K. Parve, ^[2] Mr.Pravin Awaje, ^[3] Mr. Akshay Shorte, ^[4] Miss. Shweta Ghutke,
^[5] Miss. Tanushri Yesambre, ^[6] Miss. Shrushti Yemle, ^[7] Miss. Vaishnavi
 Dangore , ^[7] Mr. Mukesh Kumar

^[1] Asst. Professor, Department of Electrical Engineering
^{[2][3][4][5][6][7]} BE Students, Department of Electrical Engineering
^{[2][3][4][5][6][7]} Priyadarshini Institute of Engineering and Technology, Nagpur

ABSTRACT

This paper proposes a Programmable Logical Control (PLC) based automated railway crossing gate control system. An existing conventional railway crossing gate control system in Bangladesh is being operated manually which causes increasing number of accidents at the crossings due to the carelessness in manual operation. Mechanism is time consuming. The gate controlling mechanism should be carried out ensuring safety to the road users and guarantying less time during gate opening and closing process. In this work, a prototype road and rail line model with automated railway level crossing gate controlling mechanism has been designed and implemented. At the train's level crossing arrival and departure side, a set of photoelectric sensors are strategically placed. Also, for detecting any obstacles, reflective type photoelectric sensors are used strategically. The developed prototype system is simple, has fast operational speed and functions agreeably in laboratory setup.

Keywords: - PLC, LED, Automatic railway gate control, DC motor.

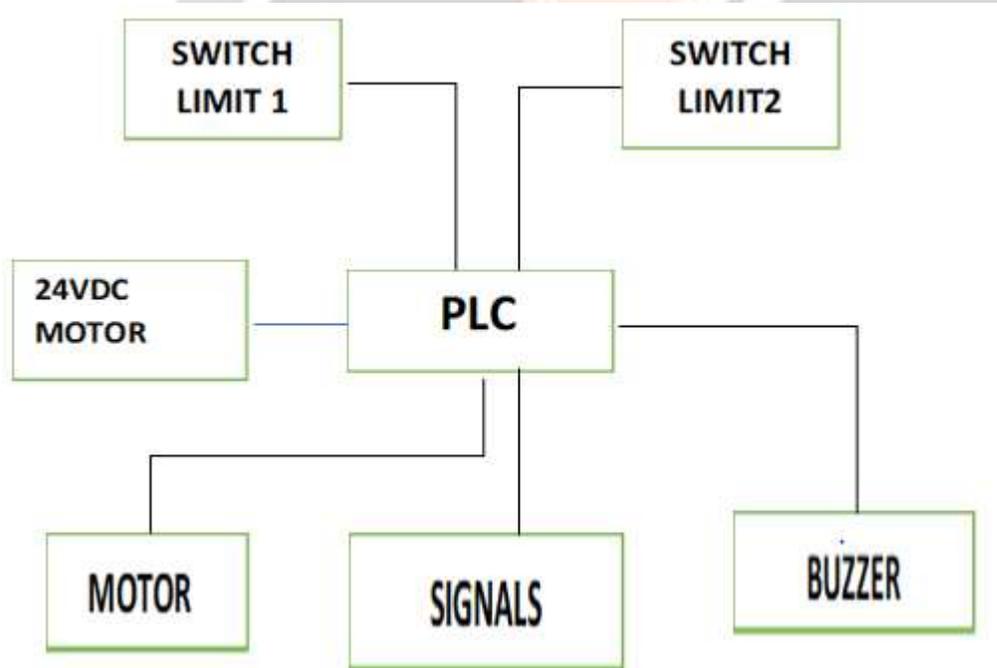
1. INTRODUCTION

When it involves public and private safety, it is always desirable to improve the signaling system and the way people are warned about potentially dangerous situations. The existing conventional signaling system most of the times rely on the oral communication through telephonic and telegraphic conversation as input for the decision making in track allocation for trains. There is a large scope for miscommunication of the information or communication gap due to the higher human interference in the system. At railway crossing, the traditional railway system uses the warning lights and human controlled gates to alert the people about an oncoming train. When the train leaves the station, the station agent informs the gatekeeper regarding the arrival of the train using the telephone and telegraph. The gatekeeper closes the gate depending on the timing at which the train arrives. Hence, if the train is late because of certain reasons, then gate stay closed for an extended time inflicting traffic near the gates. The automatic railway gate control at the railway crossing the arrival of the train is detected by the sensing element placed on the track at a precise distance from the gate. This sensing element detects the approaching train and consequently controls the operation of the gate. When the wheels of the train moving over the track there will be position switch and it will send the signal to PLC to indicate train arrival. This reduces the time that gate is closed as compared to the gates operated manually. In addition, this also reduces the human labor. This sort of automatic railway gate system is employed in associate unmanned gate crossing where the probabilities of accidents are higher and reliable operation is needed.

2. LITERATURESURVEY

The Researchers worldwide have been working on developing intelligently operated railway level crossing gate control system. The need of automated system in Bangladesh has been drawing attention of the researchers for past few decades. Most of the developed nations in the world already have automated system. However, some developing countries like Bangladesh is yet to develop automated railway level crossing gate control system. Developed an automatic railway gate control system using IR and pressure sensor along with voice declaration. This system allows the gate to be closed or opened automatically as soon as the train arrives or leaves railway-road level crossing. Microcontroller was used to trigger the siren to aware the people who may be near or on the track. And closing or opening the gate by rotating the DC motor. developed an automatic railway gate at a level crossing substituting the conventional gates maintained and operated by the gatekeeper. The system operates by AT mega 16A microcontroller. The sensor used here is also IR sensors. e. In this work an automatic railway crossing gate control system has been developed using Programmable Logic Control (PLC), Proximity Sensor, Obstacle Detector Switch, Light Emitting Diode (LED), DC Motor, and Geared Train. As the train reaches from a particular route proximity sensor provides the signal to PLC and produces an acceptable signal for the task of DC Motor to start the mechanism of opening / Closing the gate. The prototype level crossing gate control mechanism has been created in the laboratory which was experimented successfully. Automatic railway gate control is based on 8051 microcontroller and designed for operation in level crossings in the country.

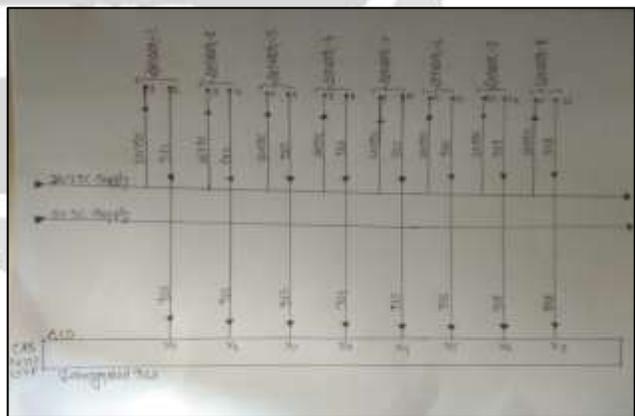
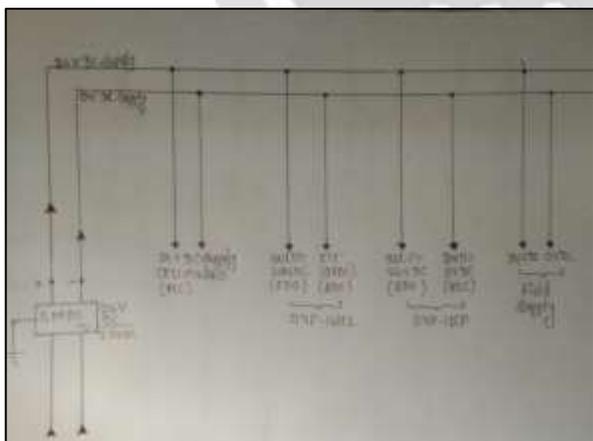
3. BLOCKDIAGRAM

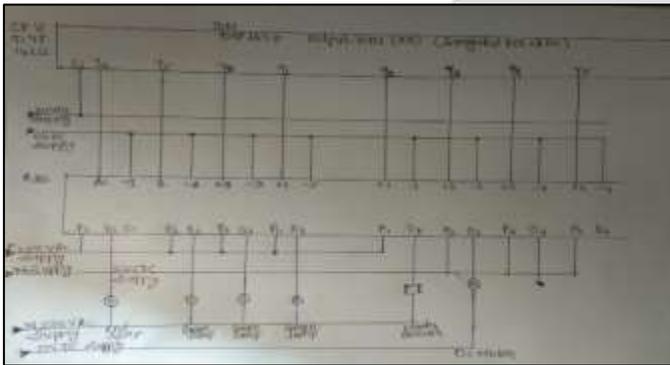
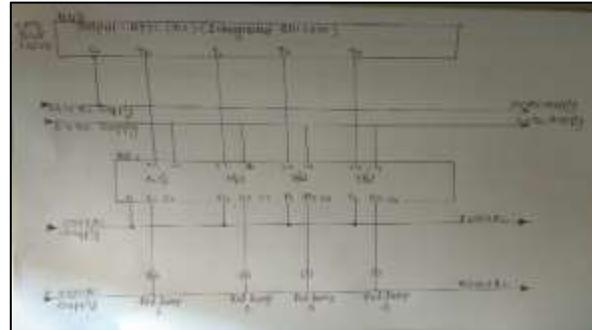
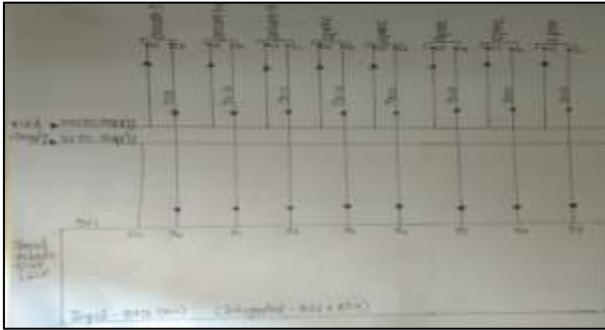


4. EQUIPMENTDIAGRAM



5. CIRCUIT DIAGRAM





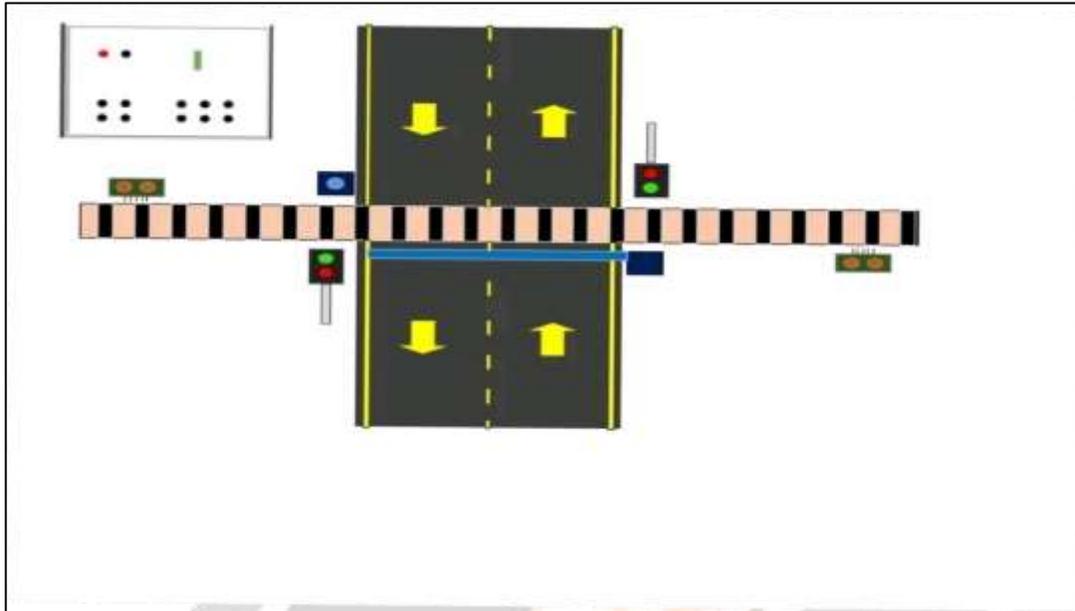
5.1 Description & Working

The main idea of our project is to develop the automatic to control the railway gate and traffic light at level crossing using PLC. As a train approach the railway crossing from either side, the sensors placed in the track at a certain distance from the gate detects the approaching train and accordingly controls the operation of the gate. The proposed system uses infrared sensors to detect the trains crossing the road and motor to control traffic light and the opening or closing of gates. The system uses two sensors to detect the arrival of the train and a second sensor to detect the leaves of the train. When the arrival of the train is sensed, signals are provided to the traffic indicating the arrival of the train on the road such as the signal turns red and the motor operates to close the gate. When the second sensor detects the train, then the signal turns green and the motor operates to open the gate. The gate remains closed until the train completely moves away from the crossing road. Thus, automation of the gate operations at the level crossing is achieved using sensors, motor and traffic light. The signal from the colour resistive sensor will play important role in gate control and traffic light control process. When the PLC receives the signal from the sensor, then it produces the output based on ladder program which is fed to stepper motor driver for closing the gate. When the gate is in a closed position, traffic light indicates the red signal for the vehicles that passing through the road. Similarly, when the PLC receives the signal from the receiver it indicates the train has passed away SWITCH gate is in open position which indicates that by a green signal for the level crossers.

6. ADVANTAGES

- Saving of money.
- Move towards smart city.
- Saving of time while construction.

7. SYSTEMMODEL



8. CONCLUSIONS

Now a day, PLCs are being used to reduce maintenance and labor cost of many control systems solutions. Within next five to ten years many existing control systems will be replaced by PLCs. Therefore, it is highly recommended that a complex system like railway gate controlling will be based on PLCs. In this project, we have developed such a control system. A prototype road and rail line model with railway gate has been created and implemented. After successful testing of the whole system, it was found that the developed system operates satisfactorily.

9. REFERENCES

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