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# Automatic Railway Gate ControlSystem Using PLC

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Abstract: The aim of this project is to develop a prototype that control the railway gate using PLC (PROGRAMMABLELOGIC CONTROLLER). Whenever train touches base at the IR sensor, caution is activated at the railway crossing so that the general population get instruction that entryway will be shut. At that point the control module initiates and shuts the gates on either side of the track. Once the train crosses, this module naturally lifts the gate. For mechanical operation of a gate DC adapted engines are utilized. We are using PLC as a main control unit. Asper the instructions produced at the PLC, the proper action (i.e., shut or lift) will be made. This logic was implemented in PLC(Programmable Logic Controller) Keywords: PLC, IR sensor, DC Motor

## I. 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 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 thetrack 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 thetrain 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.

#### **II.LITERATURE REVIEW**

The automatic railway gates operation has been projected using various methods. As proposed by XishiWang (1992), the process of developing fault tolerance method has been applied for both the hardware and the software components. Magnetic sensors placed undergroundto detect the train are less affected by environmental changes and recognizes the direction of movement of vehicles.

Jeong Y (2008) defined the railway auto control system using OSGi and JESS. The state of railway cross has been estimated using JESS in the technique. The issues in the technique are he insufficient inline citations and also multiple issues related to OSGI. The different methods used by locomotive pilots which can avoid the accidents and the safety measures while crossing the level crossings are also discussed. Atul Kumar Dewangan (2012) gave a detailed introduction about the present railway technology and also discussed the disadvantages of manually activated railway signals and the railway warnings at the level cross. The traindetectors act as the major component in the train automation system.

Banuchander J (2012) developed a method to concentrate on anti-collision system to identify the collision points and to report these error cases to main control room, nearby station as well as grid control stations.Efficient Zig- Bee based Train Anti-Collision using Zig-Bee technology for railways is implemented.

Greene R.J. (2006) anticipated an intelligent railway crossing control system for multiple tracks that features a controller which receives messages from incoming and outgoing trains by sensors. These messages contain detail information including the direction and identity of a train. Depending on those messages the controller device decides whenever the railroad crossing gate will close or open. But this technique has the issue of high maintenance.



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Kawshik Shikder (2014) projected the automatic operation of railway gates using RF technology. The major issue of this technique was every train could be provided with RF technology. Thus it was economically feasible to implement. Anil M.D. (2014) proposed advanced railway accident prevention system using sensor networks. He used ZigBee RF module to communicate between base station and trains. But, ZigBee was a short distance communicating device. Therefore it is practically not possible to implement his technique motor looks as a straight expansion over the simple DCones.

#### **III. DESCRIPTION AND WORKING**

The main idea of our project is to develop the automatic tocontrol the railway gate and traffic light at level crossingusing 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 theroad and motor to control traffic light and the opening or losing of gates. The system uses two sensors to detect 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 motoroperates to close the gate. When the second sensor detects the train, then the signal turns green and the motor operates 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 isachieved 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 steppermotor driver for closing the gate. When t gat raffic 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 indicates the train haspassed away SWITCH gate is in open position whichindicates that by a green signal for the level crosse

## A. PLC

PLC defines as a "digitally operating electronic apparatus which uses a programmable memory for the internal storage of the instructions for implementing specific functions such as logic, timing, counting and arithmetic, sequencing to control through digital or analog input/output modules, various types of machines or processors."

#### B. DC Motor

Geared DC Motors can be defined as an extension of DC motor which already had its insight details demystified here. A geared DC Motor-30RPM, 12Volts geared are generally a simple DC Motor with a gearbox attached to The speed of the motor is counted interms of rotations of the shaft per minute and is termed as RPM. The gearassembly helps in increasing the torque and reducing the speed. Using the correct combination of gears in a gear motor, its speed can be reduced to any desirable figure. This concept where gears reduce the speed of the vehicle but increase its torque is known as gear reduction. This insight will explore all the minor and major details that make the gear and hence the working of geared DC motor. At the first sight, the external structure of a DC geared







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The above architecture shows the arrangement of the components and connected in such a manner.here each and every component has connected in such away to communicate and to do control functions of all the components. By having a monitoring area all the process can be monitored at a single place. PLC is placed in central because it does all the functions according to sensor inputs

# **V. SYSTEM ARCHITECTURE**



Here we can see the complete flow process of the project the signal from the sensor will play major role in complete process as an initial state the signal is sent to PLC then it produces the output base on our ladder program the it is fed to drive the DC motor only needs the pilses. As a monitoring area we will have some display arrangements to monitor complete process.here signal to the monitoring area will betaken from the PLC.

## VI. ADVANTAGES

- A. Saving of money
- B. Move towards smart city
- C. Accident avoidance
- D. Human safety

## VII. CONCLUSION

Now a day, PLCs are being used to reduce maintenanceand labor cost of many control systems solutions. Within nextfive to ten years many existing control systems will be replaced by PLCs. Therefore, it is highly recommended thatacomplex 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 foundthat the developed system operates satisfactorily.



## VIII. SYSTEM MODEL



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#### REFERENCES

- [1] R.Gopinathan and B. Siva Shankar ISSN: 0976-1353 Volume 8 Issue 1-april 2014,"PLC BASED RAILWAY LEVELCROSSING GATE CONTROL.
- [2] B.Brailson Mansingh, Intelligent Systems and Control (ISCO), 2015 IEEE 9th InternationalConference, "Automationin unmanned railway levelcrossing."
- [3] Mr. P. Kirankumar and Mr.B.S.Shivashankar in International Journal of Engineering Research and General Science Issuedon April 2015. PLC based automatic fault detection of railwaytrack and accidence avoidance system .
- [4] I Rays to eliminate over 6,000 med level crossings article in the Indian Express, 30th July 2016 by PTL
- [5] Indian Railway develops warning system for un manned level crossings, article in Times of India. 25th October 2015 by PTI 1311.











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