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Automatic Railway Track Adjustment Bypassed System Using PLC & SCADA

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ABSTRACT

In recent day railway system is very common transportation system and at the same time it is often prone to accidents that are caused by a variety of mechanical and human faults. Normally due to the restless working of train drivers and due to lack of proper monitoring and alerting devices accidents are very frequently occurring in railway system. This proposed idea overcomes the above situation by providing the automatic monitoring and controlling device in the locomotive itself to provide remedial action under track crack, track collision, track changing, traffic light indication and gate control. This idea deals with two things; one is it has to issue an automatic control signals & track adjacent system using PLC & SCADA to the parameters concerned and second is to avoid hacker system in indian railway.

Keywords:*PLC , SCADA .*

1. INTRODUCTION

The place where track and highway/road intersects each other at the same level is known as “crossing”. There are mainly two types of level crossing they are Manned Level crossing and Unmanned Level crossing. Railways being the cheapest mode of transportation are preferred over all the othermeans.When we go through the daily newspapers we come across many train accidents occurring at unmanned railway crossings. This is mainly due to the carelessness in manual operations or lack of workers. We in this , have come up with a solution for the same. Using simple electronics components we have tried to automate the control of railway gates. As a train approaches the railway crossing from either side, the sensors placed in the tracks at a certain distance from the gate detects the approaching train and

accordingly controls the operation of the gate. When the wheels of the train moves over the track, the sensor 1 sense and detect the train and send signal to PLC to indicate the train arrival

2. PROPOSED SYSTEM

Block diagram of proposed system is as follows.

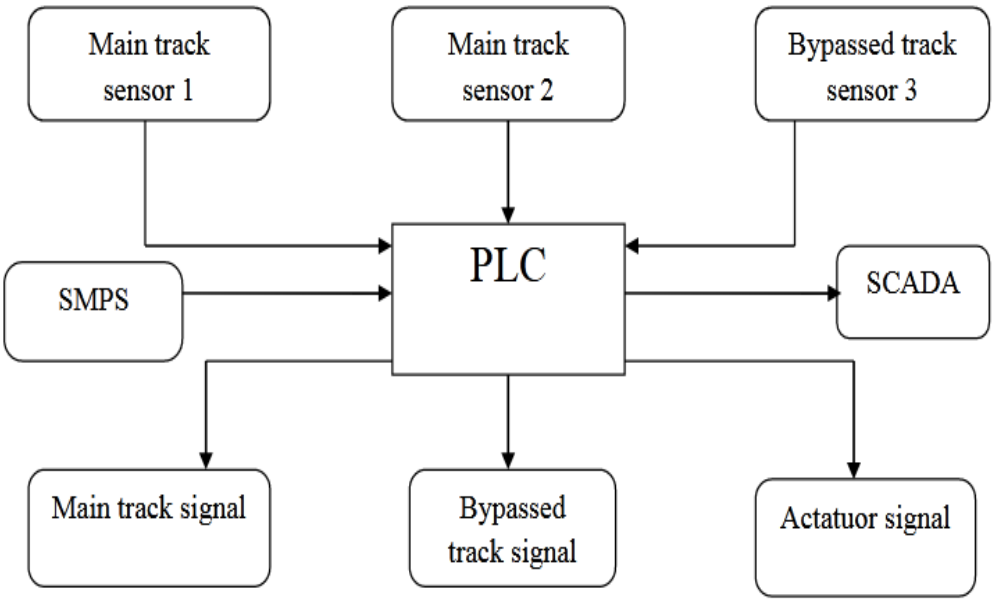

Fig-1:Proposed system of Automatic Railway Track Adjustment Bypassed System

3. Hardware and Software Used

- **Delta- DVP14SS2 (PLC).**

Fig-2Delta- DVP14SS2 (PLC).

- Category: Programmable logic controller(PLC/SPS)
- Fitting: On 35mm DIN rail, 4HPwide

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- Display:Yes
- Timer:Yes
- No. of inputs (max.): 8
- No. of outputs (max.):6
- No. of relay outputs (max.):4
- Operating voltage: 12V DC, 24VDC

- **Infrared Sensors**

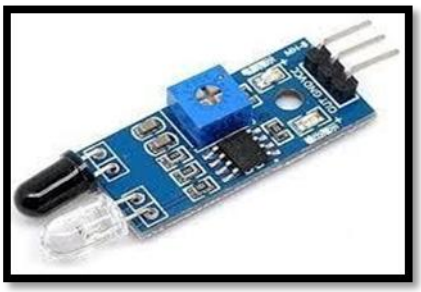

Fig-3 Delta- Infrared Sensors

- Operating voltage : 3.0v-5.0v
- Detection range : 2cm-30cm (adjustable using POT)
- Current consumption : at 3.3v – 23mA at 5.0v – 43mA
- Active output level : outputs low logic level when obstacle is detected
- On board obstacle detection LED indicator

- **BUZZER**

Fig-4 Buzzer

- Rated voltage : 5v DC

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- Number of pulse : 4
- Speed variation ratio : 1/64
- Frequency : 100 Hz

- **SOLENOID ACTUATORS**

Fig-5 SOLENOID ACTUATORS

Power Rating (DC watts or AC VA): This represents the input power possible for a solenoid with a specified winding at a specified voltage. The units for DC solenoids are watts (W) and the units for AC solenoids are volt-amps (VA).

- DC power input
- 3VDC Solenoid has a catalog rating for 3V DC input.
- 6VDC Solenoid has a catalog rating for 6V DC input.
- 12VDC Solenoid has a catalog rating for 12V DC input.
- 24VDC Solenoid has a catalog rating for 24V DC input.
- AC Power Input Options:
- 24VAC Solenoid has a catalog rating for 24V AC input.
- 115VAC Solenoid has a catalog rating for 115V AC input.
- 230VAC Solenoid has a catalog rating for 230V AC input.
- Other AC Voltage Solenoid has a catalog rating for other AC input.
- **Transformer 12v 500MA**

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Fig-6 Transformer

- Cooling :TypeDry Type
- Brand : TEER
- COILPower :500MA
- Input Voltage :230V
- Output Voltage :10V

SOFTWARE REQUIREMENT:

- Wpl Soft ForPlc Programming.
- Wonder wareIntouch For SCADA.
- KEP Server For Interfacing PLC & SCADA.

3. WORKING OF THE SYSTEM:

Track Changing:

Collision process and track cracking is interfaced in electromagnetic braking system. Using the PLC &SCADA automatic track changing is also possible. Considering a situation where an express train and a local train are travelling in opposite directions on the same track the express train is allowed to travel on the same track and the local train has been provided to avoid collisions. Here the system is use

Need of system

A. Safety :

Even though the accidents are less in Indian Railways there should be a protection system needs to be installed to prevent by any chance of occurring. When there is a signal communication, the data sent and received will be accurate. So the priority based train can take the right actions according to the PLC instructions.

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Delaying of trains:

Delaying of trains is a major issue currently we face. Presently it is rare to see that trains being reached at the right time. In order to eliminate this problem the signalling and interlocking design can be implemented. When there is an interlocking system the priority less trains can wait till the movement of other trains. Usually the fastest trains will have the high priority than the slowest. So the delaying issue can be solved by using an automated signalling and interlocking system.

B. Crack detection

Crack detection is one of the most important factor needs to be implemented in railways. There are many ways to detect the crack on the track. So the detection is only possible by using successive sensors. These sensors will be connected to the PLC for the exchange of information. The IR sensor is commonly used sensor now a days. 1 sensor indicates one receiver and also one sender. The sending and receiving antennas will communicate in every seconds so if they find out anything in the track it will be notified and the information will be sent to the plc. This is how the detection is possible.

C. Automatic railway gates:

Automating railway gate would be an important aspect in Railway safety. Still in India almost in every areas the Gates are being opened and closed by humans. The process cannot be accurate when human operates it. It is better to use vibration sensors to detect if the train is coming or not. There will be a connection with the PLC so the data can be exchanged then the stepper motor on the Gates will get activated on time .So the process.

5.ADVANTAGES:

1. Reducecollisionaccident.
2. If any interrupt are present on railway track then train automatically stop from these coming accident will remove.
3. Accident Avoidance
4. Human Safety
5. Quality& accurate service
6. Reduce the human effort and accident occurrence probabilities.
7. Eliminate trains being delayed.
8. Fast update of the relevant information.
9. Number of speed trains can be increased.
10. Easy traffic control.

6.RESULTS & DISCUSSIONS:

The present existing system is manually and human controlled system. By employing the PLC for automatic control of railway trains would decrease the railway traffic. Also automatic railway track adjacent bypassed sytem, the time for reduces the human efforts labour. The accidents are avoiding using this system. Apart from meeting the basic requirement of necessary safety in train operation, modern railway signalling plays an important role in determining the capacity of a section .The capacity decides the number of trains that can run on a single day. By proper signalling the capacity can be increased to a considerable extent without resorting to costlier alternatives. The majority of the process allow actions to be automatically triggered by events. A scripting language provided by the SCADA products allows these actions to be defined.

7.CONCLUSION:

An Automatic Accident Control System on Railway Track has successfully been designed and developed.This interface is synchronized with the whole process of accident control on the railway track. In this of prototype can easily be implemented in real life situations. With the help of PLC & SCADA sensor we can control accident on railway track and we use this sensor on train. It will sense till long distance in track. Today it will very useful for railwayboard.

This system provides a remarkable change in railway system for protection purpose with affordable cost.

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