Asian Journal of Electrical Sciences (AJES)
Vol.2.No.1 2014 pp 7-10.
available at: www.goniv.com
Paper Received :08-03-2014
Paper Accepted:22-03-2013
Paper Reviewed by: 1. R. Venkatakrishnan 2. R. Marimuthu
Editor : Prof. P.Muthukumar

AUTOMATICFIRE SENSING AND CONTROLLINGINFORMATION SYSTEMINATRAIN USING PLC AND SCADA NETWORKS.

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ABSTRACT

The demand for railway service, have consistently increasing in the, control and infrastructure are needed. Same as railway vice, in recent years,wireless technology have also advanced rapidly. Especially in this paper we are implementing a PLC, sensorwith network based information and rescuing system in a train to alert the authorities about the fire accident occurred. PLC and sensor network both are effective low cost monitoring system will also help the railway industry for both controlling and communication purpose. Finally presenting a low power embedded system to overcome the fire accidents occurring in railway industry. In this paper a discussion of proposed safety system for railway, using PLC as hardware platform, and combine with SCADA andwireless sensor networkas a communicationplatform of wireless area network. Which can transmit, receive and display warnings and emergency signals and for sensing the temperature in trains

Keywords-PLC, SCADA, Network, Temperature sensor.

1. INTRODUCTION

In present day's railways are very common and wellknown for transportation. We also know many accidentsare frequently causedin railways.Serioustrainaccidents are caused by avarietyof mechanicaland/or human factors. The so-called "human error" [6] is the result of many factors. Drivers and the running staff work irregular hours and suffer from safety risks due disturbed sleep patterns. Studies have shown that some drives are less alert and are most likely to commit errors between midnights and dawn. Another problem frequently caused in trains is fire accident. Fire on a running train is morecatastrophicthan on a stationaryone, sincefanningby winds helpsspreadthefiretoother coaches. Moreover, passenger's sometime jump out of a running train on fireresulting in increased casualties. In case of fire in running train, every railway staff available on the train or at the site shall immediately try and stop the train and plunge into action to save lives and property. All railway staff and passengers should take all possible precautionsto avoid any of the above mistakes so that possibilityof fire breaking outcan beminimized. In general fire originates in a small level. When it is surrounded by burning materials with adequate supply of air, fire spreads. Someof the main source for occurrenceof fire accidents in train. Carrying stoves, gas cylinders, kerosene oil, petrol, fireworks etc. Inpassenger compartments.2.Making fire/usingfirenearpaper, wood, petrolorsuchother inflammable articles. 3.

Lighted match sticks, cigarette ends carelessly thrown. 4. Short circuit inelectrical wirings. 5. Using naked light during authority tokendeliveryto the driver,shuntingof inflammable loads, sealing of inflammablewagons.The goal is todesignand implement a cost effective and intelligent full-fledged PLC kitandwireless based system to successfully prevent the fire accidents occurred in a train and also informs to the authorities about the incident immediately. The proposed systemconsistsofself-acting PLC, SCADA and network based data communication system which works round the clock to

avoid fire accidents in train. This system can be placed without replacing any existing system. The proposed system gets data from the moving trains, control-centers/stations, Signaling Posts. The efficiency of the system is expected to be considerably increased as the proposed system takes inputs from the signal posts and also from the train.

As no change isnecessary to be made to the infrastructure of the existing system, the cost of implementation of this system is also less .The system has been designed andsimulated using plc. Models of train system have also be made and tested. The rest of the paper deals with above give details only. Section 2 deals with the overview of the proposed system dealing the schematic diagram and detailed explanations for various blocks. Section 3 details the block diagram and PLC simulation details followed [3] with experimental setup of entire prototype, conclusion and reference.

Figure.1 Fire accident occurred in a Train

2. OVERVIEW OF THE PROPOSED SYSTEM

The project aims in designing a system which alerts the railway authorities and prevents the passengers form any kind fire accidents occurs in the train and this system also provides an immediate effect which controls fire using controlling system.

The project mainly helps to avoid accidents which usually occurs when sensor sense thetemperatureit activates the PLC. Thissystem has three mainsections:

A) Sensing B) Messaging C)Controlling

The train system does not have any kind of protection system. In this project the automatic Control system implemented. The module in the train has a temperature sensor which continuously monitors the temperature.

The temperature is read by the sensor. This sensor data is processed andSend the signal to the PLC controller. Then the PLC activates the water spray system. Clock circuit is provided about 3 min if there any temperature thenPLC activates co_2 extinguisher and send message to guard and the engine driver .Then again sense the temperature it activates the GSM,GPS and hook removing system.

A) Sensing

In a train the fire is occurred due the many criteria the fire is occurred the sensor sense the fire level and send signal to the PLC kit. Here CCTV is provided for continues monitoring.it fitted in the all compartment.

B) Messaging

Temperature sense by the sensor at the seconds the PLC kit send the message to the control center using the GSM technology. Control center having the SCADA monitoring it would conned to the networks.

C) Controlling

Temperature sense at next seconds the PLC activates the water spray system and activates the message to electrical circuit breaker system. After 3min the temperature exits the co_2 extinguishing system activates and send the message to the guard and engine driver. After 5min the temperature exits the PLC activates the GSM,GPS AND HOOK removing system. GPS is used for to know the position,GSM is used for messaging system and the hook removing system is used for to separate.

3. HOOK REMOVING SYSTEM

The command is come from the PLC kit the hydraulic system is on then the compartment will separate on bothside.

Figure.2 Ordinary Hook System

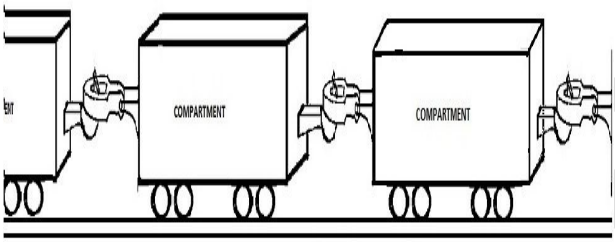

Figure.3 Normal Condition

Figure.4 Block Diagram

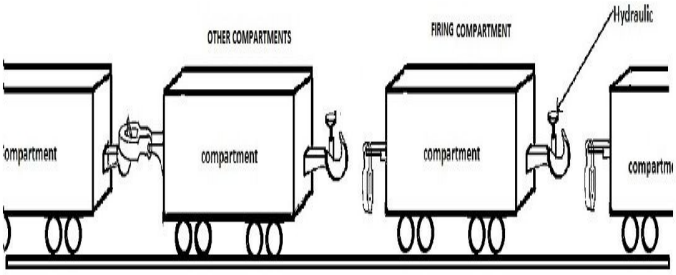

Figure.5 During operation

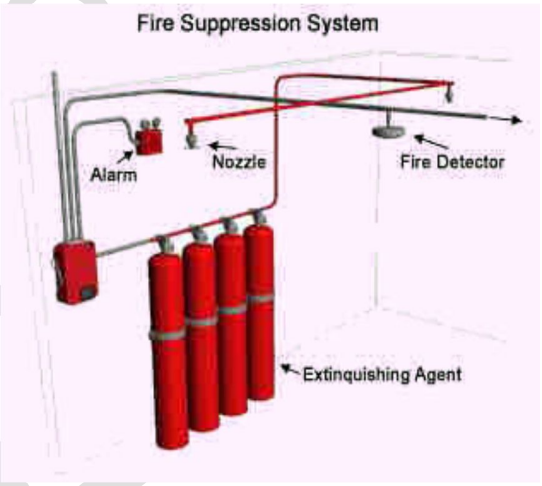

Figure.6 After operation

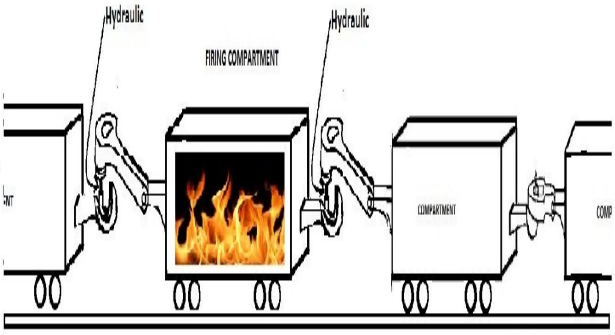

Figure.7 fire suppression modal

4. RESULTS AND ANALYSIS

Simulation of the proposed scheme has been carried-out in PLC. The program for the various systems have been simulated and all the necessary conditions verified. Program for various systems have been shown in fig G. various systems are shown in fig a, c, d,e, and f . And the snapshot of the PLC simulation result is shown in Fig h.

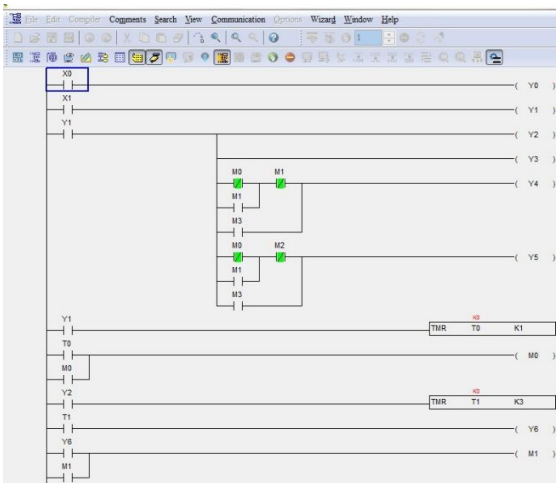

Figure.8 PLC Program

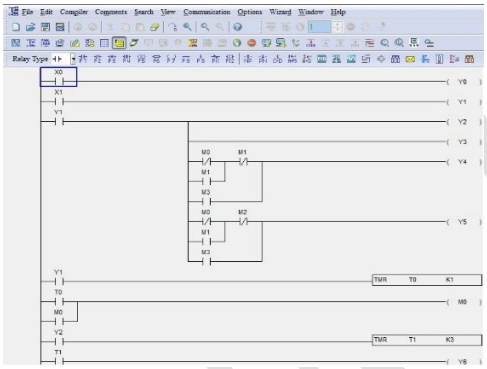

Figure.9 PLC Output

5. CONCLUSION

Inthisprojectani m p l e m e n t a t i o no f automatic f i r e controls y s t e mfortrainshave beendesigned, simulated andtested.Thesimulationhasbeendone using (WPL) PLC a n d testing hasbeencarried o u tu singt h e developed (WPL).Ithasbeenestimatedthat if the system is implemented in railways we can reduce thefire accidents with the help of PLC ,SCADA and networks .Hence it is expected that , major train mishaps can be prevented a n d human life saved if this system is implemented.

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