Paper ID: AM-21

PLC Based Automatic Railway Gate Control & Remote Monitoring System

Khandaker Marsus , Md. Selim Habib, Mohammad Ezaz Hossain , Md. Reaz Uddin, Md. I.H. Bhuiyan
Department of Electrical & Electronic Engineering,
Rajshahi University of Engineering & Technology
E-mail: kmarsus@gmail.com, selim041073@yahoo.com, ezaz.hossain@banglacat.com, reaz.uddin@banglacat.com, imam.hossain@banglacat.com

Abstract

The objective of this paper is to provide an automatic railway gate at a level crossing replacing the gates operated by the gatekeeper. It 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. By the presently existing system once the train leaves the station, the stationmaster informs the gatekeeper about the arrival of the train through the telephone. Once the gatekeeper receives the information, he closes the gate depending on the timing at which the train arrives. Hence, if the train is late due to certain reasons, then gate remain closed for a long time causing traffic near the gates. By employing the automatic railway gate control at the level crossing the arrival of the train is detected by the pressure switch placed near to the gate. Hence, the time for which it is closed is less compared to the manually operated gates and also reduces the human labor. This type of gates can be employed in an unmanned level crossing where the chances of accidents are higher and reliable operation is required. Since, the operation is automatic; error due to manual operation is prevented. And finally a computer based monitoring system is applied to the crossing area. This could be monitored through internet from anywhere. That's why any unusual problem could be easily solved remotely. Automatic railway gate control is highly economical with PLC based arrangements that could be designed for using in almost all the unmanned level crossings in the country.

Keywords: *Railway gate control, railway remote controlling system.*

1. INTRODUCTION

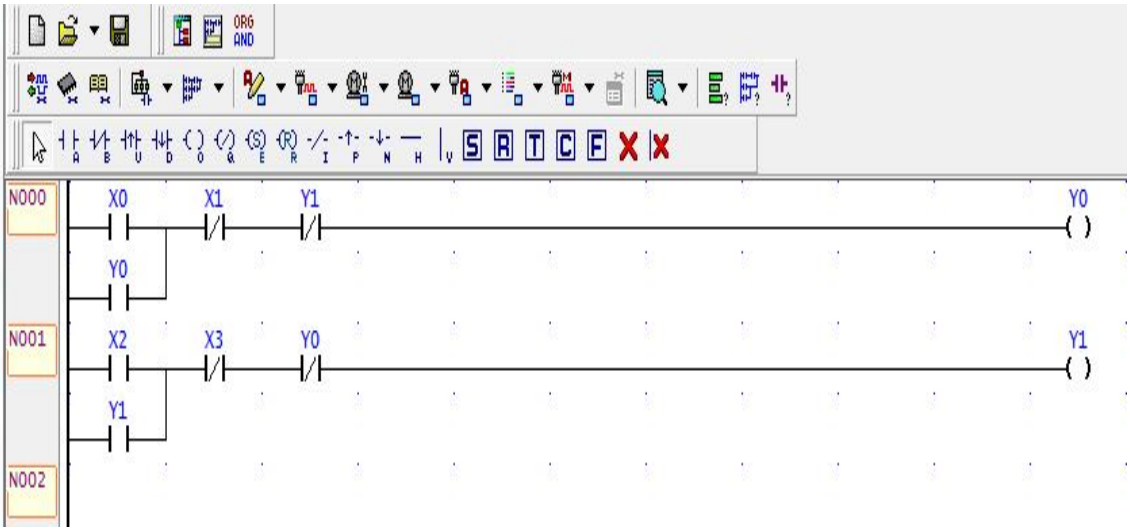
In this paper I am concerned of providing an automatic railway gate control at unmanned level crossings replacing the gates operated by gate keepers and also the semi automatically operated gates. It deals with two things. Firstly, it deals with the reduction of time for which the gate is being kept 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. By employing the automatic railway gate control at the level crossing the arrival of train is detected by the pressure switch placed on either side of the gate at about 5km from the level crossing. Once the arrival is sensed, the sensed signal is sent to the PLC. Subsequently, buzzer indication and light signals on either side are provided to the road users indicating the closure of gates. The departure of the train is detected by pressure switch placed at about 1km from the gate. The signal about the departure is sent to the PLC, 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.

2. CIRCUIT DIAGRAM & DESCRIPTION

Programming software WPL has been utilized in this project. WPL-Programmer is a PLC programming tool for the creation, testing and maintenance of programs. It provides facilities for the support of PLC devices and address information and for communications their supported network types.

3. LADDER DIAGRAM

In this paper, we define an event is the occurrence of pressure pulse created by train wheel. Here is the plc ladder diagram for whole logic.



3.1 PLC CONNECTION DIAGRAM

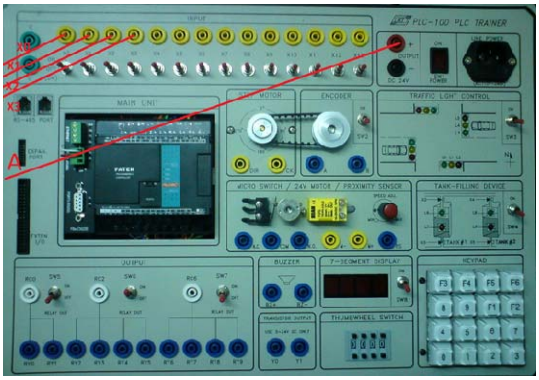


Fig. 1 Experimental setup

3.2 BUZZER & RELAY CONNECTION

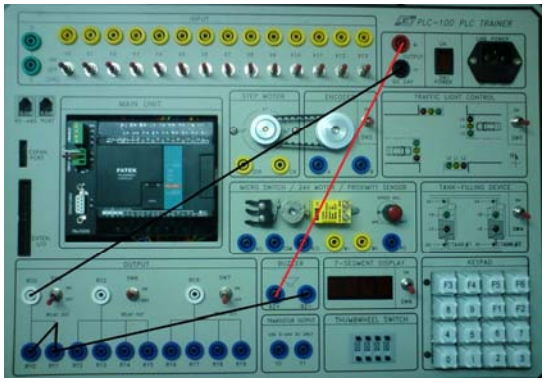


Fig. 2 Sound sensing circuitry

3.3 WORKING PRINCIPLE

In this project the PLC connected with the project. And when a train passes over the pressure sensor it just get a pulse. This pulse is received by PLC. PLC count the pulse does the work accordingly. Again when trains leave the crossing it also acts in the same way.

4 REMOTE MONITORING SYSTEMS

Remote monitoring system works thorough as real-time guard. A computer based monitoring system is applied to the crossing area. This could be monitored through internet from anywhere. That's why any unusual problem could be easily solved remotely. For remote monitoring system it needs different technical side. Sever side, camera side, streaming side, display computer and website combines the whole work.

4.1 STREAMING

Streaming media is multimedia that is constantly received by and presented to an end-user while being delivered by a provider. Its verb form, "to stream", refers to the process of delivering media in this manner; the term refers to the delivery method of the medium rather than the medium itself. A client media player can begin playing the data (such as a movie) before the entire file has been transmitted. Distinguishing delivery method from the media distributed applies specifically to telecommunications networks, as most other delivery systems are either inherently streaming (e.g., radio, television) or inherently nonstreaming (e.g., books, video cassettes, audio CDs). For example, in the 1930s, muzak was among the earliest popularly available streaming media; nowadays Internet television is a common form of streamed media. The term "streaming media" can apply to media other than video and audio such as live closed captioning, stock ticker, and real-time text, which are all considered "streaming text".

Live streaming, delivering live over the Internet, involves a camera for the media, an encoder to digitize the content, a media publisher, and a content delivery network to distribute and deliver the content.

4.2 SETUP

The total settings are containing with some software and web server.

4.3 VIDEO CAPTURING UNIT

Capturing unit is the use of video cameras to transmit a signal to a specific place, on a limited set of monitors. It differs from broadcast television in that the signal is not openly transmitted, though it may employ point to point (P2P), point to multipoint, or mesh wireless links.

Fig :4.1 Capturing unit for real-time video

4.4 STREAMING SYSTEM

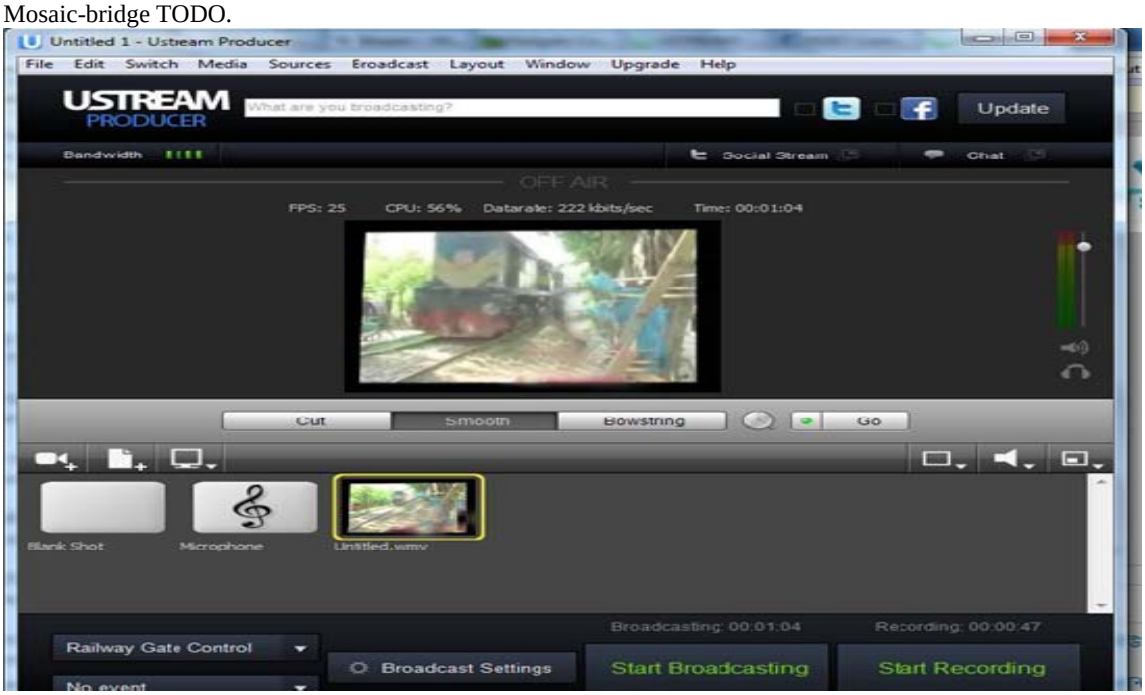
Live stream works with the following system:

Stream output is the name of the feature of broadcasting that allows outputting any stream read by file or as a network stream instead of displaying it. Different kind of processing can be applied to the stream during this process (transcoding, re-scaling, filters, re-muxing...). Stream output includes different modules, each of them having different capabilities. One can chain modules to enhance the possibilities. Standard allows to send the stream via an access output module: for example, UDP, file, HTTP, ... You will probably want to use this module at the end of your chains.

transcode is used to transcode (decode and re-encode the stream using a different codec and/or bitrate) the audio and the video of the input stream. If the input or output access method doesn't allow pace control (network, capture devices), this done "on the fly", in real time. This can require quite a lot of CPU power, depending on the parameters set. Other streams, such as files and disks are transcoded as fast as the system allows it.

duplicate allows you to create a second chain, where the stream will be handled in an independent way.

display allows you to display the input stream, as VLC would normally do. Used with the duplicate module, this allows you to monitor the stream while processing it.
rtp streams over RTP (one UDP port for each elementary stream). This module also allows RTSP support.
es allows you to make separate Elementary Streams (ES) out of an input stream. This can be used to save audio and video streams to separate files, for instance.
bridge-out TODO
bridge-in TODO
Mosaic-bridge TODO.



4.5 REMOTE CONTROL ADMINISTRATOR & USER LOGIN

This website part is for using in control room. First the controller needs to get the user name and password from the system administrator. Then he will be eligible to access the videos. The video section also categories with different sections. Such as, one unit in one section and rest units in others. One unit may contain 25-30 video players. That can control the amount of rail crossing. Presently the site is available at bdallinfo.com/railway.

4.6 ADMINISTRATOR AREA

Administrators, commonly known as admins or sysops (system operators), are rail gate controller who have been granted the technical ability to perform certain special actions on controlling, including the ability to control train, block vehicles, allow pedestrians etc. tools.

This is the real view of controlling system. From the videos the operator can take any decision and can give any command from remote.

5 CONCLUSIONS:

The world has started experiencing more digital devices that has made observation and response according to situation demand much easier. By using this application we hope that railway accidents in Bangladesh could be reduced in a significant number.

References

[1]. Robert L. Boylestad, "Introductory Circuit Analysis'', Division of Bell & Howell Company, 1995

[2] V.K. Mehta and Rohit Mehta, "Principle Of Electronics'',S.Chand & Company Ltd,2008

[3] B.L Theraja and A.K Theraja, "A text Book Of Electrical Technology (AC & DC Machines)'',S.Chand & Company Ltd.2002

[4] Russel M Kerchner and George F Corcoran, "Alternating-Current Circuits'',Fourth Edition,John Wiley & Sons Int,2006

[5] A.K Shawney, "Measurement & Instrumentation'',

[6] V.K. Mehta and Rohit Mehta, "Principle Of Power System'',S.Chand & Company,2010

[7] J. Wilson & J.F.B.Hawkes, " Optoelectronics An Introduction'',Prentice-Hall Int,Second Edition,2000

[8] S.B. Morris, "Programmable LogicControllers'', New Jersey, Prantice Hall, Inc.,1995

[9] F.D. Petruzella, Programmable LogicControllers 3th Ed, Singapore, McGraw –
Hill International Edition, 2005.

[10] C.K. Meng, Y. Away, N.F. Elias & A.S.Prabuwono, The Real-Time Visual
Inspection System For Bottling Machine,2000

[11] Bolton, W. Mechatronics: Electronic Control Systems in Mechanical and Electrical Engineering, 3rd edition Pearson Education, 2004.

[12] http://en.wikipedia.org/wiki/File/transformer-load

[13] http://program-plc.blogspot.com

[14] http://en.wikipedia.org/wiki/Programmable_logic_controller

[15] http://www.plcmanual.com