

Control, Automation and Monitoring of Class Room Using Plc and Scada

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Abstract- This article is concerned with the smart way of controlling and monitoring of class room. The manual process of the attendance management and the periodic bell ringing system is made automated and wastage of power after the end of class session is avoided. The controlling and monitoring can be done directly by the HOD or Principal in their personal computer. Controlling can be kept automated and also have an option to switch over manual control. All these are achieved by erecting PLC as a controller. The monitoring process is achieved by interfacing SCADA with the controller.

I. INTRODUCTION

Normally each and every period the attendance of the students must be enrolled in the attendance registry by a staff who is in charge of the corresponding period. This process takes some time to complete and also increases complexity. The periodic bell ringing system and power conservation system functions on the basis of the real time clock present in the PLC and programmable relays. At the end of every period and break the bell rangs automatically and at the end of the college or school time the power supply to the respective class room is switched down. The students who enrolled their attendance will directly send to the PC of class in-charge and there is no necessary for them to register the attendance by coming to the class. The periodic bell ringing and power supply over class room can also be controlled manually by providing an option in case of emergency and cautious needs.

II. PROGRAMMABLE LOGIC CONTROLLER

A programmable logic controller (PLC) is a specialized processor used to control devices and machines. Basically, PLC is an assembly of solid-state digital logic elements designed to make logical decision. It uses programmable memory to store instruction and execute specific function that include on/off control, timing, counting, sequence, arithmetic and data handling. Initially PLC is used to replace the conventional relay control. This helps to reduce hard wiring and com-

plexity. PLC is more reliable and advantageous when compared with other programmable controllers. In this article we used OMRON CPTC model PLC.

III. SYSTEM DESIGN

PLC panel forms the main core of the control system. The Panel board used for this application can also be used for the online control as well as offline testing.

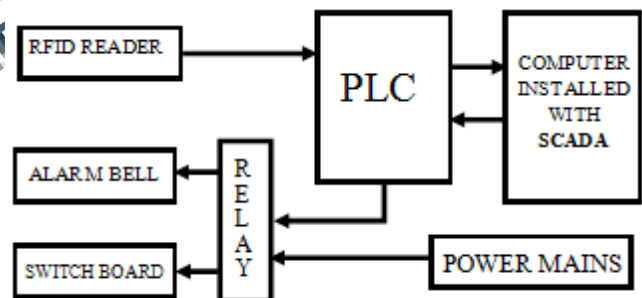


Figure 1: Block diagram of the system

The System contains RFID Reader, Relay, PLC Panel, SMPS. The power supply for the PLC and for the RFID reader is provided with the help of SMPS. The SMPS we proposed in this article is 230V AC to 24V DC power supply. This also forms an isolation from the fluctuation of the power supply

IV. AUTOMATED ATTENDANCE MANAGMENT SYSTEM

The automated attendance management is achieved using RFID technology. The RFID technology mainly comprises of reader module and the tags. The student will own their own RFID tag containing an unique identification number. The Students name and their unique ID is programmed in the PLC.

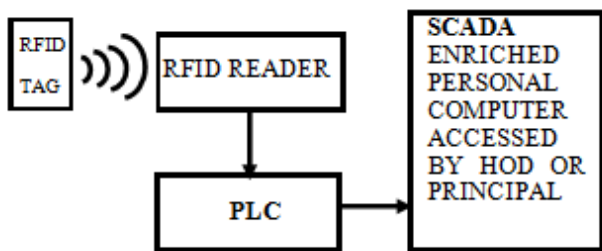


Figure 2: Block diagram of attendance system

So that whenever a student entering the class room should place their RFID tag near to the reader. The reader or interrogator reads the unique ID number and sends to the PLC. Then the PLC makes the status as present for the corresponding student automatically. The communication between the RFID reader and PLC is established using RS232 cable.

V. AUTOMATED PERIODIC BELL RINGING SYSTEM:

At the end of each and every period and at the break the bell is ranged automatically. The time management is must for programming the duration of the session and break time. It is perfectly done using the RTC (Real Time Clock) present in the PLC. Generally the PLC time is synchronized with the authenticat-ed personal computer in which the PLC is connected.

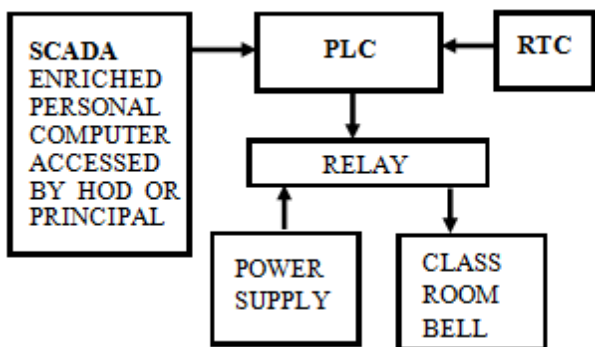


Figure 3: Block diagram for Periodic bell ringing

The bell is connected to the relay which in turn con-nected to the PLC. According to the logic stored in the memory the relay gets closed and gives supply to the bell. This makes the bell to ring for the programmed duration. This is an automated process which can also controlled manually by the personal computer connect-ed to the PLC.

VI. POWER CONSERVATION SYSTEM:

The students in the class room regularly forgets to switch off the fans and lights when they leav-ing the class room. Already the power consumption in school or college is vast, in that wastage of power is maximum compared to the efficient usage. Hence the wastage of power is avoided by switching off the pow-er supplied to the class room at the end of whole class session.

This is also achieved using the relays. The logic designed and stored in the PLC will compris-ing that the relay will open at particular time which is programmed. In case of extension of the class session the main can be switched on manually by the computer connected. This can be done by the administrator of the computer which is connected with the PLC, whose computer is enriched with SCADA.

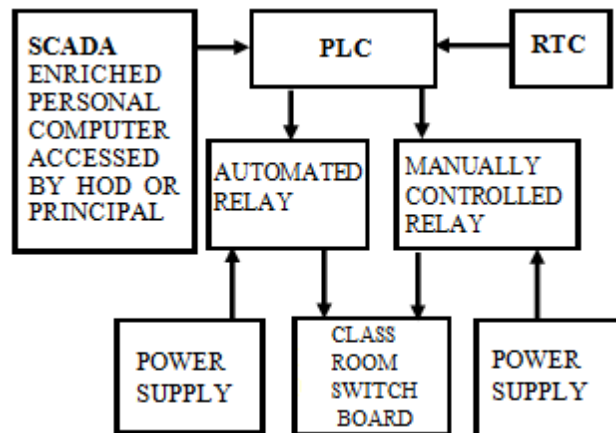


Figure 4: Block diagram for power conservation

VII. LADDER LOGIC:

Ladder logic is a logical instruction stored in the PLC, which helps the controller to con-trol its input and output devices by the logic designed. The ladder logic is generally designed by the software defined for the corresponding PLC. The software pro-posed in this article for designing ladder logic is CX-PROGRAMMER

For all the three processes namely at-tendance management, periodic bell ringing and power conservation the ladder is designed with proper timing instruction with reference to the real time clock present in the PLC itself. If any change in the field devices or replacement of input and output devices,

the updating can be done easily. The ladder logic is the simplest of all algorithms used for programming a controller.

VIII. SCADA IMPLEMENTATION:

SCADA is a graphical user interface software interfaced with the controller. SCADA system consists of a number of remote terminal units (RTUs) collecting field data and sending that data back to the master station, via communication system. The master station displays the acquired data and allows for optimization of the field operation and processes.

The personal computer connected with the PLC acts as a master station and the devices connected such as RFID reader, relay are acts a remote terminal unit. Hence SCADA displays the students present in the class by the data send by the RFID reader. The manual control can be made easy by just clicking and not dealing with the logic stored every time.

This helps the user to control the input and output devices without any need to understand the logic. Whenever a new field devices is replaced or added with the controller it is easy to make the controller to adopt. The SCADA is also easily upgraded when a new devices is connected to the controller. It will always depends on the logic stored in the PLC.

IX. EXISTING SYSTEM:

The existing system requires individual controller for each and every process. When we go for a multiple real time processes with a normal controller cascading is the only way which needs proper synchronization. As the number of controller increased the complexity of the system is also increased. It will directly reflected in the logical designing for the controller.

The chances for intruder access is more in the normal controller and reliability is decreased when multiple processes comes into the system. When the controlling of high voltages comes into process the isolation must be provided in the input and output ports which is lacking in the proposed system.

X. DISCUSSIONS AND CONCLUSIONS

The proposed system will overcome the demerits faced in the existing system and also finds a unique solution for the smart way of controlling and monitoring of class room.

The mandatory attendance made in each and every period by the staff of that class room will always consume some time and it is not accurate every time. From this system the time and man power is reduced considerably. Also in existing system the attendance is registered in the registry note which must be enrolled in the computer later for

storage. It can be avoided in this proposal by managing the attendance directly on the computer itself.

The periodic bell ringing system is done by manually all these days which does not maintain the perfect session timing which is eradicated in this article. And also concentrated over the power conservation in the class room using a single controller.

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