Plc Based Alarm Aystem

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Abstract- *Now a day's many school/college, industry, home bells are manually operated. Hence there is a big question of accuracy. In market there are many digital clocks available with bells but rings only at specific time and cannot stop after specific time. This paper discusses in detail the use of automatic control system, which saves manpower and money and yielding better accuracy. Using PROGRAMMABLE LOGIC CONTROLLER (PLC) it rings in accordance to college/school time table at specific scheduled timings. It can be replaced with the manual switching of the bell in the school/college.*

Keywords- College/school Bell, Front Panel, PROGRAMMABLE LOGIC CONTROLLER (PLC) , Humans machine interfaces, Virtual Instrumentation.

I. INTRODUCTION

Due to literacy awareness number of colleges and schools are rapidly increasing. In present system, bell for period or break are operated manually. After every class, an employee is engaged in alarming bell. Inaccuracy, Human error and inconsistency are the drawbacks of manual system.To overcome these problems programmable logic controller (PLC) plays animportant role. Automation of college bell is possible so the bell would ring automatically at the scheduled time. This paper deals with the implementation of circuit for scheduling of school/college bell. It has an inbuilt Real Time Clock which tracks over the Real Time. When this time equals to the Bell Ringing time, then the Bell is switch Ringing time can be edited at any Time, so that it can be used at Normal Class Timings as well as Examination timings.

A) Manual College Bell:

Early methods included the hand ringing of bells - some of which are still used at the moment. Progressively technology has seen the beginning of more dependable and more and more accurate systems, to the position where today's schools can have fully planned timetables that automatically make changes for exams. Present day ringing the bell in colleges/schools are carried out manually. The main disadvantage of this is one person is to be keeping alert for this. At the same time during that time he could not beengaged in another task. Of course, one further hitch of the manual bell ringing approach is the question of hearing loss caused by close proximity to the noisy bells. This exposure was either unknown in the past or at least it was by no means considered a significant enough issue to deserve changes to the practice.In recent decades, several other school bell systems have been tested, some proving more functional than others. Several schools have tried using sirens and klaxons to alert students and teachers of period times, nevertheless these were usually found to be stressful, and had an adverse effect on the concentration ability of students.

B)Real Time Clock Based Automatic College Bell:

This system replaces the Manual Switching of the Bell in College/school. It has an Inbuilt Real Time Clock which tracks over the Real Time. When this time equals to the Bell Ringing time, then the Relay for the Bell is switched On. The Bell Ringing time can be edited at any time, so that it can be used at normal class timings as well as examination timing.The Real Time Clock is displayed on HMI. When the Real time and Bell time get equal then the Bell is switched on for a predetermined time. These bells are equipped with the PLC which controls the bell.

C) Embedded Based Automatic College Bell:

Embedded Based Automatic College Bell System is developed for the users to control Bell system in companies or institutions automatically. All the bell timings and durations are predefined and set in the PLC. The user can set the timings using a key pad. A HMI display is used to display the timings. The timings set by the user are stored in thePLC. At the particular time, signal is generated in the PLC and sent through the output port. The electronic circuit receives the signal and drives a corresponding relay.The relay is used as a switch to operate the Bell. As soon as the duration is over, the signal is stopped and waiting for the next set time. This system is mainly used in Schools, Colleges and other companies where Bell system is implemented. There is no need of a person managing the bell timings.

Timers :

Timers are used to provide logic when a circuit turns on or off. Traditional pneumatic timers were provided as either on-delay timers or off-delay timers. Contacts were provided both normally open and normally closed for each type of timer. The timer head was chosen as either the on-delay type or off-delay type. PLCs allow for a quick change from one type to the other with a few keystrokes on the programming panel.

Symbols for Timers: While these timers are only a sampling of the types of different timers, their function describes the main function of all timers, a time delay. While PLC vendors do not need to use the terms of on-delay or off-delay, normally closed, normally open, held closed, or held open, these terms are an important part of design of PLC circuits. Some vendors still use the terms to show linkage between the PLC and the original timer circuits.Allen-Bradley provides three timers; TON, TOF, and RTO. All are block-type instructions and are located at the extreme right of each rung used. They are parallel to coils but may not be used in series with each other or in parallel with coils. Each has two coils extending from its right. These coils are not programmed separately. These coils appear when the timer function block is programmed.

CTU: Count up

The instruction Count up counts up the value at output CV. When the signal state at the CU input changes from 0 to 1 (positive signal edge), the instruction executes and the current count value at the CV output is incremented by one. When the instruction executes for the first time, the current count value at the CV output is set to zero. The count value is incremented each time a positive signal edge is detected, until it reaches the high limit for the data type specified at the CV output. When the high limit is reached, the signal state at the CU input no longer has an effect on the instruction.

CTUD: Count up and down

You can use the Count up and down instruction to increment and decrement the count value at the CV output. If the signal state at the CU input changes from 0 to 1 (positive signal edge), the current count value is incremented by one and stored at the CV output. If the signal state at the CD input changes from 0 to 1 (positive signal edge), the count value at the CV output is decremented by one. If there is a positive signal edge at the CU and CD inputs in one program cycle, the current count value at the CV output remains unchanged.

Clocks and Timers :

Timers can be used to design clocks. However, they tend to be inaccurate so real-time clocks have been designed into most PLCs to give very accurate times that time stamp events. Clocks programmed with timers lose accuracy when the timer is reset. Usually a scan or two is lost (added) to the time so when the timer is started a 2 to 20 msec delay occurred. Over a day or week, the timer may keep a fairly accurate clock but with time, the clock tends to get farther and farther from the true time. Of course, if the timer is reset once an hour or day with a master reset signal, the timer may mimic a very accurate clock. More accurate clocks can be built if very long time delays are used. Avoiding the reset scan allows the highest accuracy in clocks. Since PLC timer simulated clocks are not accurate for most applications, look to the PLC vendor to install a real-time clock. The real time clock is accurate to the same accuracy of the watch on your arm. It is operated with a crystal timer and set by the program and operated by the clock circuit separate from the scan time of the PLC. Most PLCs have built-in real time clocks. While the A-B SLC-500 processors do not all contain the Real-Time Clock function, they are defined in the larger SLC 5/03, 5/04, and 5/05. Status register addresses S:37 to S:42 define the Real-Time Clock. These registers are defined as follows:

S:37	Clock/Calendar	Year	Range	0-65535
S:38	Clock/Calendar	Month	Range	1-12
S:39	Clock/Calendar	Day	Range	1-31
S:40	Clock/Calendar	Hours	Range	0-23
S:41	Clock/Calendar	Minutes	Range	0-59
S:42	Clock/Calendar	Seconds	Range	0-59

HMI:

Screen Navigation: You will also need to consider configuring screen navigation. For a production process consisting of multiple sub-processes, you will configure multiple screens. You have the following options to enable the operator to switch from one screen to the next in Runtime:

● Assign buttons to screen changes
● Configuring screen changes at local function keys

The procedure for configuring screens follows:

Before you create a screen change, define the plant structure and derive from it the screen changes that you want to configure. Create the start screen under Runtime Settings > General > Start screen. You will need to assign a button to change the screen. You will need to configure a button in the screen to switch between the screens on the HMI device during operation.

Fig 1: HMI.

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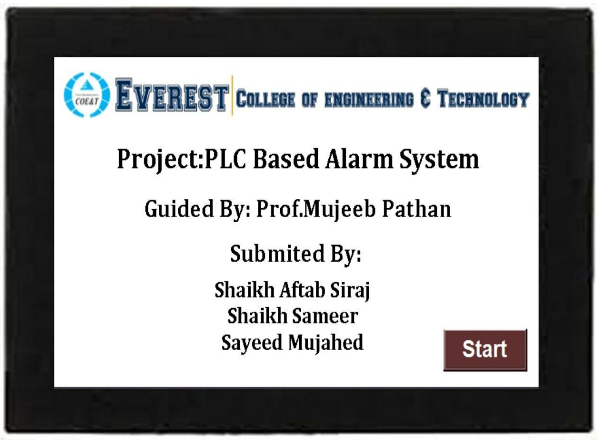

Fig 2 : HMI Screen.

- Assign buttons to screen changes
- Configuring screen changes at local function keys

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II. OVERVIEW OF HMI TAG TABLES

HMI tag tables contain the definitions of the HMI tags that apply across all devices. A tag table is created automatically for each HMI device created in the project. In the project tree there is an HMI tags folder for each HMI device. The following tables can be contained in this folderThere is one standard tag table for each HMI device of the project. It cannot be deleted, renamed or moved. The standard tag table contains HMI tags and, depending on the HMI device, also system tags. You can declare all HMI tags in the standard tag table, or create additional userdefined tag tables as you want.

User-defined tag tables :

You can create multiple user-defined tag tables for each HMI device in order to group tags according to your requirements. You can rename, gather into groups, or delete user-defined tag tables. To group tag tables, create additional subfolders in the HMI tags folder. The All tags table shows an overview of all HMI tags and system tags of the HMI device in question. This table cannot be deleted, renamed or moved.

Discrete alarms table :

In the Discrete alarms table, you configure discrete alarms to the HMI tag selected in the HMI tag table. When you configure a discrete alarm, multiple selections in the HMI tag table is not possible. You configure the discrete alarms for each HMI tag separately.

Analog alarms table :

In the Analog alarms table, you configure analog alarms to the HMI tag selected in the HMI tag table. When you configure an analog alarm, multiple selections in the

HMI tag table is not possible. You configure the analog alarms for each HMI tag separately.

Defining Limits for a Tag :

For numerical tags, you can specify a value range by defining a low and high limit. Additionally, you configure the system to process a function list whenever a tag value drops below or exceeds its configured value range.

INPUT RELAYS:

-(contacts)These are connected to the outside world. They physically exist and receive signals from switches, sensors, etc. Typically they are not relays but rather they are transistors.INTERNAL UTILITY RELAYS-(contacts) These do not receive signals from the outside world nor do they physically exist. They are simulated relays and are what enables a PLC to eliminate external relays. There are also some special relays that are dedicated to performing only one task. Some are always on while some are always off. Some are on only once during power-on and are typically used for initializing data that was stored. COUNTERS-These again do not physically exist. They are simulated counters and they can be programmed to count pulses. Typically these counters can count up, down or both up and down. Since they are simulated they are limited in their counting speed. Some manufacturers also include high-speed counters that are hardware based. We can think of these as physically existing. Most times these counters can count up, down or up and down.

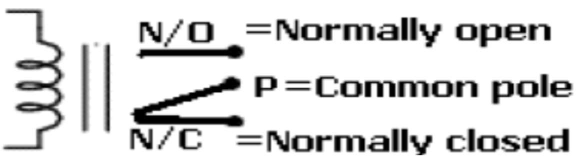

Fig 3: Relay connection.

PLC:

The article starts with an overview of the history and the role PLCs in factory automation. The basic principles of PLC operation are discussed. The core modules of an industrial-control system are examined: the analog input function, analog output functions, the distributed control (fieldbus) interface, digital inputs and outputs (I/Os), the CPU, and isolated power. Functional block diagrams and recommended devices are included for each function.

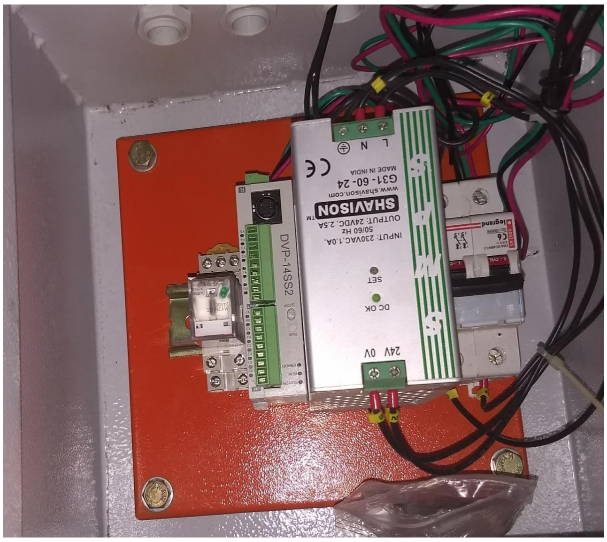

Fig : 4 PLC connection with relay

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III. OVERVIEW

Programmable logic controllers (PLCs) have been an integral part of factory automation and industrial process control for decades. PLCs control a wide array of applications from simple lighting functions to environmental systems to chemical processing plants. These systems perform many functions, providing a variety of analog and digital input and output interfaces; signal processing; data conversion; and various communication protocols. All of the PLC's components and functions are centered around the controller, which is programmed for a specific task.The basic PLC module must be sufficiently flexible and configurable to meet the diverse needs of different factories and applications. Input stimuli (either analog or digital) are received from machines, sensors, or process events in the form of voltage or current. The PLC must accurately interpret and convert the stimulus for the CPU which, in turn, defines a set of instructions to the output systems that control actuators on the factory floor or in another industrial environment.Modern PLCs were introduced in the 1960s, and for decades the general function and signal-path flow changed little. However, twenty-first-century process control is placing new and tougher demands on a PLC: higher performance, smaller form factor, and greater functional flexibility. There must be built-in protection against the potentially damaging electrostatic discharge (ESD), electromagnetic interference and radio frequency interference (RFI/EMI), and high-amplitude transient pulses found in the harsh industrial setting.

Current Communication for PLC:

Current-control loops evolved from early twentieth-century teletype impact printers, first as 0–60mA loops and later as 0–20mA loops. Advances in PLC systems added 4–20mA loops.A 4–20mA loop has several advantages. Older discrete component designs required careful design calculations; circuitry was comparatively large compared to today's integrated 4–20mA ICs. Maxim has introduced several 20mA devices, including the MAX15500 and MAX5661, which greatly simplify the design of a 4–20mA PLC system.

IV. RESULT

- The bell which was set at an interval of 45 min iS functioning as per expected
- The timing of the bell can be varied using the keypad supplied with it
- The time is displayed in the HMI screen . The variation in timing is also applicable and is used in this circuit

V. CONCLUSION

Automatic college bell system using the PLC and HMI can be extended for further development as there can be many departments in a university at a distance in the same campus and want to synchronize all department bells. A server program has to be designed with the specified bell timings. The basic design of the Automatic College Bell is designed and implemented successfully. The system will ring the College Bell at pre-scheduled times of periods on each day. There are different timings for a period varying from one college to the other.A automatic college bell can be successfully designed and can be applicable in school and colleges as per to save manpower and also to save time it’s a cost effective project which can be built using easily available equipment and can be used in real time in the school and in the colleges this can be included in every educational institution as per the timing which can be easily reprogrammed by a common laymen and can also vary timing for some classes as per the schedule of the school. The display of time in the project also increases it effectivene.

REFERENCES

[1] Abyash Gautam, Deepak Rasaily, Sejal Dahal, “Microcontroller controlled Automated College Bell” International journal of engineering trends and Technology volume 32 Number 4-February 2016.

[2] Edwin Astro, Dianno Starovoyota, Madara “Design and testing of mobile-phone-Detectors” ISSN volume 7, number 9, 2014.

[3] Song, M., Kim, B., Ryu, Y., Kim, Y., and Kim, S., “Adesign of real time control robot system using android Smartphone” The 7th International Conference on Ubiquitous Robots and Ambient Intelligence (URAI), BusanKorea,