PLC application in automated Building Management System

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ABSTRACT*:* Automation in buildings began long before recorded time, with the help of microprocessors. The use of dedicated software for safety and control applications began with the technological advancement in the field of PLC. With the advent of newer technologies, situations have turned around a lot and the need to view the live Process in a system, within a control has become essential. The technological advancements over the last decades have led to the combined use of PLC with SCADA. The controlling unit in building management system automation is a PLC. Every device in an installation is connected to the PLC. When a user wants to interact with a system an operator terminal, which is attached to a cabinet where the PLC is installed, is used. With this solution the user needs to be in front of the cabinet to interact with the system**.**

KEYWORDS: BAS- Building automation system, PLC – programmable logical control, SCADA – supervisory control and data acquisition BMS-Building management system, LED- Light emitting diode, LDR- Light dependent resister, IR- Infrared**.**

I. INTRODUCTION

The universe is expending right inside your building, each day you are challenged to manage multiple networks, systems and control components without sacrificing efficiency, comfort, productivity, or the flexibility to grow in the future. We know that a good building automation system can help reduce your operating costs. But in addition to energy management, a BAS adds automated control and management to other building operations, such as fire and safety, security, and elevator. The East Coast has been rocked (with an earthquake) and roiled (one hurricane behind us and another on the way). It seems like a good opportunity to talk about making emergency situations easier to contend with.

General features applicable to the BMS as a whole   include:

- Trend monitoring
- Maintenance reminders
- Security access
- Protection during and after power failures
- Lighting control systems
- Automated fire and life safety security systems
- Security system

A good automation has a several advantage to the human being. Every one in the country having the same problem they can not attend all the general daily work in a few times, facility should be increased, our country is on the way like wise other country, every one want to be top. Facing all the problems increase our difficulty. The management of the building throughout security is difficult and time taken. With increase the facility the time collapse has.

Every one wants comfort and efficient life, addition of facility with less economy. In a building all the facility or services through the security not possible every where. So removing the problems and the security facility in efficient the great news is there. Converting all the security in the automation is to entry in new life style proposing this having several advantages to the human beings. Present no one have the time, they want to finish their work as possible as. The machine facility has changed our life style, almost all the work has replace human to devices or machine.

In the comfort way of human life styles in the building there are many system has automated, with increase the almost all the facility to throughout all the machine with less economics introduces. Car parking facility, light control, water control proposed here. Almost every where the parking problems is a big issue in the urban state. In this the parking facility has introduced, by automated. Light control also the big issue, Less Consumption of the energy in the

overall building as external light by automated has introduces. Keeping in the mind internal facility has also automated, controlling water in buildings should be necessary. Keeping all the things in the mind all the system are introduces automated here.

The following paper is organized as follows. In section II we describe the system design and architecture. In section III the salient features of the proposed system are discussed. And we finally conclude the paper in section IV.

In the building management system we are going to control four parameters with the help of PLC and SCADA. They are as.

1) internal light control
2) external light control
3) water level control
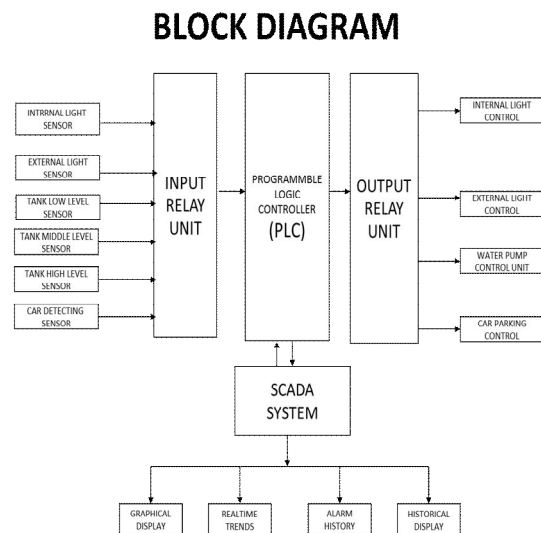4) car parking

Under water level there are three level of control

Low level

High level and

Mid-level.

II.CAR PARKING

The principle of this is based on IR SENSOR. IR sensor

BLOCK DIAGRAM

In the above block diagram shows how we are going to use these parameter.

Function depends on transmitter and receiver section. There is a continuous transmission of signal between transmitter and receiver and, where the IR sensor connected to the ULN 2803, Relay and it finally goes to the PLC input . when car enter on the IR sensor the transmission of signal stops between the transmitter and receiver and it goes to the PLC input through the ULN and Relay and the gate opens . After few moments when car pass through the gate, the gate becomes close and the transmission of signal again carried out between the transmitter and receiver which goes to the PLC i/p . In this section the parking facility has been introduced depends on the empty place car has to park .on the every place of the car parking place there is an IR sensor kept when there is no car the transmission of signal goes between transmitter and receiver to the PLC input and shows the vacant place on the screen board through the LED or by numbering system if there is no vacant place means the signal transmission stops and goes to the PLC .

III.EXTERNAL LIGHT CONTROL

External light control can be also use as street light . it works on the principle of LIGHT DEPENDENCE RESISTER(LDR). LDR, an acronym for light dependent resistor is a resistor whose resistance is dependent on light. The resistance of LDR is of the order of Mega Ohms in the absence of light and reduces to a few ohms in presence of

light. In this circuit when the light falls on LDR, the resistance of LDR becomes low and the entire voltage drop takes place across the variable resistance VR1 (10K). As a result the base of transistor (T1) gets high input and it gets biased thereby glowing the LED. When no light falls on LDR, the resistance of LDR becomes high so almost entire voltage drop takes place across it and the base of transistor is at low potential. So transistor does not gets biased nor it becomes conducting, hence switching off the LED. The sensitivity of the circuit can be adjusted by varying the preset VR1.

Internal light control
 Internal light control works on the principle of the IR sensor. in the internal light control the facility in the room has been introduced depends on the persons if one persons enters in the room light and the fan get switch on , for second person the fan gets off and the A.C will be ON . depends on the uses to the person LED shows .There are four LED has been given for every LED there is a fix of the parameter in the room .
For Ex 1st LED light and fan, 2nd A.C, 3rd T.V and more

Water level control
In water level control there are three level:
    High level
    Middle level
    Low level
For every level there is two terminals of wire goes to the comparator 1st +ve terminals, 2nd for signal, there is a fix voltage in the comparator given when there is low level ,high , middle level the signal terminals goes to comparator connected to plc through ULN and Relay . when ever there is any change in the level the voltage change occurs so the LED will glow depend on the given level of LED .

PLC
 Programmable controller is a digital computer used for automatic of electromechanical processes, such as control of machinery on factory assembly lines, amusement rides, or lighting fixtures.

SCADA
* Supervisory Control and Data Acquisition system.
* It is used to monitor and control plant or equipment.
* The control may be automatic, or initiated by operator commands.
* The data acquisition is accomplished firstly by the RTU's scanning the field inputs connected to the RTU (it may be also called a PLC - programmable logic controller). This is usually at a fast rate.
* So we can collect the datas from RTU's for monitoring and also we can control the field I/O equipments from SCADA screen itself

Interface
 Interfacing is the one which connects hardware (PLC) and software (SCADA). The interface used in this gearbox system is RS232 which is a serial communication port. RS-232 (Recommended Standard 232) is a standard for serial binary data signals connecting between a DTE (data terminal equipment) and a DCE (Data communicating equipment).

Advantages
Reduce energy cost
1. Monitor and analyse where and when energy is consumed
2. Introduce time controls for lights and air conditioner units in the offices to switch off when they are not required based on office occupancy
3. Provide local controls for increased productivity in occupied areas and automate energy efficiency measures in unoccupied areas
4. Schedule the optimal sequence for lighting and air conditioner unit start-up for maximum energy efficiency

Reduce operation and maintenance costs
1. Advanced diagnostic capabilities and controls maximize the efficient use of equipment, provide timely maintenance, increasing the life-span of capital investments Integrate subsystems and manage from a central point

for faster response times, more efficient training and cross-checking Integrated systems can be used to increase efficiency of related systems such as CCTV monitoring, Access Control, etc

2. An integrated approach also allows for the remote monitoring of equipment

Improve staff productivity

1. Control and schedule the temperature, lighting and humidity patterns to maximise the comfort of staff working within the building.
2. Improve responsiveness to HVAC related complaints and as a result, can experience increased employee productivity.
3. Provide local controls so that staff have better control over their internal comfort in occupied areas, while automating efficiency measures in unoccupied areas

Environmental Sustainability Policy

1. Provide demonstrable reductions in energy consumption and contribute to a reduction in carbon dioxide (CO_2) emissions
2. Contribute towards compliance with mandatory legislation
3. Decrease emissions legislation related levy paid to the Government
4. Provide an environment that encourages staff to develop a sustainable approach to their work and lifestyle

IV.CONCLUSION

The project "PLC BASED BUILDING MANAGEMENT SYSTEM" has the advantages of SCADA & PLC. PLC is used for automation and SCADA for control and monitoring. This project ensures less maintenance and reduces risk factor and also increases the efficiency. Now a day's PLC and SCADA plays the important role in industrial automation devices. In our project we had utilized the application of PLC and SCADA effectively.

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