

Design and Implementation in Laboratory Using Siemens PLC S7-200

Praveen Kumar S¹, Karuppusamy P², Murali P³, Yugandran S⁴, Madhan Raj R⁵

^{1, 2, 3, 4} UG Student, Knowledge Institute of Technology, Salem-637504

⁵Assistant Professor, Knowledge Institute of Technology, Salem-637504

Abstract - This paper deals with the laboratory automation using Siemens PLC. In this project laboratory appliances are automatically control by using PLC for energy saving purpose. This project includes many sensors for various applications. Temperature sensor which is interfaced to PLC as the temperature exceeds certain temperature the fan will turn on and also the speed of fan will be controlled depending on temperature and LDR sensors used for controlling the level of illumination of the light. Also the motors are used for curtain closing and opening purposes. The real time system developed is highly effective, efficient and robust. The concept of laboratory automation is to connect all the systems and devices so that it can be controlled from anywhere.

Key Words: LDR Sensor, Temperature Sensor, PLC, DC Motor.

1. INTRODUCTION

Nowadays, the rapid development of information technology has brought powerful changes to the structure of automation system, and makes people to set a higher request to security, comfort and efficiency of laboratory environment. Intelligent appliances have become a research focus in laboratory automation industry, for how to let projector set, fan, lightings, curtain closer and other devices work efficiently and easy to be used. Under such demand laboratory appliances should not only operate by itself, but also with other devices together, i.e. they should be connected within a wireless network for easy management.

A laboratory automation system integrates electrical devices in college with each other. The techniques employed in automation include those in building automation as well as the control of domestic activities, such as entertainment systems, PC and changing the projector slides for different events. Devices may be connected through a computer network to allow control by a personal computer, and may allow remote access from the internet. Through the integration of information technologies with the laboratory environment, systems and appliances are able to communicate in an integrated manner which results in convenience, energy efficiency, and safety benefits. In this paper we have concentrated on the control of "Implementation in Laboratory Automation" in the laboratory premises. The control of these systems is achieved by using various electronic circuitry .e.g. For Fan speeds controlling system we used the temperature sensor and for lighting we had used the simple LDR circuit. This electronic circuitry is controlled by the PLC.

2. LITERATURE REVIEW

As per the Home Automation Using PLCs. Sujatha, K.M.Om Prakash describes the solution for controlling the home appliances with the less man power in a different way by using programming logical devices (PLC). The numerous benefits of today's home automation solution includes safety and security, energy savings, money savings, convenience and control. It improves the daily life of seniors and disabled by offering voice control and safety items.

As per the An Advanced Home Automation System Using Mobile Phone. Apurva Misra, Ajay K. Yadavaal describes about a unique System for Home automation utilizing Dual Tone Multi Frequency (DTMF) that is paired with a wireless module to provide seamless wireless control over many devices in a house. We can operate our robot from any distant or remote area. It is a wireless robot but instead of using a separate wireless module (transmitter and receiver) we are using the cell phones for this purpose. The principle used for mobile controlled robot is the decoding of DTMF tone.

As per the Advancement in Home Appliance Automation Using PLC, Mrs. Pooja, S. Purid describes the project which is based on the programmable logic controller (PLC). Temperature sensor will help to the monitor ideal temperature more accurately. As detect the correct temperature the fan gets on this is better over the traditional system also if the correct number is pressed then an then only the door latch is open this will increases the security home also because of the providing the limit switch in water tank the buzzer is on so we can prevent the wastage of water. PLC is much better when compared to relay based advantage is that, it consumes less power, low maintenance cost, can be programmed. Thus, productivity increases.

3. EXISTING METHOD

The existing method deals with the home automation using PLC. Home appliances are automatically control by using PLC for energy saving purpose. This project includes many sensors for various applications. Temperature sensor which is interfaced to PLC as the temperature exceeds certain temperature the fan will turn on and also the speed of fan will be controlled depending on temperature and level sensors used for controlling the level of water of the tank. Also the DTMF is used for door latch system. The real time system developed is highly effective, efficient and robust. The concept of home automation is to connect all the systems and

devices so that it can be controlled from anywhere. PLC is much better when compared to relay based advantage is that, it consumes less power, low maintenance cost, can be programmed. Thus, productivity increases.

the data flow goes through it. The proposed system includes PLC, sensors, control unit, wireless network and supply unit. The main aim of this project is to control the laboratory appliances using mobile as well as by using manual operation, so that all appliances can be connected using PLC module. It can be very easy to handle all the appliances with power consumption.

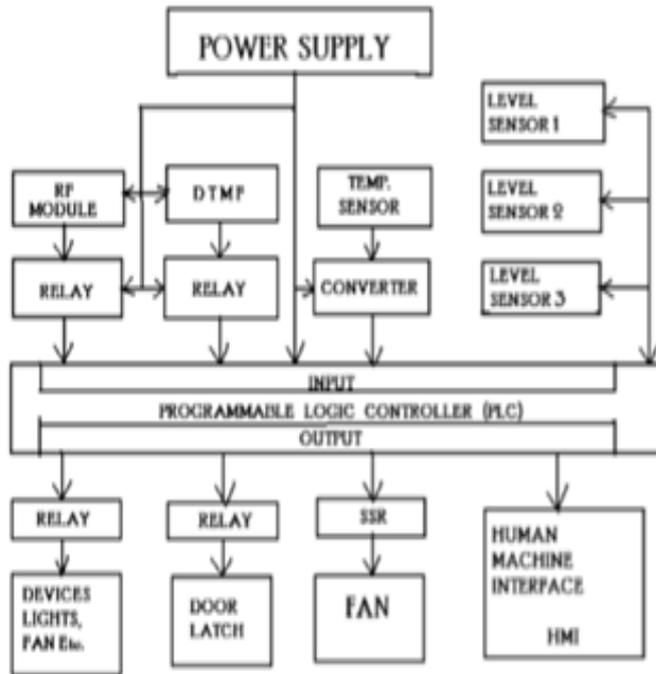


Fig -1: Existing Block Diagram

4. PROPOSED METHOD

4.1. Functional Block Diagram

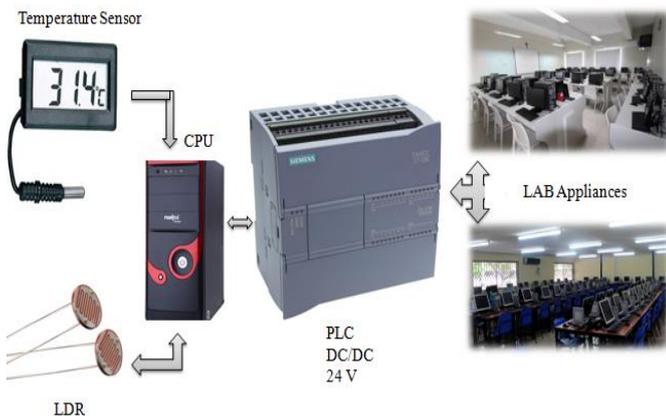


Fig -1: Block Diagram of Proposed Model

4.2. Description of Proposed Method And Its Functional Units

The block diagram shows the automation of laboratory using Siemens PLC. It shows how the system circuit works and how

4.3. Temperature Sensor

A temperature sensor is a device, typically, a thermocouple or RTD that provides for temperature measurement through an electrical EW signal. A thermocouple (TIC) is made from two dissimilar metals that generate electrical voltage in direct proportion to changes in temperature. An RTD (Resistance Temperature Detector) is a variable resistor that change its electrical resistance in direct proportion to changes in temperature in a precise, repeatable and nearly linear manner

4.4. LDR

A light-dependent resistor alternatively called an LDR, photo resistor, photoconductor, or photocell, is a variable resistor whose value decreases with increasing incident light intensity.

An LDR is made of a high-resistance semiconductor. If light falling on the device is of high enough frequency, photons absorbed by the semiconductor give bound electrons enough energy to jump into the conduction band. The resulting free electron (and its hole partner) conduct electricity, thereby lowering resistance.

4.5. Siemens PLC-200

SIMATIC S7-200 stands for a reliable, fast and flexible controller in the micro automation area with a broad scale of modules. Programming was based on the easy to learn engineering Micro/WIN.

The Siemens PLC S7-200 series of micro-programmable logic controllers (Micro PLCs) can control a wide variety of devices to support our automation needs. The S7-200 monitors input and changes outputs as controlled by the user program, which can include Boolean's logic, counting, timing, complex math operations, and communications with other intelligent devices. The compact design, flexible configuration, and powerful instruction set combine to make the S7-200 a perfect solution for controlling a wide variety of applications.

5. CONCLUSIONS

This project is based on the programmable logic controller (PLC). Temperature sensor will help to the monitor ideal temperature more accurately. As detect the correct temperature the fan gets on this is better over the traditional

system also if the projector is on curtain closes automatically and light illumination level is controlled by using LDR sensor. This automation project has a control of both manual and user access through automatic controller. PLC is much better when compared to relay based advantage is that, it consumes less power, low maintenance cost, can be programmed. Thus, productivity increases.

REFERENCES

- [1] Mrs. Pooja .S.Puri; "Advancement in Home Appliance Automation Using PLC", International Research Journal of Engineering and Technology (IRJET), volume: 03 Issue: 06 June-2016
- [2] ApurvaMisra, Ajay K. Yadav, ShrikeshYadav, Ashwani K. Sonker; "An Advanced Home Automation System Using Mobile Phone", International Journal Of Electrical And Electronics Engineers, ISSN- 2321-2055, Volume 07, Issue 01, Jan- June 2015
- [3] S.Sujatha, K.M.Om Prakash, M.Rajesh Kumar; "Home Automation Using PLC", International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering, ISSN (Online): 2278 – 8875, Volume 5, Special Issue 1, March 2016