Development of Microcontroller Based Classroom Automation

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Abstract **- Now a days, one of the main problems that of we face is that electricity wastage. In our homes, schools, colleges and industries, we see that fans and lights are often kept ON even if nobody in the room or area or passage. To avoid such a situation we have designed this paper "Classroom Automation". In our paper, along with appliances control (i.e. fans and lights) we have incorporated "Attendance Monitoring" and "Message Transmission". Modern day class rooms are equipped with electronic devices that have supporting software to improve and facilitate teaching methods. However, it is often seen that significant class time is wasted on taking attendance, or the class may face interruption due to late entries of students and disturbances such as the manual control of fan and light. Therefore, to overcome these problems a feasible system is created in this thesis paper that will have no physical intervention from teachers, students or floor attendance. Hence, the system will facilitate the smooth running of the scheduled classes at our university, and minimize time loss. Thus in short the main aim of our paper is to save electricity, time and help in functioning of classroom system smoothly.**

Keywords- **Automatic attendance, Load control and message transmission.**

Abbreviations-

LCD: Liquid Crystal Diode
PLC: Programmable Logic Control

I. INTRODUCTION

In recent years the energy crisis has become one problem which the whole world must confide. Home power consumption makes up the largest part of energy consumption in the world. In particular, the power consumption of lamps in a typical home is a factor which cannot be ignored. The typical user needs different light intensities in different places. Sometimes the light intensity from outside is sufficient, and thus we don't need to turn ON any light. But sometimes the user leaves and forgets to turn OFF the light. These factors cause energy waste. Therefore some power management of light control in a home as well as classrooms, offices and industries is necessary in order to save energy.

These days intelligent automation has stepped its presence in every field all over the world. Our project is a step towards attendance and power management of the classrooms in the colleges or institutes. The use of low cost technologies for highly reliable applications with the help of newly innovated algorithm makes the automation process to reach the consumers at cheaper and reliable cost. Thereby in our project the fingerprint recognition system is used to take the attendance. Power management and wireless message transmission are the remaining applications. The classroom unit displays the strength of classroom and also the loads are controlled such that they should not be switched ON in an empty classroom. A LCD displays all the status and saves it in visual basics.

II. PROBLEM STATEMENT

Automation is the use of control systems and information technologies to reduce the need for human work in the production of goods and services. Automation greatly decreases the need for human sensory and mental requirements as well. Automation plays an increasingly important role in the world economy and in daily experience.

This Project can be design by using PLC but the problem related to PLC is higher cost. The another problem is that, we can use PLC only if the person who is handling, must be PLC literature. So to avoid this; we are implementing Classroom Automation using microcontroller.

An ideal classroom is an environment in which teachers are able to focus solely on their lectures and the students are able to concentrate on the information they are being given. Unfortunately, this does not happen in our country. During class hours, time is usually wasted in many ways such as manually recording student's attendance one after another. Other disruptions also occur throughout class time such as temperature and light variation. These problems cause affected students to wander around the class guessing for the right switch and adjusting it to equilibrate the environment back to satisfying conditions. This causes disturbances for both teachers and other students, and so to eliminate these irritations an intelligent classroom system is created that allows the classroom to become more efficient, and eliminate any human assistance.

III. PROPOSED BLOCK DIAGRAM

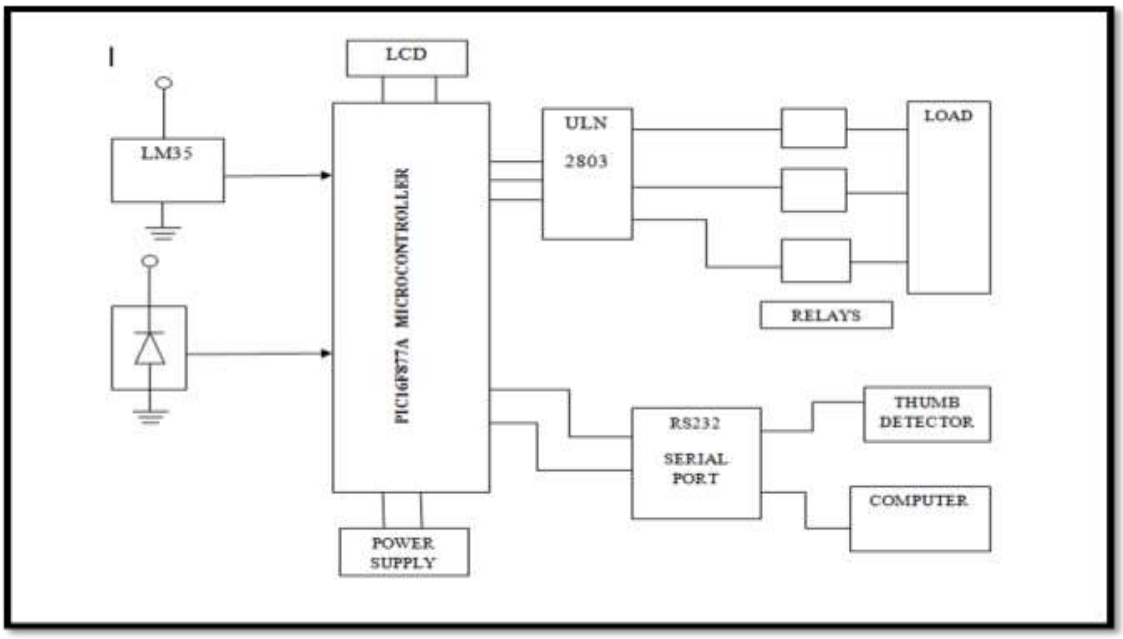

Fig 1: Block diagram of classroom automation

IV. OPERATION OF WORKING

Microcontroller based classroom automation consist of three applications:

1) Automatic attendance 2) Automatic load control 3) Message transmission. The first part of the systems to automatically take attendance using thumb detector. It can be used for both verification and identification. In verification the system compares an input fingerprint to the "enrolled" fingerprint of a specific user to determine if they are from the same finger. In identification system compares an input fingerprint with the prints of all enrolled users in the database to determine if the person is already known under a duplicate or false identify.

The second object is to automatically control the load i.e. fan and light. The idea is to plant several sensors around the classroom and give a calculated feedback to the response these sensors receive. An example would be having temperature sensors around the classroom that would detect the temperature and respond to any change by alternating the fan speed. For light control, there will be proximity sensors that would detect student's presence and allows the lights to turn on if students are near that area.

The third part is to convey the message on the LCD screen present in the classroom. Any notice related to students or staff will be displayed in the classroom. The notice has been transmitted through monitor of HOD.

V. ADVANTAGES

1) Maintenance is easy.
2) Easy to troubleshooting.
3) Power consumption is less.
4) Reliability is more.
5) Ease for administration to convey messages.
6) Eliminates time wasted in manual attendance.

VI. APPLICATIONS

1) In educational institutes:

After opening the lock when the person enters the room the counter gets incremented. Now if it is a day then the lights would not be switched on but if it is dark then the lights will automatically switch on. Now whatever may be the number of people entering the room the counter will automatically get incremented by itself and on leaving the room the counter will get decremented but the system will keep on working, Once the counter is zero in other words once every one leaves the room the switching system will automatically stop working.

2) In Industries:

The smart grid concept includes the industry/building automation system with better energy management and with superior quality of power. An industry automation system integrates electrical devices in a house with each other. The techniques employed in industry automation include those in building automation as well as the control of domestic activities, such as industry entertainment systems, houseplant and yard watering, pet feeding, changing the ambiance "scenes" for different events (such as dinners or parties), and the use of domestic robots.

3) In home automation for safety as well as automatic functioning temperature controlled cooling system:

Once the person has entered the room he would not require to switch on anything everything will just happen automatically. Like if the temperature is high then the fan will switch on, on its own. Else it will remain in off state. This temperature is predefined by us in the controller. But this system will only work if there is a person in the room in other words if the counter is not zero.

VII. CONCLUSION

This paper has presented design and development of classroom automation using microcontroller. We can save the electricity with our proposed work, where we have focused on energy saving with load control in classrooms and time management with the help of attendance monitoring which is based on fingerprint identification. The system helped to reduce many issues such as, denying the possibilities of cheating in recording the attendance, helps to ease the lecturers to keep data of student's attendance, the encryption technique adds more security so there will be no anonymous fingerprint which is able to tamper with the recorded data, and the portability saves time in taking attendance instead of queuing in a line. And the message transmission which can reduce the interruption of class, hence the system will facilitate the smooth running of the scheduled classes at our university, and minimize time loss.

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