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Department Management System Using Arduino.

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Abstract:- In older times information were stored and conveyed by papers and other physical media. But now our world has changed and everything around us are almost digitized. The proposed Department Management System aims to replace the traditional time table management system to reduce the usage of papers and to ease the process . It displays the staffroom timetable with room temperature in an LCD screen and includes a power saving module. This can be used in institutions such as Schools , Colleges, Universities ,Offices etc. It is even possible to store multiple timetables and switch between them. Thus it becomes easier for the staff to refer to the entire departments timetable , check temperature all at the same time. The power saving module saves the energy by switching off all unwanted electrical appliances like fans and lights when there is nobody in the staffroom.

Key Words: - Arduino UNO, Digital timetable, Digital Thermometer, Human Detection, Power Module.

1. INTRODUCTION

The world is in search of new and more convenient methods of accessing various systems. The introduction of the microprocessors have revolutionized this era of digital technologies. The old analog techniques are replaced by the latest processor assisted digital methods. The main advantage of the digital techniques is that it is easier to get an electronic device to switch into a number of working stages accurately. Digital electronic circuits are usually made from large assemblies of logic gates, simple electronic representations of Boolean logic functions. To live in a world that is moving so fast, the solution is to be faster and smarter. In order to achieve this digital techniques are to be introduced into the everyday systems in order to save time and money. This system has to be energy efficient, accurate and economically feasible. All of this can be achieved by the use of latest microprocessor techniques.

One way to do this is by introducing digital techniques at the institution levels. Nowadays tedious paper and charts are used to refer to the timetable in most of the places. Traditional circuits made use of various circuits soldered together in PCB to implement a required device. These traditional methods have to be made new. So one way to do it is by the introduction of microprocessor assisted new methods. To switch from traditional to a digitized world, it requires a change from the bottom level itself. All of this is achieved by integrating Sensors and LCD to the Arduino module. By using the proposed system it becomes easier for the staff to refer to the entire department's time table, check temperature all at

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the same time. The proposed system makes use of an ARDUINO module along with a LM35, LCD display and PIR sensor. Arduino stores data based on the basic C programming and displays it on the LCD screen. The LM35 works as a digital thermometer displaying the temperature on the LCD. The PIR sensor constitutes for power management. The main advantage of introducing such a system is the ease of access of information and the power management.

2. PROPOSED METHODOLOGY

2.1. Existing System

In the present world, the existing systems are being overtaken by the growing digital world. The traditional system of management has brought us this far and it is not to be taken lightly. At those periods people depended on manpower and intelligence rather than handing it over to the machines and artificial intelligence. Management is required where ever a unique system is present. It is necessary for the proper handling of various subunits assisting in the functionality of a firm. A management system at present makes use of the techniques of paper based notice board in order to convey the messages to various participants or members of an organization. In case of institutions, the timetables and other information displaying boards also follow the same method of paper based boards. In any companies or institutions, the prime objective is to minimize the expenditure and thus maintain a balance. To minimize the expenditure, we have to introduce more convenient methods of management. In the present scenario, the one biggest problem that we face is the power management. A department involves many equipment's and electronic devices. So at present there is no system present in order to save power unless someone is there to control it manually For instance, if there is no one in a room and the equipment's are still switched on, there will be a lot of power loss. Also the present system does not have any ways to measure the temperature in the working environment so as to adjust it or control it. Management is all about keeping everything up to date and perfect. The present system which involves the paper based notice boards, human dependent power management etc. all are in a way traditional or old. From one point of view, they might seem inexpensive, easy to fabricate, easy to handle and maintain. But considering the growth of the digital era, it is irrelevant, slow, time consuming and unattractive. Apart from all these, they waste a lot of power which has become a very essential part of our daily life. So it is important that these old techniques make way for the latest, most modern digital technologies involving microprocessors for more faster, accurate and stable systems.

2.2 Proposed System

In a world that is being digitized, it is important that all the systems are also being upgraded. So one way to do it is to introduce digital systems at the most simplest of levels. For instance, in a department. Here the so proposed system takes care of the department management which may be either an institution or a company. The proposed system does this by introducing various newer modifications to the currently used traditional methods. The main attraction of the proposed system is the introduction of the programmable microcontroller Arduino Uno, belonging to the open source Arduino. Uno is the latest in a series of USB ARDUINO boards and it does not use the FTDI USB-to-serial driver chip. The usage of the Arduino has a number of advantages over the existing system, which will be discussed later. The department management system is all about bringing a coordination and ease of access in the department. At the moment it deals with a educational department and this can be modified as per the requirement. In this project, we are making use of the ability of Arduino processor to assist the various requirements of the department. The base of the whole system is the Arduino module which is programmable using the basic C programming. The various modules for the system are interfaced with the Arduino through the analog and digital pins present in it on the base of the program written in C.

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3. BLOCK DIAGRAM

The block diagram of Department Management System is shown in fig1 consisting of following:

3.1 Digital Timetable: The traditional use of the paper based time tables are going to be replaced by the microcontroller based digital timetable in the department. The basic layout will be an LCD display displaying the time table of the entire department's faculties as per the day and period. The days of a week can be accessed any time with the help of the switches array that will be interfaced with the timetable display. With this timetable it will be easy for them to arrange as per the availability of faculties. This could prove to be a of great use to the department.

3.2 Digital thermometer: At times when the temperature becomes high, it is important that it is known to all. A rise in temperature could bring a lot of changes in the working of the equipment's as well as the human metabolism. The digital thermometer constantly checks the temperature in the area and transfers it to the processor. The temperature is measured with the help of the LM35 temperature sensor interfaced with the Arduino

3.3 Power Management system: Here power management is achieved in the department through the control of the electrical equipments present. The power can be saved by switching off these in the absence of people in the room. This is achieved by the use of a PIR sensor clubbed with the Arduino module. PIR sensor detects the IR radiations emitted by the human body to detect them and thus switching on and off the equipments. This way power is used only when people are present. As a demo version, the sensor is programmed to switch on and off the backlight of the lcd displays on human detection, thus saving power.

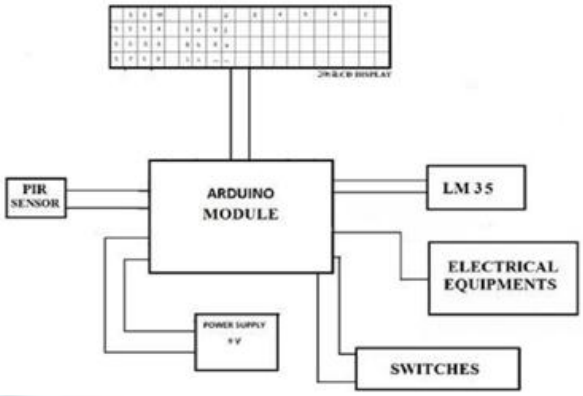

Fig 1. Block diagram of Department Management System

3.4 Arduino Uno: The working of the entire proposed system depends on the programming of the Arduino uno and the interfacing of the various circuit components required. The ARDUINO UNO is a microcontroller board based on the 16 MHZ ATmega328, programmed as a USB-TO-SERIAL converter. It consists of 14 digital input/output, 6 analog inputs, a USB connection, an ICSP header, and a reset button. It has an operating voltage of 5v & an input voltage of 7-12v.Flash memory is 32KB & RAM is 2KB. UNO is the latest in a series of USB ARDUINO boards and it does not use the FTDI USB-to-serial driver chip. The program used here is the basic and can be burnt to the Arduino using the software provided by the Arduino open source.

Fig 2. Arduino UNO

Features of Arduino Uno :

(1) Operating Voltage 5V

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(2) Microprocessor ATMEGA 328
(3) Input Voltage (recommended) 7-12V
(4) Input Voltage (limits) 6-20V
(5) Digital I/O Pins 14 (of which 6 provide PWM output)
(6) Analog Input Pins 6
(7) Flash Memory 32 KB (ATmega328) of which 0.5 KB used by boot loader SRAM 2 KB (ATmega 328)
(8) EEPROM 1 KB (ATmega328)

4. WORKING

The proposed system is controlled by ARDUINO UNO board and it consists of medium sized 20x4 LCD display, a LM35, power supply, PIR sensor and an array of switches.

The Arduino is programmed using C to implement the logic of this system. The array of switches consists of 6 switches and each switch corresponds to a day of a week. When a switch is pressed the timetable for the day is displayed on the LCD screen. The LM35 module senses the room temperature and it is also displayed. The PIR sensor which is interfaced with the Arduino module constitutes for power management module, checking human presence and saves power. It automatically turns off some electrical appliances if there is no presence of human where the system is placed. It can be a staffroom, office, classrooms etc. The whole system is powered by 9V DC supply.

The advantages of this system are:

(1) Reduce the paper usage by digitizing the timetable system
(2) Very convenient power saving
(3) Ability to store multiple timetables
(4) Reliability & Updateability
(5) More accurate & faster.
(6) Small in size & Inexpensive.
(7)

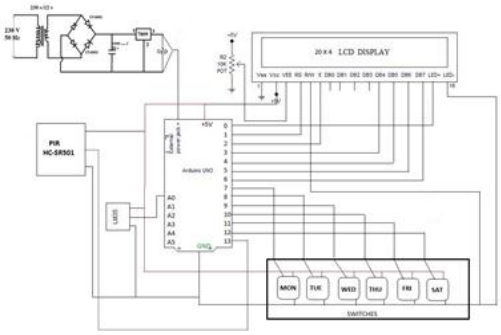

Fig 3.Circuit diagram of Department Management System

4.1 Working of PIR

A PIR detector is a motion detector that senses the heat emitted by a living body. These are often fitted to security lights so that they will switch on automatically if approached. They are very effective in enhancing home security systems.

The sensor is passive because, instead of emitting a beam of light or microwave energy that must be interrupted by a passing person in order to sense that person, the PIR is simply sensitive to the infrared energy emitted by every living thing. When an intruder walks into the detector's field of vision, the detector C sharp increase in infrared energy.

A PIR sensor light is designed to turn on when a person approaches, but will not react to a person standing still. The lights are designed this way. A moving person exhibits a sudden change in infrared energy, but a slower change is emitted by a motionless body. Slower changes are also caused by gradual fluctuations in the temperature of the environment. If the light were sensitive to these slower changes, it would react to the sidewalk cooling off at night, instead of the motion of a burglar. If you have a PIR light, you may notice that it is more sensitive on cold days than on warm days. This is because the difference in temperature between the ambient air and the human body is greater on cold days, making the rise in temperature easier for the sensor to detect. This has drawbacks, though; if the sensor is too sensitive, it will pick up things you don't want it to such as the movement of small animals. Passive infrared sensor is an electronic device, which measures infrared light radiating from objects in its field of view. PIRs are often used in the construction of PIR-based motion detectors. Apparent motion is detected when an infrared source with one temperature, such as a human, passes in front of an infrared source with another

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temperature, such as a wall. All objects emit what is known as black body radiation. This energy is invisible to the human eye but can be detected by electronic devices designed for such a purpose.

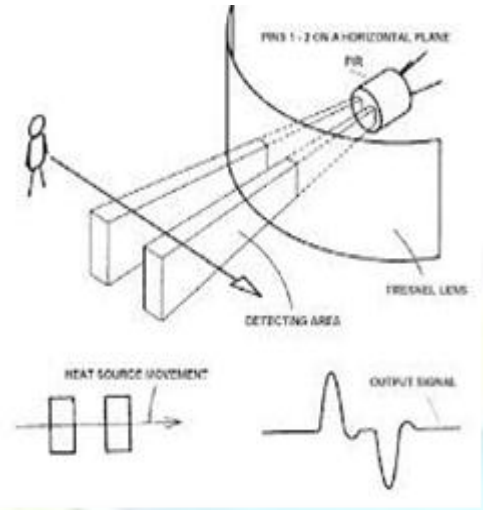

Fig 4. Working of PIR

The most common used in home security systems has numerous Fresnel lenses or mirror segments and has an effective range of about thirty feet. Some larger PIRs are made with single segment mirrors and can sense changes in infrared energy over one hundred feet away from the PIR. There are also PIRs designed with reversible orientation mirrors, which allow either broad coverage (110° wide) or very narrow 'curtain' coverage.

5. FLOWCHART

Fig 5. Flowchart

6. CONCLUSION

The system is designed to digitize the current conventional timetable system. It sets forth a reliable management system which is ecofriendly and also saves power. The ease of management and updateability are the main trademark of the system.

7. FUTURE WORKS

The system opens windows for many future modifications like alerting the faculty about his schedule, status of faculties and classroom, bigger LCD, LED screen for better display, enlarging the range of human detection by using more sensitive PIR of greater range.

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