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Smart Class & Monitoring System

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Abstract: In today's digital world, technology is very advanced and we prefer things to be done automatically without any human efforts. With the increase in standard of living, there is a sense of urgency for developing circuits that would ease the complexity of life. In this paper, a smart class monitoring system is made that makes use of RFID technology to mark attendance of employees and also serves the purpose of bidirectional visitor counter with room light controller. RFID or radio frequency identification is a method in which electromagnetic waves are used for transmitting data for the purpose of identifying tags attached to objects. The ability of the system to uniquely identifying each person based on their RFID tag type of ID card makes the process easier, faster and secure as compared to conventional method. The idea is to come up with a cost effective setup that can be used installed at workplaces. In order to have more capacity and less power dissipation, a more advanced microcontroller i.e. ARM7 LPC2148 is considered.

Index Terms: DC motor, LCD, sensor, RFID (radio frequency identification), RFID reader and tag, ARM7 LPC2148, student's attendance.

I. INTRODUCTION

Access control and monitoring system has become a popular topic in research field. This paper provides knowledge on radio frequency identification (RFID) technology which can be incorporated to maintain attendance record of employees and overcome security threats within an institute.

There were two conventional methods for taking attendance, i.e. by calling out students' name or by taking their signature on paper. These strategies were however time consuming, stressful and laborious because the valuable lecture time that could otherwise have been used for lectures is dedicated to student attendance taking. In addition to this, traditional methods were also prone to manual errors. Overall, the major problems are-

- Payment of an extra attention
- Disturbance to both lecturer and students
- Possibility to misplace the attendance sheets
- Difficulty of analyzing
- Proxy attendance
- Lecture time wasted in attendance taking
- Difficulty to collect attendance from a large number of students.

This led to the need of a more reliable and precise method. By using RFID technology, it is easier and faster to detect employees handling and manage access control.

Bidirectional Visitor Counter with Automatic Room Light and fan Controller is a reliable Circuit that takes over the task of controlling the room lights as well us counting number of person's visitors in the room very accurately when somebody enters into the room then the Counter is incremented by one value and the light in the room will automatically switched ON and when any one leaves the room then the counter is decremented by one value and the light will be only switched OFF until all the persons in the room go out. The total number of persons inside the room is also displayed on the LCD displays.

By the help of both RFID and bidirectional counter the data of visitor or person is store and displayed on the LCD. Through which this project becomes fully automated or we can say in one word 'SMART'.

II. REVIEW OF RFID TECHNOLOGY

RFID or Radio Frequency Identification is a method in which electromagnetic waves are used for transmitting data for the purpose of identifying tags attached to objects. It is an automatic identification technology which uses radio frequency electromagnetic fields to identify objects carrying tags when they come close to a reader.

It is one family member in the family of Automatic Identification and Data capture technologies and is a fast and reliable means of identifying just about any object. The acronym RFID refers to small electronic devices that consist of a small chip and an antenna. The chip typically is capable of carrying 2,000 bytes of data or less.

III. AUTOMATION

Automatic room light and fan controller with bidirectional visitor counter is a reliable circuit that takes over the task of controlling the room lights as well us counting number of persons/visitors in the room very accurately when somebody enters into the room then the counter is incremented by one and the light in the room will be switched on and when any one leaves the room then the counter is decremented by one the light will be only switched off until all the persons in the room go out.

IV. SYSTEM OVERVIEW

The system technical specifications consist of two main categories- Hardware specifications and Software specifications as listed below:

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A. Hardware Specifications

i. RFID reader and tag-

The RFID reader sends a pulse of radio waves to the tags and listens for its response. The RFID tag is primarily a kind of a memory device that can transmits its contents when being scanned by the reader.

RFID CARD

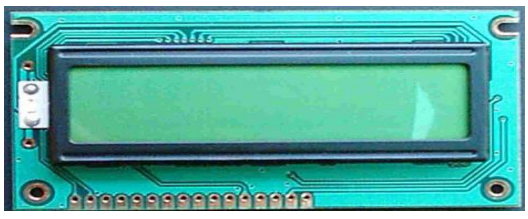
RFID READER

ii. LPC2148 microcontroller-

Microcontroller used here is ARM7-LPC2148. The controller is responsible for detection and making decisions for the connected devices. LPC2148 is the widely used IC from ARM-7 family. It has two general purpose I/O ports each of 32-bit. It is the major part of the system which controls all the operation of the circuit such as LCD interfacing, receiving RFID data. It also decides the messages to be displayed on the LCD along with the time duration for which they should be displayed on the LCD.

iii. LCD-

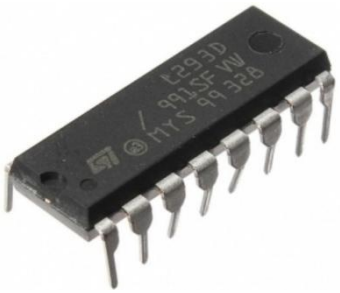
A liquid-crystal display (LCD) is a flat-panel display or other electronic visual display that uses the light-modulating properties of liquid crystals. A 2x16 LCD has 2 rows and 16 columns and it can display a maximum of 32 characters. In this LCD each character is displayed in 5x7 pixel matrix.



iv. L293D (motor driver IC)-

L293D is a typical Motor driver IC which allows DC motor to drive on either direction. It converts direct current electrical power into mechanical power. L293D is a 16-pin IC which can control a set of two DC motors simultaneously in any direction. It means that you can control two DC motors with a single L293D IC. In a single L293D chip there are two h-Bridge circuits inside the IC which can rotate two dc motor independently.

H-bridge is a circuit which allows the voltage to be flown in either direction and is ideal for driving a DC motor.



v. IR Sensor (Infrared Sensor):

IR sensors are used to produce IR waves. It consist of IR Transmitter and IR receiver. IR sensor works on infrared waves, the module comprises of one IR led (Transmitter) and one photodiode (Receiver).This module provides a HIGH (+5V) signal when a voltage greater than reference voltage is generated and a LOW (0V) signal when it is lower than reference voltage. These module also have an onboard LED which glows off when an object is detected.

vi. DC Motor-

A DC motor is any of a class of rotary electrical machines that converts direct current electrical power into mechanical power. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic; to periodically change the direction of current flow in part of the motor. DC motors are widely used in control applications like robotics, tape drives, machines and many more.

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B. Software Specifications

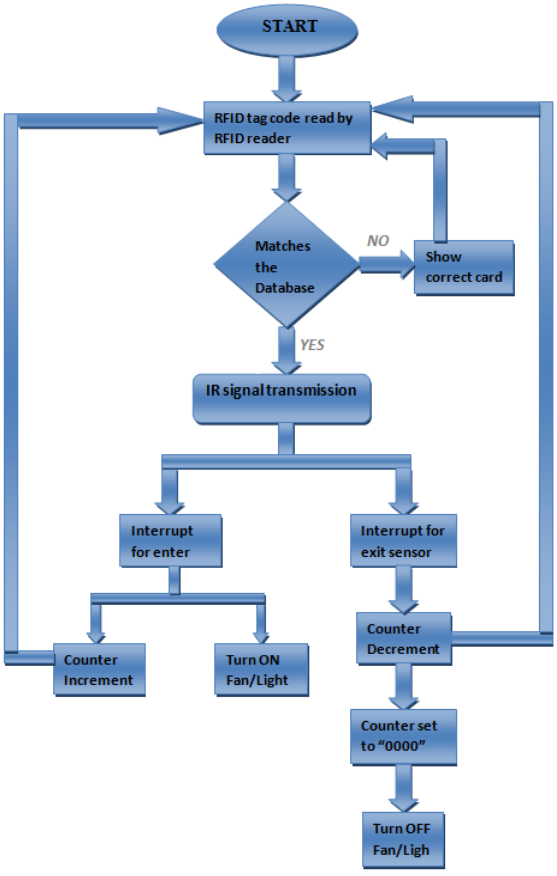
The program is written in 'C' language and compiled using **Keil µVision4 compiler**. This is an Integrated Development Environment which is used for writing code for the LPC2148 microcontroller and compiling it. Several C files are created for the project using this compiler.

Flash magic programmer is used to burn the hex file generated by the keil software onto the ARM processor. The com port to which write is to be done is selected. Baud rate is set to a value of 9600. Interface is kept as ISP. The oscillator frequency is kept to 12 MHz. The hex file is selected. Verify and programming verifies if the hex file is in proper form and then uploads it to ARM after erasing the flash.

Proteus is used for simulation of hardware. It is mainly popular because of availability of almost all microcontrollers in it.

Hercules Setup utility is useful serial port terminal (RS-485 or RS-232 terminal), UDP/IP terminal and TCP/IP Client Server terminal. It was created for HW group internal use only, but today it's includes many functions in one utility and it's Freeware! With our original devices (Serial/Ethernet Converter, RS-232/Ethernet Buffer or I/O Controller) it can be used for the UDP Configure.

V. FLOW CHART

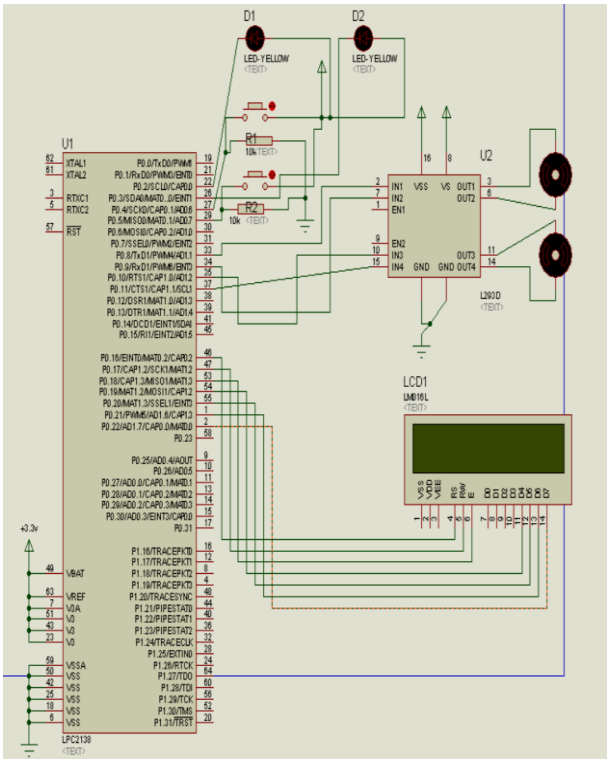


VI. WORKING & RESULT

The overall project overview comprises of following parts-

a) RFID based attendance system
b) Automatic room fan and light system using dc motors and LEDs.
c) Visitors counter system using IR sensor.
d) PC interfacing using Hercules setup and ARM programming
e) Display of data match with RFID card.

- When tag is interacted with RFID reader, 12 characters from the tag are sent to the controller via serial communication. Before this, controller is loaded with the program that contains data of students. When we provide power supply to the circuit, the circuit switches on and "SMART CLASS AND MONITORING SYSTEM" is displayed on the LCD.
- When 12 characters are transferred to controller, the controller matches the characters with the saved characters. If the characters are matched with saved characters, "WELCOME" with student name and id is displayed on the LCD, otherwise "SHOW CORRECT CARD" is displayed.
- The data is transferred onto the computer via serial communication through RS-232. The data is displayed on a hyper terminal "HERCULES" on the computer.
- Now the sensors attached with door are on and if that student enters in the room, Visitor Count increase by one and lights and fans in room automatically ON.
- Same procedure if apply for exit.
- When Visitor Count become 0000(zero), the fans and lights are automatically OFF.



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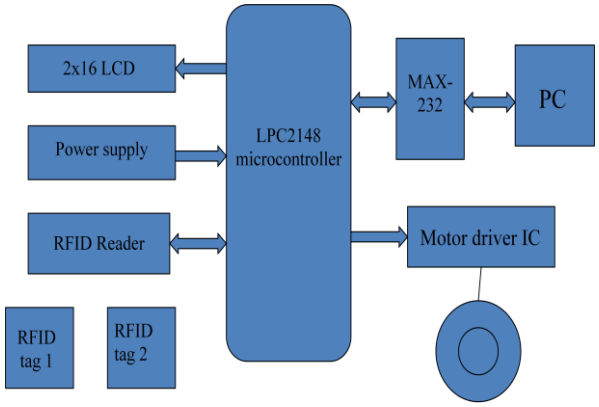
BLOCK DIAGRAM



VII. CONCLUSION

This project deals with the usage of the energy in this competitive world of electricity. This project is efficient enough to let someone know about the accuracy of the person entered and have taken the exit from the room.
A novel architecture for an economic bidirectional Visitor Counter and room lighter and fan controller is proposed and implemented in this paper. It gives basic idea of how to control the bidirectional visitor counter and room light counter using ARM7.The cost of this technology is very economical. This low cost system is designed to improve the living standard and complexity of visitors counting.
For future work, some recommendation can be made like, addition of cameras through with not only counting but also the image can be stored precisely. Wireless connectivity can be added to system, by controlling the Wi-Fi modules.

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