Automatic Room Light Controller with Visitor Counter

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ABSTRACT: This paper is written to enhance the use of resources in developed as well as developing countries. In this digital world, use of technology is very advanced and we prefer things to be done automatically without any human efforts. This project also helps to reduce human efforts. Also it is very useful to conserve resources. In today's world, there is a continuous need for automatic appliances. With the increase in standard of living, there is a sense of urgency for developing circuits that would ease the complexity of life. Also if at all one wants to know the number of people present in room so as not to have congestion, this circuit proves to be helpful. "Automatic room light controller with 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.

INDEX TERMS— ARM7 LPC2148 MICROCONTROLLER, DC MOTOR, LCD, SENSOR

I. INTRODUCTION

In today's world, there is a continuous need for automatic appliances. With the increase in standard of living, there is a sense of urgency for developing circuits that would ease the complexity of life. Also if at all one wants to know the number of people present in room so as not to have congestion, this circuit proves to be helpful. Automatic Room Light Controller with 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.

Electricity is one of the most important resources in this century. We should conserve the electricity. But many times we come outside the room/hall and forget to turn off the lights/fan, thus the electricity is wasted. To overcome this we are going to implement a project called "Automatic room light controller with visitor counter". This project has 2 modules. First module is "Visitor counter" and the other module is "Automatic room light controller". Main concept behind this project is to measure and display the number of persons entering in any room like seminar hall, conference room. And when number of persons inside the room is zero, power supply inside the room will be turned off. This will help to save electricity. LCD display placed outside the room displays number of person inside the room. 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. The total number of persons inside the room is also displayed on the LCD.

The microcontroller does the above job. It receives the signals from the sensors, and this signal is operated under the control of program which is stored in ROM. Microcontroller continuously monitor the Infrared Receivers. When any object pass through the IR Receiver's then the IR Rays falling on the receivers are obstructed. This obstruction is sensed by the Microcontroller. However, it implies the possibility that inconvenience of users can be bigger because of frequent light on/off, and dark indoor environment, etc. whereas the energy saving effect becomes larger.

II. DEVICE AND IMPLEMENTATION

The block diagram for the proposed system is shown which consists of arm microcontroller (lpc2148), LED lighting system, alphanumeric LCD, IR Sensor (transmitter and receiver).

1. Transmitter: We are going to implement the Person counter module using two transmitters and two receivers. We are going to use Infra-Red transmitters

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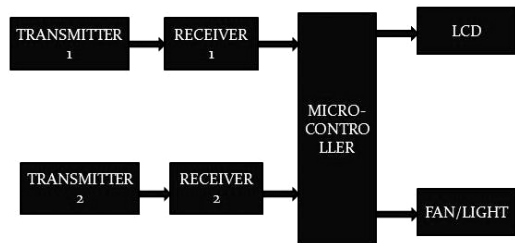because infrared beams are not visible to human eyes. Transmitters used are IR LEDs.

Fig. 1. Block Diagram.

2. Receiver: We are going to use an Infrared receiver. It is an active low device which means it gives low output when it receives the Infrared rays. So when the IR rays are interrupted by any person then microcontroller will receive a high pulse from the IR receiver.

3. ARM7TDMIS: This is the CPU (central processing unit) of our project. Microcontroller is the heart of this system. Some points of this microcontroller is used for the programming purpose. We are going to use a microcontroller named LPC2148. The LPC2148 are based on a 16/32 bit ARM7TDMI-S™ CPU with real-time emulation and embedded trace support, together with 128/512 kilobytes of embedded high speed flash memory.

4. 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. Liquid Crystal Display screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits.

III. TECHNICAL SPECIFICATION

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

A. Hardware Specifications

Arm7 lpc2148 microcontroller: LPC2148 is the widely used IC from ARM-7 family. The LPC2148 microcontrollers are based on a 32/16 bit ARM7TDMI-S which is shown in fig.2 with real-time emulation and embedded trace support, that combines the microcontroller with embedded high speed flash memory ranging from 32 kb to 512 kb. A 128-bit wide memory interface and a unique accelerator architecture enable 32-bit execution at maximum clock rate.

Fig. 2. LPC2148 BOARD.

Due to their tiny size and low power consumption, LPC2148 are ideal for applications where miniaturization is a key requirement, such as access control and point-of-sale. A blend of serial communications interfaces ranging from a USB 2.0 Full Speed device, multiple UARTs, SPI, SSP to I2CS and on-chip SRAM of 8 kb up to 40 kb make these devices very well suited for communication gateways and protocol converters, soft modems, voice recognition and low end imaging, providing both large buffer size and high processing power. Various 32-bit timers, single or dual 10-bit ADC(s), 10-bit DAC, PWM channels and 45 fast GPIO lines with up to nine edge or level sensitive external interrupt pins make these microcontroller particularly suitable for industrial control and medical systems.

IR Sensor. IR sensors are used to produce IR waves. It consists of IR Transmitter and IR receiver. IR sensor works on infrared waves, the module comprises of one IR led (Transmitter) and one photodiode (Receiver). Module consists of 3 pins namely GND, VCC (+5V) and SIG pin provides the TTL value based on the reference voltage set. It also consists of a potentiometer which can be adjusted to vary the reference voltage hence varying its range and accuracy. An infrared sensor circuit is one of the basic and popular sensor module in an electronic device. This sensor is analogous to human's visionary senses, which can be used to detect obstacles and it is one of the common applications in real-time.

Fig. 3. IR Sensor.

i. **2x16 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.
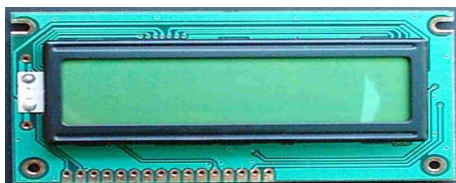

Fig. 4. LCD.

L293D (MOTOR DRIVER IC).

It converts direct current electrical power into mechanical power. It can drive 2 motor at a time & bidirectional. This device is suitable for use in switching applications at frequencies up to 5 kHz. The L293D is assembled in a 16 lead plastic package which has 4 center pins connected together and used for heat sinking.L293D is a typical Motor driver or Motor Driver IC which allows DC motor to drive on either direction. 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 motor with a single L293D IC. L293D works on the concept on H-bridge.

**Fig. 5.** MOTOR DRIVER IC.

A. *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. The Proteus Design Suite is an Electronic Design Automation (EDA) tool including schematic capture, simulation and PCB Layout modules. It is mainly popular because of availability of almost all microcontrollers in it.

IV. WORKING
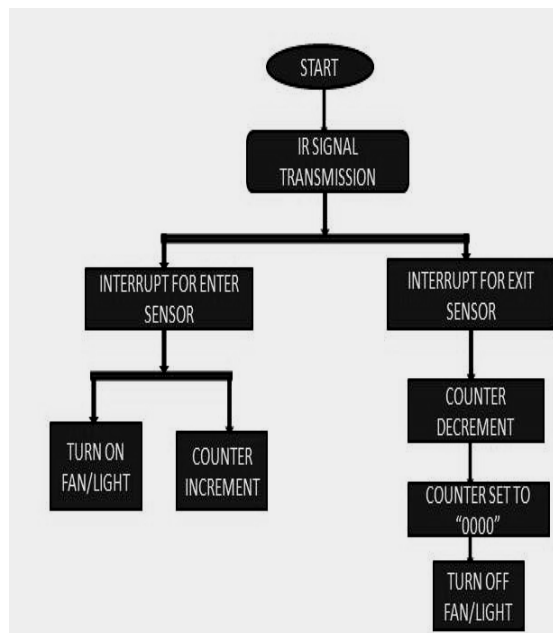
If the sensor 1 is interrupted first then the microcontroller will look for the sensor 2. And if it is interrupted then the microcontroller will increment the count.

When the first person enter the room then the counter goes to 1 and that time the FAN/LIGHT will turn on.

If the sensor 2 is interrupted first then the microcontroller will look for the sensor 1. And if it is interrupted then the microcontroller will decrement the count.

When the last person leaves the room then counter goes to 0 and that time the FAN/LIGHT will turn off.

V. CONCLUSION

In our project, we have designed and implemented a Bi-Directional Counter & Home Automation using the concept of Embedded System. The target users of the project can be any one right from a common man to any organization. Lets say if any one uses our project for Seminar Purpose then the track record of the persons attending the seminar will give the exact idea about the no. of candidate attending and leaving the seminar and accordingly the Project Model will control the

Electronics Gadget of the Seminar Hall, In making this project.

This project is useful in developing countries and this project has a bright future. In this digital world Technology is very advanced and we prefer things to be done automatically without any human efforts. This project also helps to reduce human efforts. Also it is very useful to conserve resources. It is very useful in Schools, hospitals, malls, offices, auditoriums etc. This gives lots of knowledge of software as hardware.

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