AUTOMATIC ROOM LIGHT CONTROLLER WITH BIDIRECTIONAL VISITOR COUNTER

Anup Tarwade[1], Chaitanya Nehe[2],Niraj Mahajan[3],Kanchan Ugale[4]

Student[1],Student[2], Student[3] , Lectural[4,]

Diploma Student, Dept. of MK.Guru Gobind Singh Polytechnic, Nashik

kanchan.ugale@ggsf.edu.in

Prof. K.D.Ugale, Faculty,Dept. of MK. Guru Gobind Singh Polytechnic, Nashik

ABSTRACT:
This project involves the installation and designed by using the logic trainer EES 2001 to provide the automatic control for the room light, count the visitors and to avoided the crowdyplaces.This project is very useful in houses, seminar halls, institutions etc to avoid congestion and save electricity that can be utilized for another microcontroller (AT89S52) acted as a heart of the whole circuit and allowed dynamic and faster control for all functions.In this competitive world and busy schedule routine, switching off lights, is often negligible, when even there is no need of light.The designed circuit consisted of two IR transmitter-receiver pairs Initially the light is switched off but as the person entered into the room; the receiver of first IR sensor pair identified the person and then it will send the signals tomicro controller. In response, microcontroller will switched on the room light. thereas, when anyone left the room, another pair of IR sensor will send the signals to the microcontroller to switch off the room light. The seven segment display showed the total number of visitors that entered or left the room.

KEYWORDS: *Arduino, microcontroller, IOT, IR Sensor Module, Counter*

I. INTRODUCTION

This Project ―Automatic Room Light Controller with Visitor Counter using Microcontroller 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. The total number of persons inside the room is also displayed on the seven segment displays.The microcontroller does the above job. It receives the signals from the sensors, and this signal is operated under the control of software which is stored in ROM. MicrocontrollerAT89S52 continuously monitor the Infrared Receivers, When any object pass through the IR Receiver's then the IR Rays falling on the receiver are obstructed , this obstruction is sensed by the Microcontroller.

II. METHODOLOGY

The hardware part mainly consists of a digital computer, an Arduino Uno board, Infrared Sensor module, LM358, 16x2 LCD.displays, BD139 Transistor which is being discussed along with their specific functions.

A. Arduino Uno

An Arduino board [1] consists of an Atmel 8-, 16-or 32-bit AVR microcontroller with complementary components that facilitate programming and incorporation into other circuits. An important aspect of the Arduino is its standard connectors, which let users connect the CPU board to a variety of interchangeable add-on modules termed shields. Some shields communicate with the Arduino board directly over various pins, but many shields are individually addressable via an I²C serial bus—so many shields can be stacked and used in parallel. It provides 14 digital I/O pins, six of which can produce pulsewidth modulated signals, and six analogue inputs, which can also be used as six digital I/O pins. This board has a 5 volt linear regulator and a 16 MHz crystal oscillator.

B. Infrared Sensor Module

An infrared sensor is an electronic device that emits in order to sense some aspects of the surroundings. An IR sensor can measure the heat of an object as well as detects the motion. The radiations are invisible to our eyes, which can be detected by an infrared sensor. The emitter is simply an IR LED (Light Emitting Diode) and the detector is simply an IR photodiode which is sensitive to IR light of the same wavelength as that emitted by the IR LED.

C. Dual Operational Amplifiers (LM358)

LM358 [2] is a devices consist of two independent, highgain frequency compensated operational amplifiers designed to operate from a single supply or split supply over a wide range of voltages. It has Wide Supply Ranges. Single Supply is 3 V to 32 V and Dual Supplies: ±1.5 V to ±16 V.

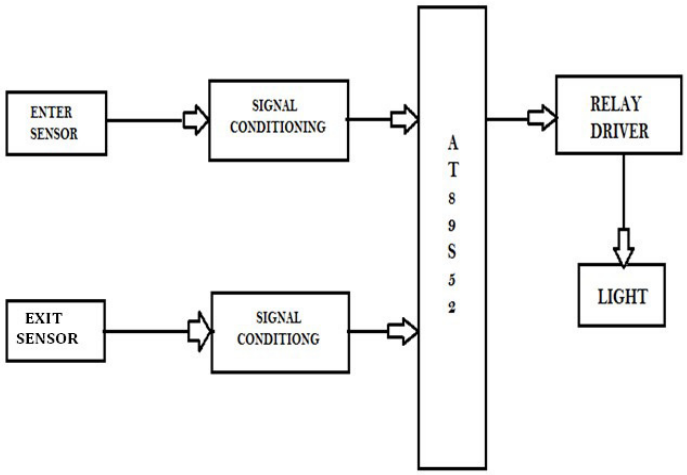
D. Liquid Crystal Display (LCD)

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. These modules are preferred over seven segments and other multi segment LEDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments), animations and so on. A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data. The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data to be displayed on the LCD. The data is the ASCII value of the character to be displayed on the LCD.

E. Transistor (BD139)

The BD139 [3] is a through hole NPN complementary low voltage transistor in TO-126 (SOT-32) package. This device manufactured in epitaxial planar technology. Used for audio amplifiers and drivers, utilizing complementary or quasi complementary circuits. Collector to emitter voltage (Vce) is 80V, Collector current (Ic) is 1.5A, Power dissipation (Pd) is 12.5W, Collector to emitter saturation voltage of 500mV at 0.5A collector current, DC current gain (hFE) of 25 at 0.5A collector current and Operating junction temperature range from 150°C

III. WORKING



The basic block diagram of the bidirectional visitor counter with automatic light controller is shown in the above figure. Mainly this block diagram consists of the following essential blocks.

1. Power Supply
2. Entry and Exit sensor circuit
3. AT 89S52 micro-controller
4. Relay driver circuit.

1. *Power Supply:-*

Here we used +12V and +5V dc power supply. The main function of this block is to provide the required amount of voltage to essential circuits. +12voltage is given. +12V is given to relay driver. To get the +5V dc power supply we have used here IC 7805, which provides the +5V dc regulated power supply.

2.Enter and Exit Circuits:-

This is one of the main parts of our project. The main intention of this block is to sense the person. For sensing the person and light we are using the light dependent register (LDR). By using this sensor and its related circuit diagram we can count the persons.

3. 89S52 Microcontroller:-

It is a low-power, high performance CMOS 8-bit microcontroller with8KB of Flash Programmable and Erasable Read Only Memory (PEROM). The device is manufactured using Atmel's high-density non-volatile memory technology and is compatible with the MCS-51TMinstruction set and pin out. Theon-chip Flash allows the program memory to be reprogrammed in-system or by a conventional non-volatile memory programmer. By combining a versatile 8-bitCPU with Flash on a monolithic hip, the Atmel AT89S52 is a powerful.

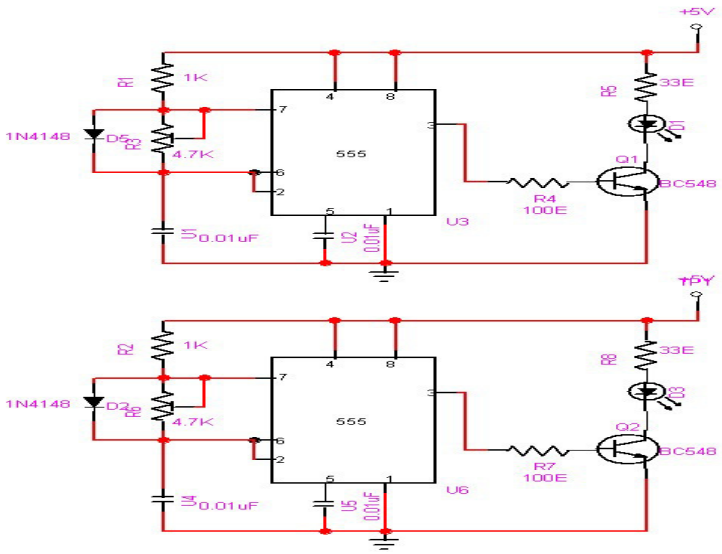
4. Relay Driver Circuit:-

This block has the potential to drive the various controlled devices. In this block mainly we are using the transistor and the relays. One relay driver circuit we are using to control the light. Output signal from AT89S52 is given to the base of the transistor, which we are further energizing the particular relay. Because of this appropriate device is selected and it do its allotted function.

IV. SIMULATION RESULTS

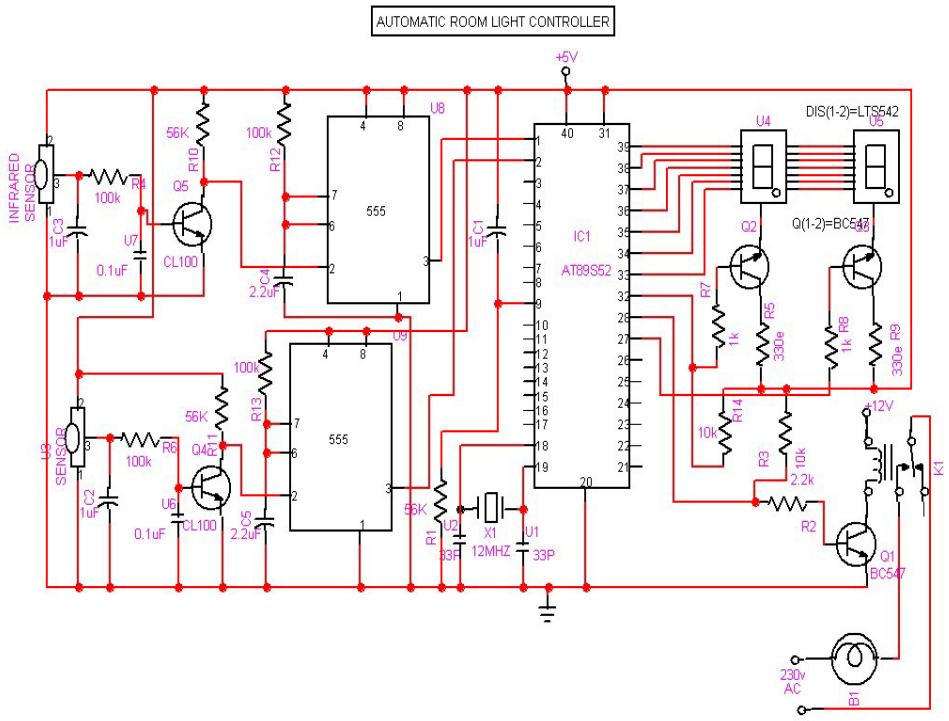
A. *Transmission circuit:*

This diagram shows a 555 timer IC, configured to function as a basic actable multivibrator. The stable multi vibrator generates square wave, the period of which is determined by the circuit external to IC 555. The astable multivibrator does not require any external trigger to change the state of the output. Hence the name free running oscillator. The time during which the output is either high or low is determined by the two resistors and a capacitor which are externally connected to the 555 timer. In this circuit, a negative pulse applied at pin 2 triggers an internal flip-flop that turns off pin 7's discharge transistor, allowing C1 to charge up throughR1. At the same time, the flip-flop brings the output (pin 3) level to 'high'. When capacitor C1 as charged up to about 2/3 Vcc, the flip-flop is triggered once again, this time making the pin 3 output 'low' and turning on pin 7's discharge transistor, which discharges C1 to ground. This circuit, in effect, produces a pulseat pin 3 whose width t is just the product of R1 and C1, i.e., t=R1C1. IR Transmission circuit is used to generate the modulated 36 kHz IR signal. The IC555 in the transmitter side is to generate 36 kHz square wave. Adjust the preset in the transmitter to get a 38 kHz signal at the o/p. Then you point it over the sensor and its o/p will go low when it senses the IR signal of 38 kHz.



A.Transmission circuit:

The IR transmitter will emit modulated 38 kHz IR signal and at the receiver we use TSOP1738 (Infrared Sensor). The output goes high when there is an interruption and it return back to low after the time period determined by the capacitor and resistor in the circuit i.e. around 1 second. CL100 is to trigger theIC555 which is configured as monostable multivibrator. Input is given to the Port 1of the microcontroller. Port 0 is used for the 7-Segment display purpose. Port 2 is used for the Relay Turn On and Turn off Purpose.LTS 542 (Common Anode) is used for 7-Segment display and that time Relay will get voltage and triggered, so light will get voltage and it will turn on and when counter will be 00 and at that time Relay will be turned off. Reset button will reset the microcontroller.



V. CONCLUSION AND FUTURE WORK

A novel architecture for an economic bidirectional Visitor Counter and room lighter 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 Arduino Uno and Ardiono(IDE). The cost of this technology is very economical. This project uses low cost off the shelf components, and is based on Arduino platform which is FOSS (Free Open Source Software). So the overall implementation cost is very cheap and is affordable by a common person. This low cost system is designed to improve the living standard and complexity of visitors counting. It provides accurate data and eliminating the error where possible.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.. The whole system can be fabricated as economic commercial hardware package.

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