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Automatic Room Light Controller with Bidirectional Visitor Counter (/microcontroller-projects/automatic-room-light-controller-with-bidirectional-visitor-counter-using-arduino)

By   (page_author.html)Saddam (/users/saddam)   🕓 Oct 13, 2015

173
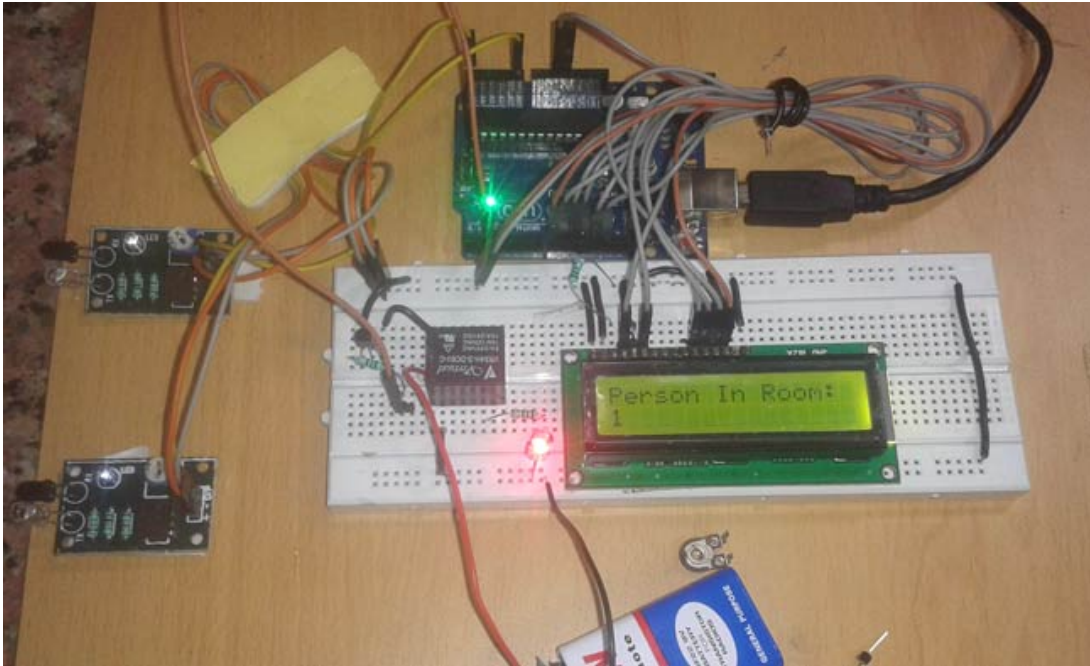
Arduino Based Visitor Counter with Automatic Light Control

Often we see visitor counters at stadium, mall, offices, class rooms etc. How they count the people and turn ON or OFF the light when nobody is inside? Today we are here with **automatic room light controller project with bidirectional visitor counter** by using Arduino Uno. It is very interesting project for hobbyists and students for fun as well as learning.

Components

- Arduino UNO
- Relay (5v)
- Resisters
- IR Sensor module
- 16x2 LCD display
- Bread Board
- Connecting Wires
- Led
- BC547 Transistor

The project of "**Digital visitor counter**" is based on the interfacing of some components such as sensors, motors etc. with arduino microcontroller. This counter can count people in both directions. This circuit can be used to count the number of persons entering a hall/mall/home/office in the entrance gate and it can count the number of persons leaving the hall by decrementing the count at same gate or exit gate and it depends upon sensor placement in mall/hall. It can also be used at gates of parking areas and other public places.

This project is divided in four parts: sensors, controller, counter display and gate. The sensor would observe an interruption and provide an input to the controller which would run the counter increment or decrement depending on entering or exiting of the person. And counting is displayed on a 16x2 LCD through the controller.

When any one enters in the room, IR sensor will get interrupted by the object then other sensor will not work because we have added a delay for a while.

IR Rx

Reflected IR Light

IR Tx

IR light

White Surface
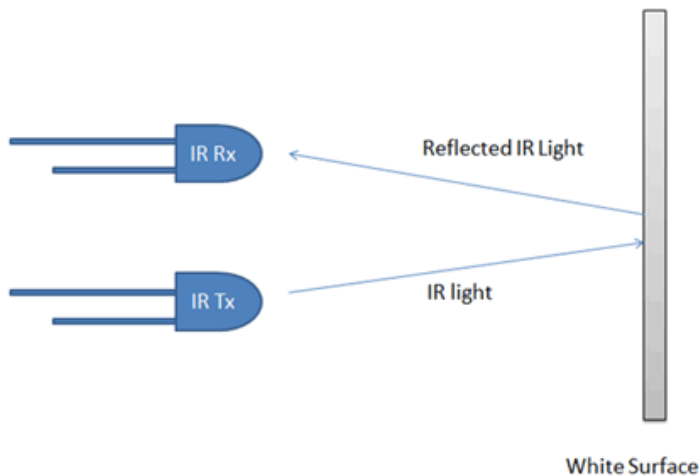
Circuit Explanation

There are some sections of whole visitor counter circuit that are sensor section, control section, display section and driver section.

Sensor section: In this section we have used two IR sensor modules which contain IR diodes, potentiometer, Comparator (Op-Amp) and LED's. Potentiometer is used for setting reference voltage at comparator's one terminal and IR sensors sense the object or person and provide a change in voltage at comparator's second terminal. Then comparator compares both voltages and generates a digital signal at output. Here in this circuit we have used two comparators for two sensors. LM358 is used as comparator. LM358 has inbuilt two low noise Op-amp.
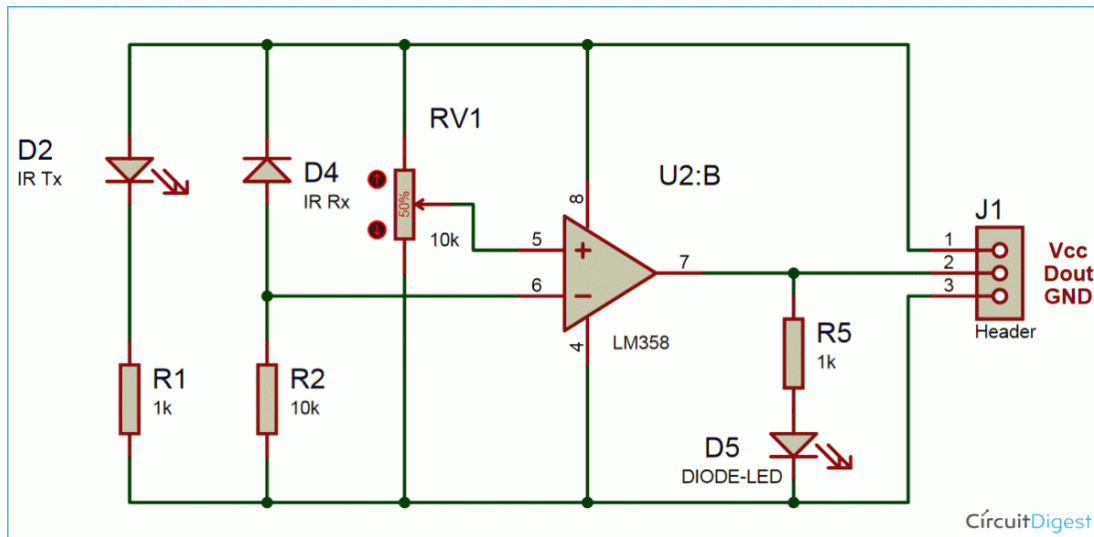
(/fullimage?i=inlineimages/IR-Circuit.gif)

Control Section: Arduino UNO is used for controlling whole the process of this visitor counter project. The outputs of comparators are connected to digital pin number 14 and 19 of arduino. Arduino read these signals and send commands to relay driver circuit to drive the relay for light bulb controlling. If you find any difficulty in working with relay, check out this tutorial on arduino relay control (https://circuitdigest.com/microcontroller-projects/arduino-relay-control) to learn more about operating relay with Arduino.

Display section: Display section contains a 16x2 LCD. This section will display the counted number of people and light status when no one will in the room.

Relay Driver section: Relay driver section consist a BC547 transistor and a 5 volt relay for controlling the light bulb. Transistor is used to drive the relay because arduino does not supply enough voltage and current to drive relay. So we added a relay driver circuit to get enough voltage and current for relay. Arduino sends commands to this relay driver transistor and then light bulb will turn on/off accordingly.

Visitor Counter Circuit Diagram

The outputs of IR Sensor Modules are directly connected to arduino digital pin number 14(A0) and 19(A5). And Relay driver transistor at digital pin 2. LCD is connected in 4 bit mode. RS and EN pin of LCD is directly connected at 13 and 12. Data pin of LCD D4-D7 is also directly connected to arduino at D11-D8 respectively. Rest of connections are shown in the below circuit diagram.
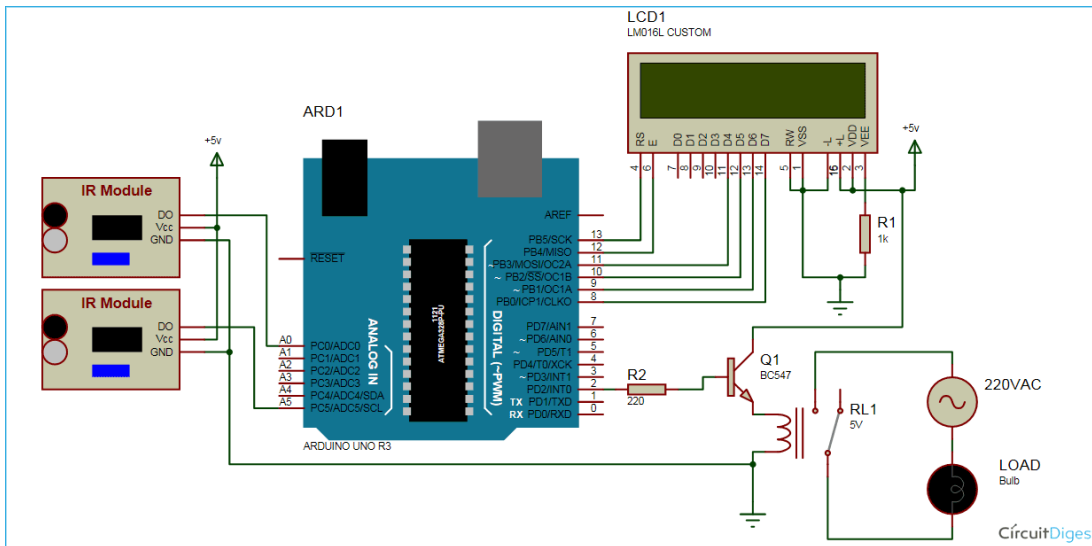
i=circuitdiagram_mic/Visitor-Counter-Circuit1.gif)

(/fullimage?

Code Explanation

First we have included library for LCD and defined pin for the same. And also defined input output pin for sensors and ralay.

```
#include<LiquidCrystal.h>
LiquidCrystal lcd(13,12,11,10,9,8);

#define in 14
#define out 19
#define relay 2
```

Then given direction to input output pin and initialized LCD in setup loop.

```
void setup()
{
  lcd.begin(16,2);
  lcd.print("Visitor Counter");
  delay(2000);
  pinMode(in, INPUT);
  pinMode(out, INPUT);
  pinMode(relay, OUTPUT);
  lcd.clear();
  lcd.print("Person In Room:");
  lcd.setCursor(0,1);
```

In loop function we read sensors input and increment or decrement the counting depending upon enter or exit operation. And also check for zero condition. Zero condition means no one in the room. If zero condition is true then arduino turn off the bulb by deactivating the relay through transistor.

```
void loop()
{

  if(digitalRead(in))
  IN();
  if(digitalRead(out))
  OUT();

  if(count<=0)
  {
    lcd.clear();
    digitalWrite(relay, LOW);
    lcd.clear();
    lcd.print("No Body In Room");
    lcd.setCursor(0,1);
```

And if zero condition is false then arduino turns on the light. Here is two functions for enter and exit.

```
void IN()
{
    count++;
    lcd.clear();
    lcd.print("Person In Room:");
    lcd.setCursor(0,1);
    lcd.print(count);
    delay(1000);
```

```
void OUT()
{
  count--;
    lcd.clear();
    lcd.print("Person In Room:");
    lcd.setCursor(0,1);
    lcd.print(count);
    delay(1000);
```

Code

```
#include<LiquidCrystal.h>

LiquidCrystal lcd(13,12,11,10,9,8);

#define in 14
#define out 19
#define relay 2

int count=0;

void IN()
{
   count++;
   lcd.clear();
   lcd.print("Person In Room:");
   lcd.setCursor(0,1);
   lcd.print(count);
   delay(1000);
}

void OUT()
{
  count--;
   lcd.clear();
   lcd.print("Person In Room:");
   lcd.setCursor(0,1);
   lcd.print(count);
   delay(1000);
}

void setup()
{
 lcd.begin(16,2);
 lcd.print("Visitor Counter");
 delay(2000);
 pinMode(in, INPUT);
 pinMode(out, INPUT);
 pinMode(relay, OUTPUT);
 lcd.clear();
```

```
lcd.print("Person In Room:");
lcd.setCursor(0,1);
lcd.print(count);
}
void loop()
{

if(digitalRead(in))
IN();
if(digitalRead(out))
OUT();

if(count<=0)
{
  lcd.clear();
  digitalWrite(relay, LOW);
  lcd.clear();
  lcd.print("Nobody In Room");
  lcd.setCursor(0,1);
  lcd.print("Light Is Off");
  delay(200);
}

else
  digitalWrite(relay, HIGH);

}
```

Video

Automatic Room Light Controller with Bidirectional Visitor Counter

TAGS   EMBEDDED (/TAGS/EMBEDDED)   ARDUINO (/TAGS/ARDUINO)

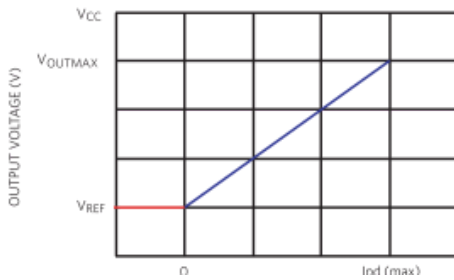ROOM LIGHT CONTROLLER (/TAGS/ROOM-LIGHT-CONTROLLER)   ARDUINO UNO (/TAGS/ARDUINO-UNO)   IR (/TAGS/IR)

VISITOR COUNTER (/TAGS/VISITOR-COUNTER)

⌃

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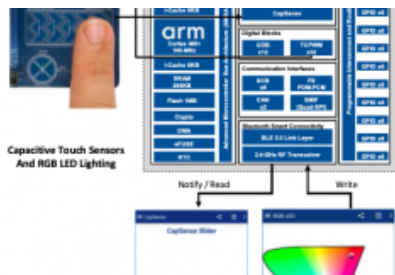
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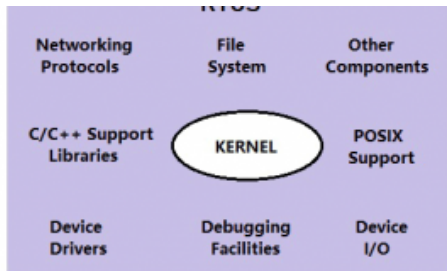
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COMMENTS

juani
Oct 20, 2015

Hi Saddam, could you please tell me where you got those 2 IR Sensor Modules from ?

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Thank you in advance and best regards.

juani

Abhishek (/users/abhishek)
Oct 22, 2015

(/users/abhishek)

These IR sensor Modules are easily available online (ebay/amazon) or offline at local

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electronics components shop.

talash ganvir
Jan 08, 2017

what can i do when the sensor is active low

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Bhanu Shukla
Nov 05, 2015

The IR SEnsor modules I have are not giving any output, i think it's not compatible with arduino.

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Please specify proper model number for IR Sensor Module so that I can buy specific one

Maddy (/users/maddy)
(/users/maddy) Nov 14, 2015

Any IR sensor module should work here, please set the proper sensitivity of sensor by

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rotating the potentiometer on it. Learn the working of IR sensor module here
(http://circuitdigest.com/electronic-circuits/ir-sensor-circuit-diagram). Otherwise check the circuit and code
once again.

mahendar13yadav...
Nov 06, 2015

cant we count persons more than one if we can how can we do it

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Amit
Nov 14, 2015

This project is already counting multiple persons, please check the Video.

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tushti
Mar 02, 2018

we are getting the same output

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ibrahim bashir
Nov 18, 2015

liked very much

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umar
Dec 03, 2015

yar this programming is not working right because it does not count correctly .

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when you keep your hand in front of IR module so it will continuous the counting .

But instead of count one it count continuous i think so their is problem in programm plz someone upload correct

programm other than it it has no problem reply must

daniella
May 20, 2016

did you already have a corrected programming?

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nirmal
Dec 07, 2015

How can I use the counted value to be sent to the serial out pin that to be used by a computer?

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Abhishek (/users/abhishek)

(/users/abhishek) Dec 17, 2015

You can easily send this data to Computer, by using some code (Serial.begin(9600);

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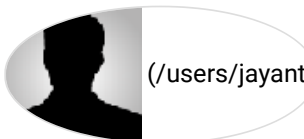destination=node/188%23comment-form) to post comments

Serial.println("Hello");) and Arduino IDE. There are numerous tutorial on the web.

raj
Jan 02, 2016

How can i connect 220 Volt AC bulb to it. Please help immediately.

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Jayant (/users/jayant)

(/users/jayant) Jan 14, 2016

If you look at the circuit diagram, it already has 220v AC bulb connected through the Relay.

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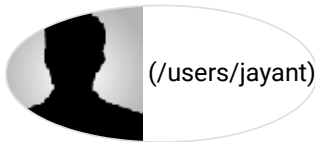
abhinav
Jan 09, 2016

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on relay wire is connected on which two terminal

C and NC

OR C and NO

∧

Jayant (/users/jayant)
(/users/jayant)
Jan 14, 2016

When there is no current in Relay coil, COM and NC are connected.Check this Article for

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relay working: Automatic Staircase Lights using PIR Sensor and Relay (http://circuitdigest.com/electronic-
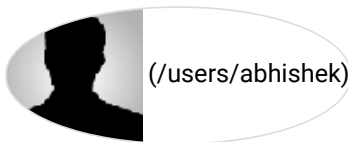circuits/automatic-room-lights-using-pir-sensor-and-relay)

abhinav
Jan 10, 2016

can i use pir sensor insted of ir sensor

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Abhishek (/users/abhishek)
(/users/abhishek)
Jan 14, 2016

Yes PIR may be used, but it should be OFF within a second, after somebody passes it.

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Learn the working of PIR here: PIR Sensor (http://circuitdigest.com/electronic-circuits/pir-sensor-based-motion-
detector-sensor-circuit)

akash m kashyap
Jan 21, 2016

i used this code iny project but the range of the ir sesnor is only of 1-2cm soo i have to increase the distance

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so pls give me the code to increase the rangee..

saddam khan
Jan 27, 2016

use variable resistor placed at IR sensor module for increase sensing distance.

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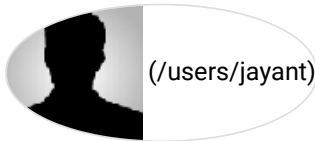**Deenkhar Beejad...**
Feb 04, 2016

Hello Sir,

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destination=node/188%23comment-form) to post comments

Great project. I am current doing my final year project in BEng Electronic Engineering. I am doing a solar automatic lighting control system for a house. i found your project interesting so i tried add it to my house. BUT, when i finished mounting the circuit, the lcd count goes on constantly 0, -1,0,-1,0,-1...

now when i put my hand one of the sensor either the count keeps going from 0 to 1,2,3, etc... or it decrements to -1,-2,-3, etc...

can you advice?? i tried adjust the sensitivities but in vain.

thnx in advance.

Jayant (/users/jayant)
(/users/jayant)
Feb 06, 2016

Please check your circuit connections and code twice. Do not keep any unnecessary

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moving things in front of IR sensors. Try understanding the code, and change it accordingly. There is one IR pair for Entry detection and another for Exit detection, if you keep your hand in front of both the IR pair, then the number will continuously goes up and down. And the value shouldn't go negative as there is condition for that in the code, please check.

Deenkhar Beejad...
Feb 08, 2016

Thanks for replying... I altered the code only but left the circuitry the same... It works now. Now will try

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optimize and add further components.

Naveen
Mar 29, 2016

good morning deenkhar beejad ji,

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in the above mentioned circuit i got the same problem as you,please send me the alterd code

daniella
May 20, 2016

hello deenkhar beejad ji,

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in the above mentioned circuit i got the same problem as you,please send me the corrected code

Jimmy
Sep 06, 2016

Hi! I have faced the same problem with you. I had tried to modify the code and still cannot get it correctly. Would you share your altered code with me? I really need your help to complete my final

year project.

∧

Azwan Syazwan B...
Nov 15, 2016

i also have the same problem.. can u email me the correct code.. i tried to play with the delay...but

it still not stable

nita
Dec 16, 2016

Hi Deenkhar Beejad...

I don't have a lot of programming experience, and I am struggling with fixing the code. Would you please
be able to send your altered code?

Thanks,
N

Xeshas
May 26, 2017

I am facing the same problem on my project. Can you please send me the altered program which

worked for you

Alvin Avarachan
Nov 16, 2017

I have the same problems. Will u please send the altered code

Jhomel
Dec 12, 2017

hello...can i also have the altered codes for this, im having the same issue here...

SARAH
Jan 25, 2018

Hi sir. Im face with the same issue. could you please help me send the coding. Please help me sir

nishant singh
Mar 28, 2018

can you send me the correct code..because i m doing this project...bt it does't work

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Kita
Mar 28, 2018

Can u plz send the correct code.

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mian umar
May 12, 2018

sir can you please send me the altered code?

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saba
Apr 15, 2016

i am facing same issue please upload your modified code

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Sushmitha
Feb 19, 2016

Hi

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Its a nice simple yet effective project

I face troubles in relay connections

i used a 5-pin,5v relay

It would be of great help if you could mail me relay connections with the pin specs and reqd. voltages at each pin

thank you

Abhishek (/users/abhishek)
Feb 24, 2016

(/users/abhishek)

Check some Home automation projects on this site from where you can get the idea of

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connecting relay: Home Automation Projects (http://circuitdigest.com/search/node/Home%20Automation)

SUNIL BHANDARI
Apr 14, 2018

sir i am facing problem in connecting relay with 5 leg can u please help me.

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Deenkhar Beejad...
Feb 21, 2016

Hello Sir,

Log in (/user/login?destination=node/188%23comment-form) or register (/user/register?
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Is there anyway to prevent the counter from moving up or down when i place my hand infront of 1 of the sensors constantly? If ever i leave my hand infront of 1 of my sensors, the count eitheir goes up or down. So in a real case scenario, if someone stays infront of the door for sometime, either the count will go continuously up or down. and it will affect when the lights should go off.

Thanks.

Abhishek (/users/abhishek)
(/users/abhishek)   Feb 24, 2016

Good thought, for this you can either increase the Delay in code or add some condition

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to avoid this, like only increase the count if IR sensor is switched from Off to ON state, and dont increases count if IR sensor is previously ON or continuously getting digitalRead(in). Try around some codes and share with us.

Allen Paul Antony
Oct 11, 2017

Please tell me how to change program according to this above mentioned.

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saddam khan
Feb 25, 2016

you may add a deboucing condition in both if case condition. like:

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while(digitalRead(pin_number)==0);

Rohit
Feb 29, 2016

Please tell me how to burn display

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Jayant (/users/jayant)
(/users/jayant)   Mar 11, 2016

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Arduino IDE software (Arduino Nightly : https://www.arduino.cc/en/Main/Software
(https://www.arduino.cc/en/Main/Software)) used to write, verify and upload/burn the code to Arduino, through PC

∧

Mark
Mar 01, 2016

Can we use proximity sensor module on this? Can we have a circut diagram using this type of module?

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Maddy (/users/maddy)
(/users/maddy)
Mar 11, 2016

yes, basically IR sensor belongs to Proximity sensor.

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qasim saleem
Mar 02, 2016

i need proteus file.....

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bhimrao bhalerao
Mar 03, 2016

which resister(value) are use in this ckt pls tell me

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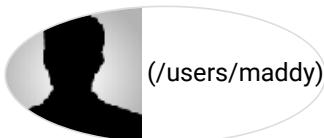
Tarun kunula
Mar 09, 2016

Can you pls send a circuit diagram?What are the values of the resistances and the pins they need to be

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connected?

Maddy (/users/maddy)
(/users/maddy)
Mar 11, 2016

Resistor values are clearly mentioned in the Circuit Diagram.

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mansi shukla
Mar 11, 2016

sir, i m not able to get exact circuit diagram of automatic door opener using visitor counter....so, kindly cn u

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suggest some help all i get is room light controller every time.....cn i get circuit diagram of defined subject

PURVI
Mar 14, 2016

fine

victor
Mar 17, 2016

my backlight isn't coming on. please help

akash m kashyap
Mar 17, 2016

i think there is some problem in the code because if the first senses then the count value got incremented and

if second sensor is sensed n it wil get decremented. i mean to say if first sensor goes high the display will be one if

the second sensor goes high n then value wil be 0 n lights wil be off wat shl i do to get rid of it

Abhishek (/users/abhishek)
(/users/abhishek)
Mar 28, 2016

That's how it is supposed to work. You can increase the delay to 2000 in 'IN' and 'OUT'

functions. Also read all the above comments, solution has already been suggested.

naveen
Mar 21, 2016

what type of sensor modules used in the circuit,tell me the ic number in the module.....?

naveen
Mar 21, 2016

i have some more doughts please help me

after burning the code which lights in arduino board will glow or blink...?

after bulilding above circuit display is showing 1 and 0 continuously help me to solve this.....?

Jayant (/users/jayant)
(/users/jayant)
Mar 28, 2016

@Naveen: Please read all the above Comments before asking any question, your questions are already answered.

akash m kashyap
Mar 21, 2016

they have given ic 358 in tht module

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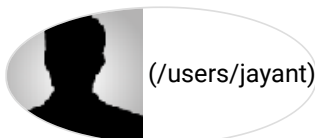destination=node/188%23comment-form) to post comments

Nekuie
Apr 13, 2016

i have a question!

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by using this circuit how we can have an accurate result? i mean repetitive visits can't be counted

Laura
Apr 14, 2016

i didnt not use the IR modules you have, i built my from scratch using IR LEDs, resisters, and 741 op-amp.

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when i plug my circuit into the arduino it counts on its own without the IR beam being broke. what kind of output
signal is the arduino looking for? it also will count negative, what can i add to the code to prevent that?

Maddy (/users/maddy)
(/users/maddy)
Apr 18, 2016

Check the IR module you have built, and adjust the sensitivity of circuit. Check this for IR

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sensor building : IR Sensor Module Circuit (http://circuitdigest.com/electronic-circuits/ir-sensor-circuit-diagram)

Faisal
Apr 18, 2016

sir I am doing a mini project on your idea. but I am facing some problems that my LCD is not showing any

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single alphabet. I have checked all the circuitry, its fine. is there any change should made in code for this. actually
sir I am from mechanical dept that's why I don't know much programming. can you please help me in this?

prabhakaran
Apr 19, 2016

if there any IR module available for proteus ....if available where can i download it..??

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pls help me bro....

saddam khan
Apr 21, 2016

you may use torch ldr in proteus in place of ir sensor module.

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antex
May 03, 2016

could you able to program LDR in your circuit?

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Ashis kundu
May 04, 2016

Sir my project name is automatic room light control using ir sensor I using ardiuno uno r3 circuit board then I

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don't know this programming please help me and give the programming

kshitij
May 10, 2016

i compiled the code ....but when i uploaded it the light is continuously glowing !!!!!

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will it work without the lcd ..???

shiva kumar
May 15, 2016

i went through the program and what I didn't understand is how you you are determining if the person is

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leaving or entering the room. and also you seem to have connected the IR sensors to analog pins, so shouldnt it say
" analogRead()" instead of "digitalRead()" ?
Thank You.

Ateeq Anjum
Jun 02, 2016

Hello everyone, i selected this project as final year project. but i also try to add more things... and i try to make

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it for a class room where the student and teacher separately count and total persons too. and for teachers count
use a keypad. and also give me some idea which is possible to add in mine project..

shiva
Jun 17, 2016

hey, i made this project and i saw that the led that is operating through the relay glows when the relay goes
LOW and vice versa. I checked my hardware and the wiring. Why is that?

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Abhishek (/users/abhishek)
(/users/abhishek)   Jul 09, 2016

You must have interchanged the NC and NO, please check.

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charlei
Jul 12, 2016

please send me the program you used while codding coz am having troubles with ir sensors ,they are counting

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the no of people in the room continously

thnks

naibin paul
Jul 19, 2016

Sir pls send code

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hareesh tm
Jul 20, 2016

Can you please get me the modified code for counting the total number of persons entered in the room for a

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particular period.?

Maddy (/users/maddy)
(/users/maddy)   Aug 20, 2016

@charlei @naibin and @hareesh: The code given is full and complete, please go through

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the above comments, some people modified the code accordingly and you can also modify the code according
to your need.

Sk.Kamrul Hassan
Aug 10, 2016

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Sir,

I am from Bangladesh, we have a problem with electricity in our country.

Can u help me to save last status in epprom at ATMEGA328 ? If you pls send me..

∧

Abhishek (/users/abhishek)
(/users/abhishek)   Sep 17, 2016

Check this article : accessing-internal-eeprom-on-atmega328 (http://cse537-

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2011.blogspot.in/2011/02/accessing-internal-eeprom-on-atmega328p.html)

Ej
Aug 24, 2016

Sir, Can I use IR collision sensor in this project?

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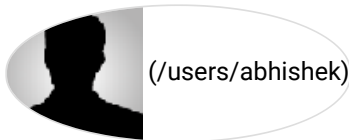
Abhishek (/users/abhishek)
(/users/abhishek)   Sep 17, 2016

Yes

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syket
Sep 25, 2016

i can not find ir module in proteus please help me

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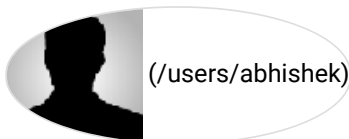destination=node/188%23comment-form) to post comments

Riku
Sep 28, 2016

Sir can you send me all detail about this project like source code, component and etc because i want make

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this project for project last year for my college

Abhishek (/users/abhishek)
(/users/abhishek)   Oct 06, 2016

All the components, circuit, code are already given in the project, please check.

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komal patole
Sep 28, 2016

what is the use of relay in bidirectional visiter counter and do you have any new programming for the same
circuit .and what is the meaning of in and out in the program

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Abhishek (/users/abhishek)

(/users/abhishek)

Oct 06, 2016

Relay is to operate any AC appliances instead of LED, while some one is passing

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through.

lewis

Sep 29, 2016

what if two people enters the door at time?

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Riku

Sep 30, 2016

Sir plz send me correct code ,no ic arduino uno

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AMANJEET

Oct 22, 2016

Sir, how will the code change accordingly if I use microcontroller 8051 in place of aurdino board.please

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suggest me if there is modification needed on this program.

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