PIR Motion Sensor LED Ceiling Light - Arduino Compatible

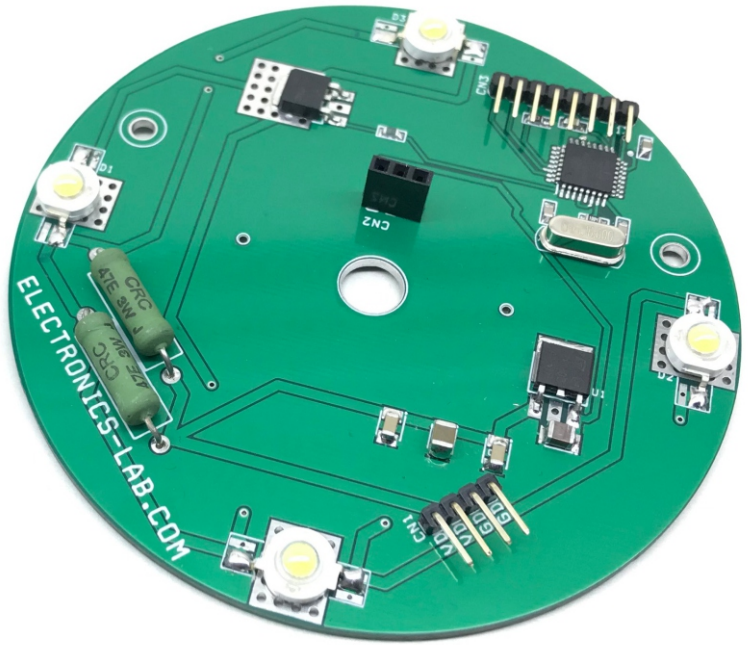
This motion sensor LED ceiling light board has been designed using 4 white LEDs each of 1-3W, PIR sensor module, Atmega328 microcontroller, low ohm IRLR7843 MOSFET, and few other components. The PIR sensor detects the infra-red rays emitted by human motion within the detection area and switches on the 4 white LEDs for 10 seconds. The project helps in energy-saving applications and new green building projects. Detecting distance: 1 to 20 feet. Detecting angle: 360 degrees. Installation height 2-15 feet. 2 mounting holes are provided to mount this board. It is advisable to use this board indoors.

The operation of this circuit is simple, the motion sensor provides a TTL output pulse when it detects the human presence, then the ATmega328 microcontroller detects the trigger on digital in D12 and sets the digital pin D3 high for 10 seconds, this high signal triggers the MOSFET which drives power to 4 LEDs in parallel. Resistors R2 and R5 act as current limiting resistors, U1 is a 5V regulator that provides 5V DC to the microcontroller and sensor from an input supply 12V DC. The operating power supply is 9-12V DC and its draws 500mA of current. The project tested with 3W white LEDs, but any other LED can be used, but take care of current limiting resistor R2 and R5 respectively to LEDs current requirements. CN1 4 pin male header is provided for power input, CN2 SIP8 connector provided for bootloader burning and programming using Arduino IDE.

Note: New Atmega328 Micro-Controller requires Bootloader and Code uploading, SIP8/CN2 connector provided for both, more information is available here
https://www.arduino.cc/en/Tutorial/BuiltInExamples/ArduinoISP

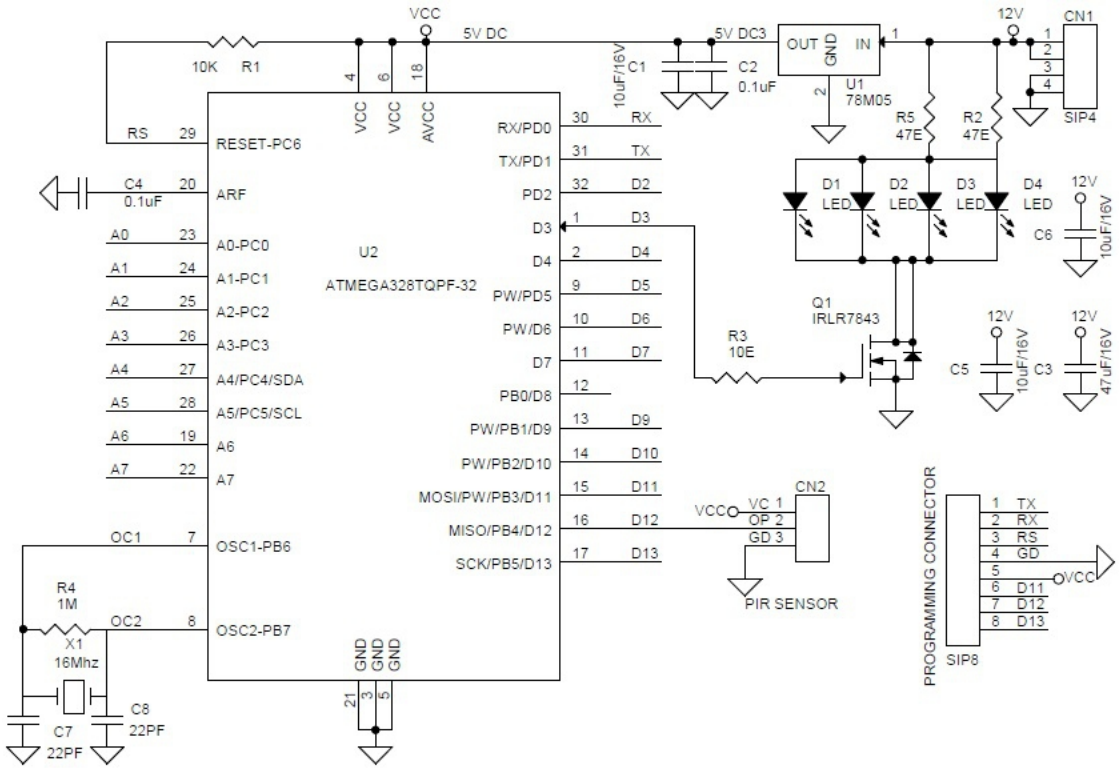
Refer the programming connection diagram to program the board. Arduino example code is available at download link.
PIR sensors are used to detect motion from pets' humanoids from about 20 feet away. The operating principle of such sensors is straightforward: a crystalline sensing element generates an electric charge when exposed to infrared radiation, such as body heat. The more infrared radiation present, the higher the voltage generated. A Fresnel lens is used to focus the infrared radiation on sensor, and an onboard amplifier boosts the signal and trips an output if it starts changing too rapidly.

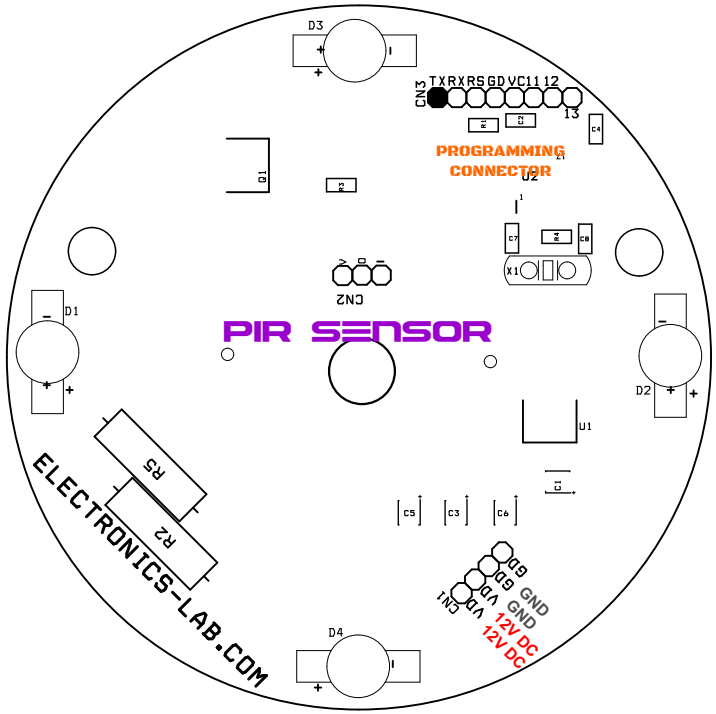
More info about PIR sensor available here
https://www.seeedstudio.com/PIR-Motion-sensor-module-p-74.html



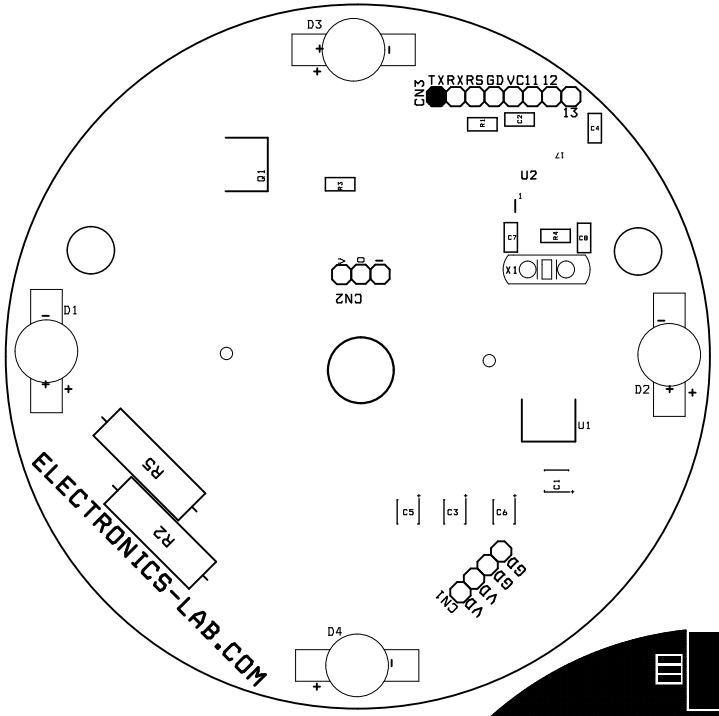
Features

- Power Supply 9-12V DC
- Current consumption 500mA
- On Board 4 x3W White LEDs

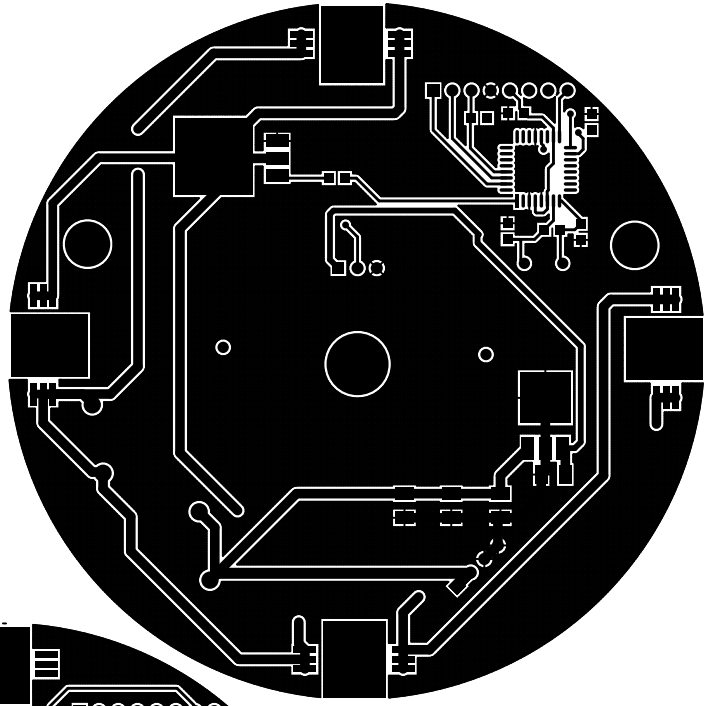

VCC
5V DC
10K R1
4
6
18
VCC
VCC
AVCC
10uF/16V
C1
5V DC3
C2
0.1uF
OUT
GND
IN
U1
78M05
12V
CN1
SIP4
R5
47E
R2
47E
RS 29
RESET-PC6
C4
0.1uF
20
ARF
A0 23
A0-PC0
A1 24
A1-PC1
A2 25
A2-PC2
A3 26
A3-PC3
A4 27
A4/PC4/SDA
A5 28
A5/PC5/SCL
A6 19
A6
A7 22
A7
U2
ATMEGA328TQPF-32
RX/PD0 30 RX
TX/PD1 31 TX
PD2 32 D2
D3 1 D3
D4 2 D4
PW/PD5 9 D5
PW/D6 10 D6
D7 11 D7
PB0/D8 12
PW/PB1/D9 13 D9
PW/PB2/D10 14 D10
MOSI/PW/PB3/D11 15 D11
MISO/PB4/D12 16 D12
SCK/PB5/D13 17 D13
D1 LED
D2 LED
D3 LED
D4 LED
12V
C6
10uF/16V
Q1
IRLR7843
R3
10E
12V
C5
10uF/16V
12V
C3
47uF/16V
OC1 7
OSC1-PB6
R4
1M
OC2 8
OSC2-PB7
X1
16Mhz
C7
22PF
C8
22PF
GND GND GND
21 3 5
VCC
VC 1
OP 2
GD 3
CN2
PIR SENSOR
PROGRAMMING CONNECTOR
1 TX
2 RX
3 RS
4 GD
5
6 D11
7 D12
8 D13
SIP8
VCC



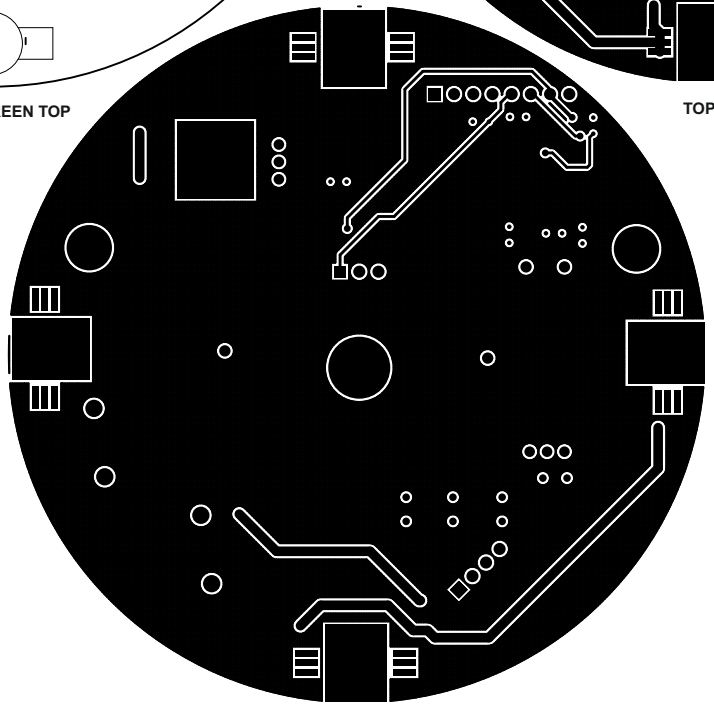
BOM						
NO.	QNTY.	REF.	DESC.	MANUFACTURER	SUPPLIER	SUPPLIER PART NO
1	1	CN1	4 PIN MALE HEADER 2.54MM PITCH	SULLINS	DIGIKEY	S1011EC-40-ND
2	1	CN2	PIR SENSOR MODULE	CHINA	ADAFRUIT	PRODUCT ID: 189
3	3	C1,C5,C6	10uF/16V SMD SIZE 1210	YAGEO	DIGIKEY	
4	2	C2,C4	0.1uF/50V SMD SIZE 0805	YAGEO	DIGIKEY	
5	1	C3	47uF/16V SMD SIZE 1210	YAGEO	DIGIKEY	
6	2	C7,C8	22PF/50V SMD SIZE 0805	YAGEO	DIGIKEY	
7	4	D1,D2,D3,D4	LED WHITE LED 1 TO 3W	CHINA	AMAZON	
8	1	SIP8	8 PIN MALE HEADER 2.54MM	SULLINS	DIGIKEY	S1011EC-40-ND
9	1	Q1	IRLR7843	INFINION	DIGIKEY	
10	1	R1	10K 5% SMD SIZE 0805	YAGEO	DIGIKEY	
11	2	R2,R5	47E 5% SMD SIZE 0805	YAGEO	DIGIKEY	
12	1	R3	10E 5% SMD SIZE 0805	YAGEO	DIGIKEY	
13	1	R4	1M 5% SMD SIZE 0805	YAGEO	DIGIKEY	
14	1	U1	LM78M05 DPAK	TEXAS INTRUMENTS	DIGIKEY	LM78M05CDTX/NOPBCT-ND
15	1	U2	ATMEGA328TQPF-32	MICROCHIP	DIGIKEY	ATMEGA328PB-AN-ND
16	1	X1	16Mhz	ECS INC	DIGIKEY	X1103-ND



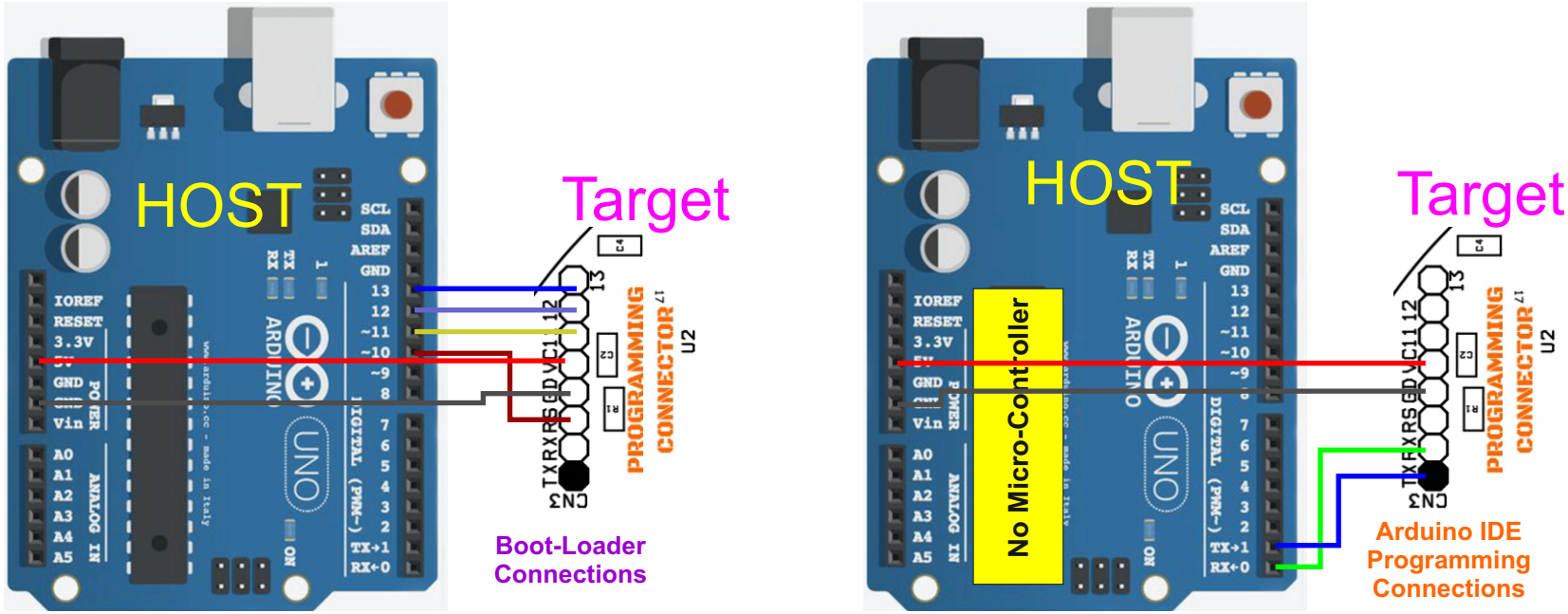
SILK SCREEN TOP



TOP LAYER



BOTTOM LAYER



Connections Diagram for Arduino Programming and Boot Loader