

## Automatic LED Stairway Lighting, Arduino Compatible

This creative idea is suitable for a stairway with 16 stairs, each stair can have a 12V LED. It has two sensors one at the start and one at the end of the stairs and when the sensor triggered at any end it starts a process of lighting each of the steps in a progressive cycle starts. When you reach the other side of the stairway and the second sensor is triggered it will start to extinguish all the lit lights in the ascending cycle.

This is a very simple and easy to build project based on the Arduino platform The board consists of an ATMEGA328 microcontroller, 16 channel MOSFETs, 2 optical retro-reflective or optical defuse sensor, 16 x 12V LEDs, LM7805 regulator, DC filter capacitors, and optional current limiting resistor on each MOSFET. The circuit requires 12V DC, each MOSFET can drive a LED up to 1A (0.5 to 12W LED)

**LEDs:** Each MOSFET can drive LED of 0.5W to 12W, it is advisable to use 12V LEDs, use appropriate current limiting resistors (R3, R15, R23, R31, R7, R17, R25, R33, R11, R19, R27, R35, R13, R21, R29, R37) if lower voltage LEDs is used. The default value for these resistors is 0 Ohms.

**Sensor:** Optical Retro-reflective sensor or optical defuse sensor can be used. The project is tested with a reflective sensor from Omron, NPN type sensor is best suitable. The optical sensor has a supply range of 12V to 24V DC which is within the supply range to interface with this project. Retroreflective sensor E3F3-R11 from Omron is suitable, it has 3 meters range with an open collector NPN type. Defuse sensor E3F3-D12 can also be used if it used in a narrow range.

**Stairway:** Circuit can drive 16 channels, for more steps, use multiple LEDs in parallel configuration considering load should not exceed 1A on each channel.

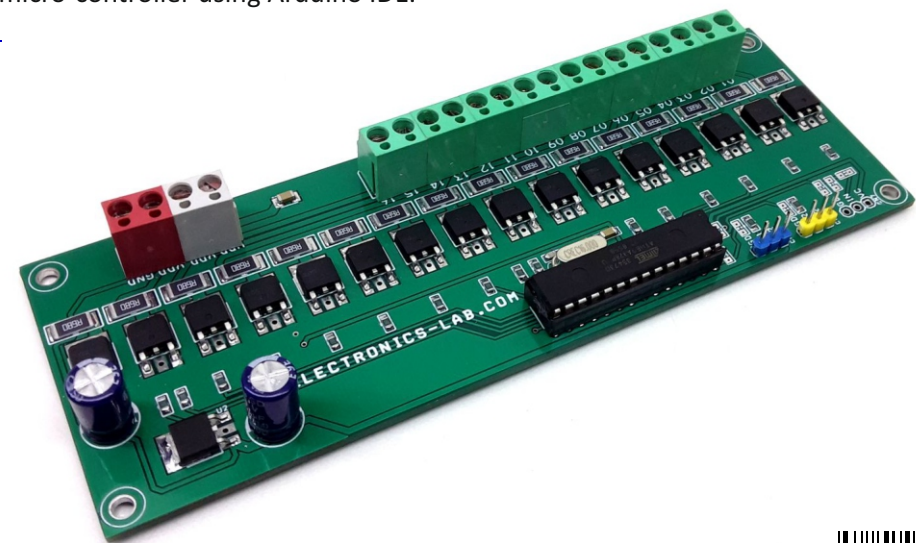
**Cooling:** It is advisable to use forced air to cool down the MOSFETs if full load 1A on each channel is used, load up to 0.5A on each channel doesn't require a fan.

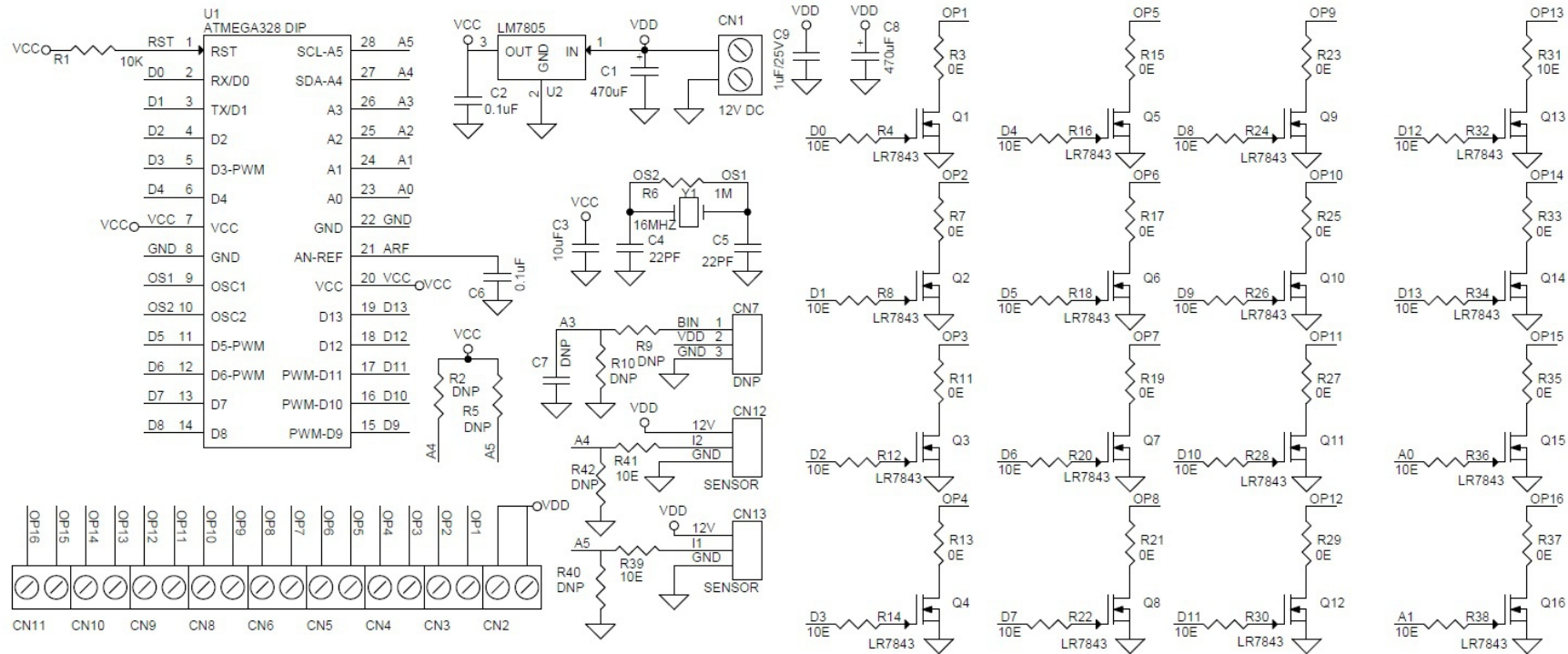
**Arduino Code:** Arduino example code is provided as download; this code can be modified as per user requirements, delay between LED ON/OFF can be change in code. Follow bellow link to learn programming new ATMEGA328 micro-controller using Arduino IDE.

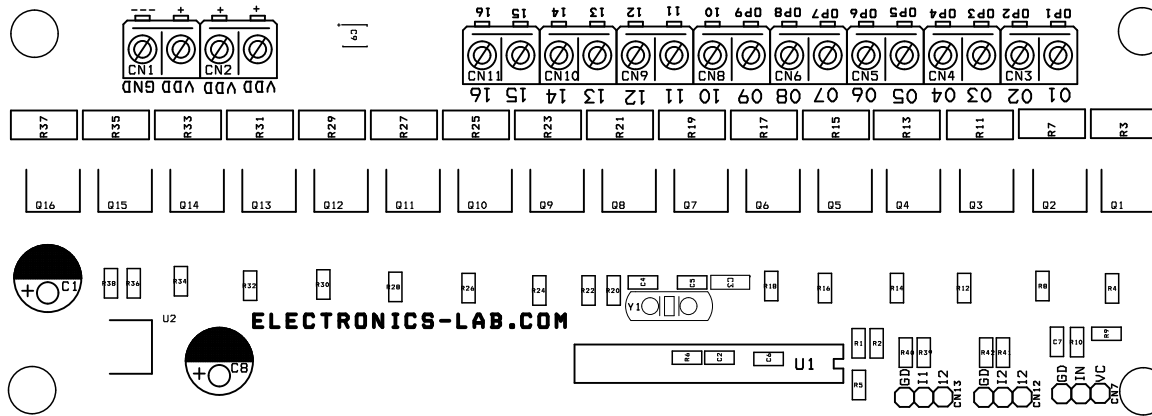
<https://www.arduino.cc/en/Tutorial/BuiltInExamples/ArduinoToBreadboard>

### Features

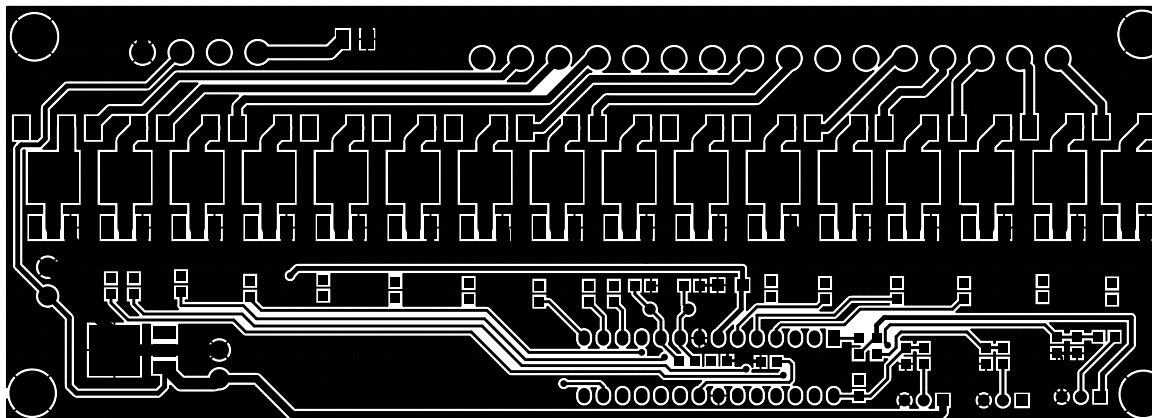
- Operating Supply 12V DC
- 16 Channels X 12V LEDs
- Load up to 1A X 16 Channel
- PCB Dimensions 154.31MM X 55.40MM



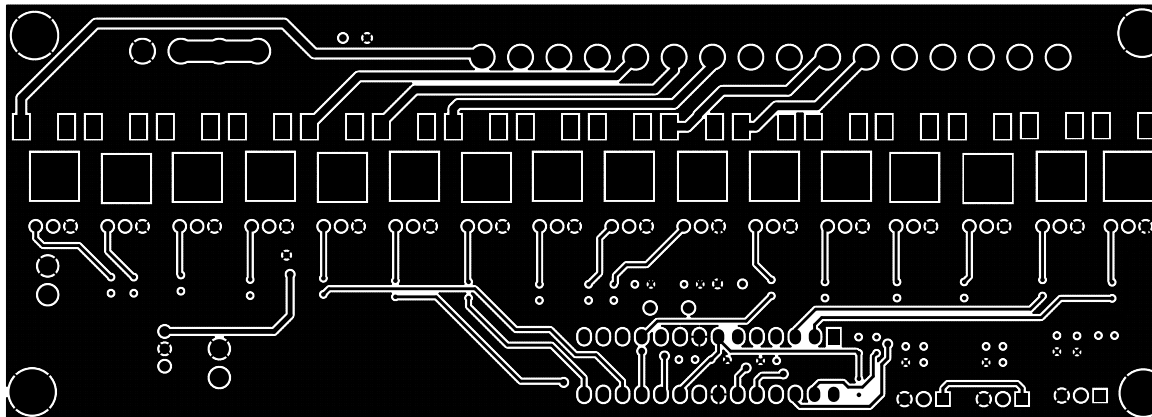




SILK SCREEN TOP

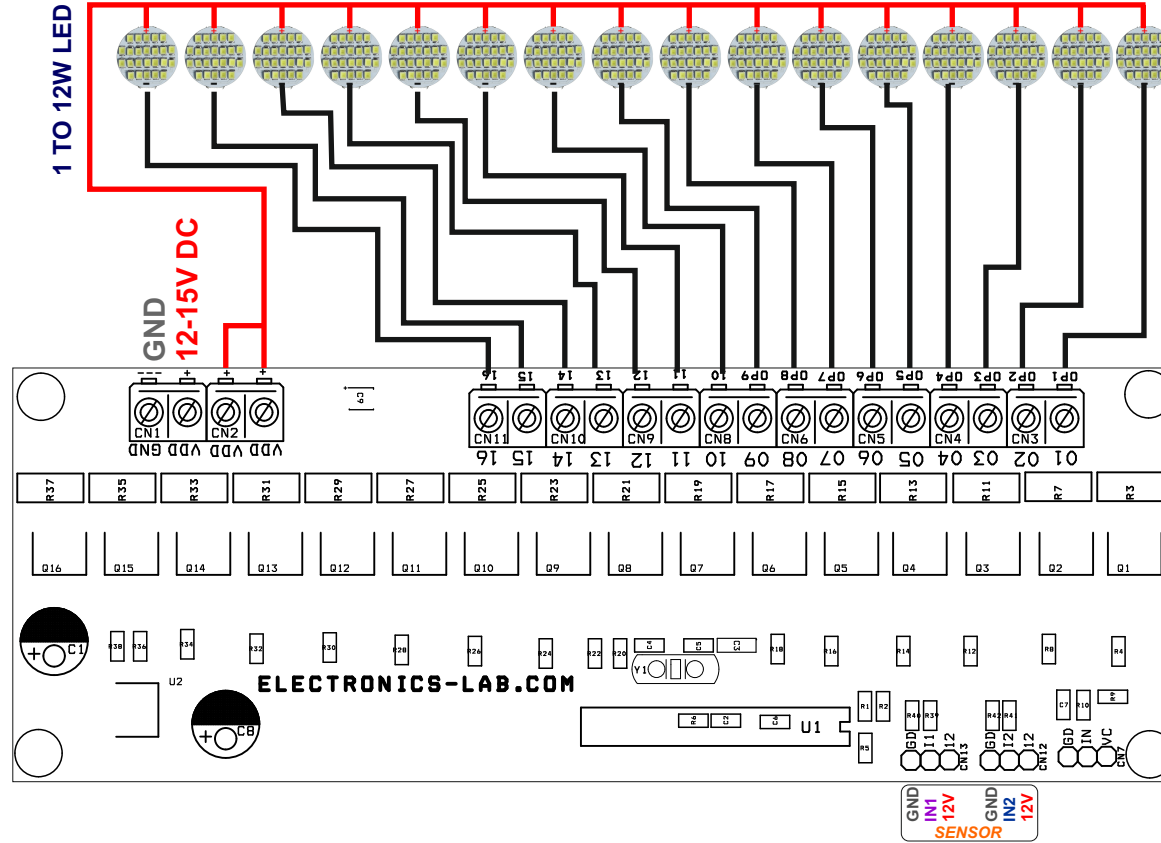


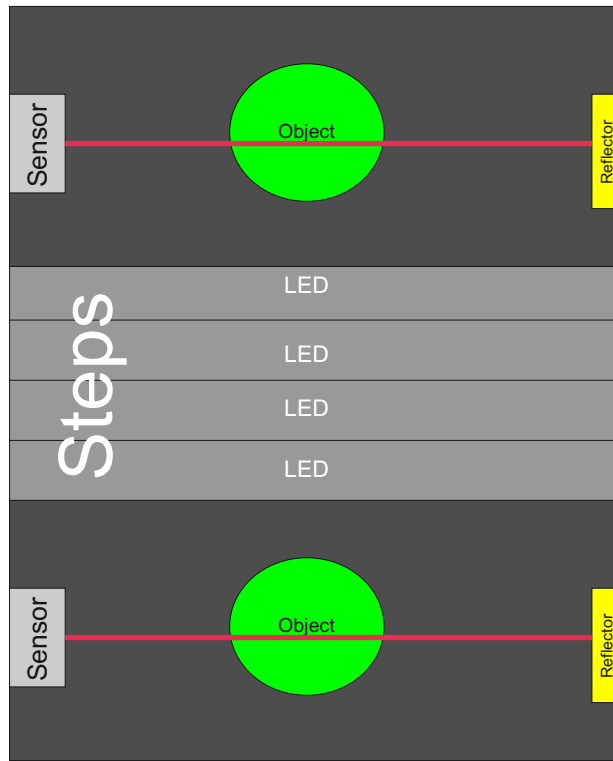
TOP LAYER



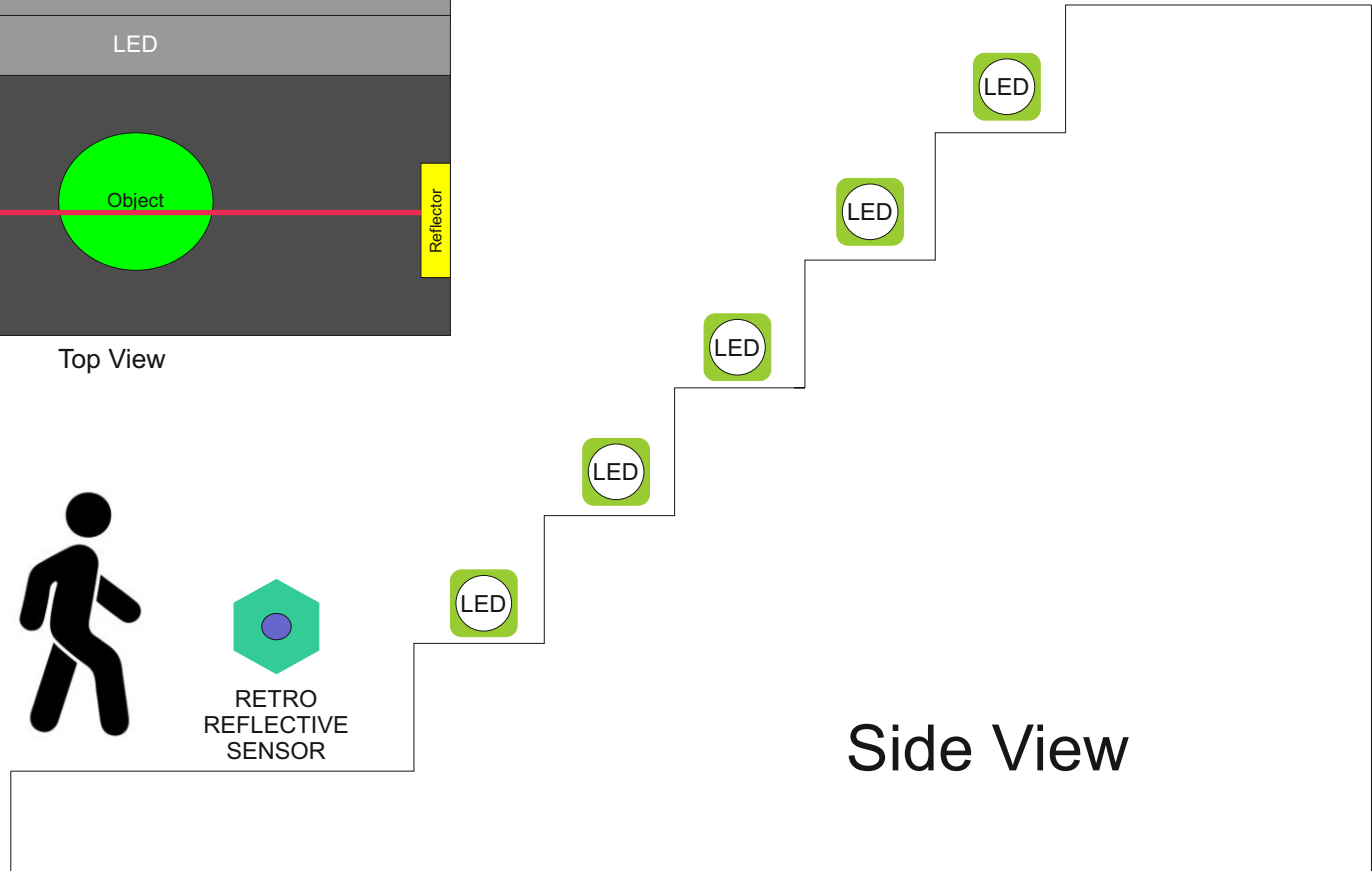
BOTTOM LAYER  
PCB DIMENSIONS 154.31MM X 55.40MM







Top View



Side View





BOM						
SR	QNTY.	REF.	DESC.	MANUFACTURER	SUPPLIER	SUPPLIER PART NO
1	1	CN1	2 PIN SCREW TERMINAL 5.08MM PITCH	PHOENIX	DIGIKEY	277-1247-ND
2	9	CN2,CN3,CN4,CN5,CN6,CN8,CN9,CN10,CN11	2 PIN SCREW TERMINAL 5.08MM PITCH	PHOENIX	DIGIKEY	277-1247-ND
3	8	R2,R5,CN7,C7,R9,R10,R40,R42	DNP		DIGIKEY	OMIT
4	2	CN12,CN13	3 PIN MALE HEADER 2.54MM PITCH	WURTH	DIGIKEY	732-5316-ND
5	2	C1,C8	470uF/25 ELECTROLYTIC	RUBYCON	DIGIKEY	1189-1869-ND
6	3	C2,C6	0.1uF/50V SMD SIZE 0805	MURATA/YAGEO	DIGIKEY	
7	1	C3	10uF/10V SMD SIZE 1206	MURATA/YAGEO	DIGIKEY	
8	2	C4,C5	22PF/50V SMD SIZE 0805	MURATA/YAGEO	DIGIKEY	
9	16	Q1,Q2,Q3,Q4,Q5,Q6,Q7,Q8,Q9,Q10,Q11,Q12,Q13,Q14,Q15,Q16	IRLR7843	INFINION	DIGIKEY	448-IRLR7843TRLPBFCT-ND
10	1	R1	10K 5% SMD SIZE 0805	MURATA/YAGEO	DIGIKEY	
11	15	R3,R7,R11,R13,R15,R17,R19,R21,R23,R25,R27,R29,R33,R35,R37	0E SMD SIZE 2512	BOURNS	DIGIKEY	CR2512-J/-000ELFCT-ND
12	19	R4,R8,R12,R14,R16,R18,R20,R22,R24,R26,R28,R30,R31,R32,R34,R36,R38,R39,R41	10E 5% SMD SIZE 0805	MURATA/YAGEO	DIGIKEY	
13	1	R6	1M 5% SMD SIZE 0805	MURATA/YAGEO	DIGIKEY	
14	1	U1	ATMEGA328 DIP	MICROCHIP	DIGIKEY	ATMEGA328P-PU-ND
15	1	U2	LM7805	ONSEMI	DIGIKEY	MC78M05CDTGOS-ND
16	1	Y1	16MHZ	ECS INC.	DIGIKEY	X1103-ND
17	1	C9	1uF/25V	TDK	DIGIKEY	445-5914-1-ND

