Detect Me Not - Instructor Guide

Kit Overview

Detect Me Not is based on a Passive infrared Sensor that will turn on either an LED or Buzzer when it detects movement. It has range up to about 5m, and will keep the LED or Buzzer on for about 2 to 3 seconds after the sensor no longer detects anything. This is just a fun kit for Kids to play with to see if they can get past it undetected, or maybe approach something near it without being detected. The LED can be a coloured LED, or a white LED - both options are in the assembly guide, component sorter and parts list.
The PIR uses very little power when its sensing (about 20µA), so with a decent alkaline battery, it will run for years .Once it sense movement, the circuit will use 20-30Ma when running a White LED (less for the Red LED) or the Buzzer. A White LED could be used as a sensor light to illuminate a hallway or room at night , to provide basic illumination only when needed.

Design principles

Detect Me not is designed to be built by young Scouting youth members with limited to no soldering experience. It has many design principles that should ensure lower assembly failure rate, and a longer lasting robust kit

Design features

- Side mounted on/off switch - so that it can not be accidentally turned on
- Recommend using a small 2mm thick piece of double sided tape to help hold the battery holder on - see assembly section.
- Larger solder pads 2.5-3mm, to make soldering easier for Scouts
- Wider spacing for radial component leads to prevent solder bridges, and components laid down to prevent breakage.
- Wider tracks so that if through holes are delaminated, then the component lead can be soldered to the track - saves replacing the board and starting again,
- No more than 1 track connected to a through hole to reduce the number of tracks to be reconnected if a pad is delaminated.
- Space for youth members name and group on the back.

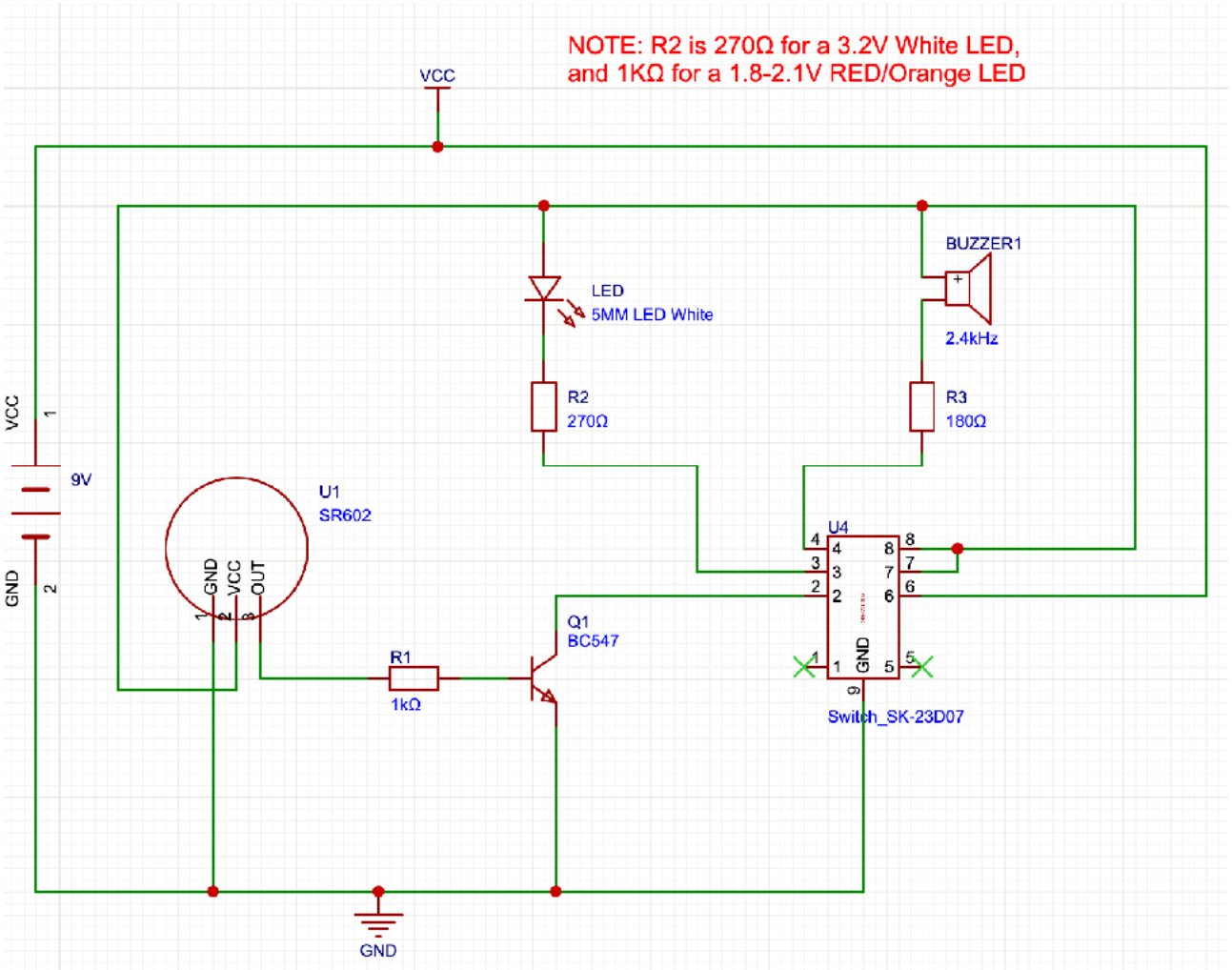




Circuit details

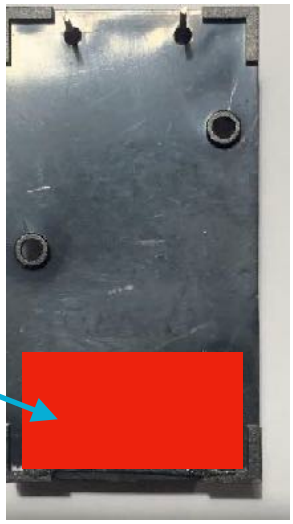
The circuit is based on a SR602 Passive infrared sensor, that draws about 20ua when sensing. The output pin is normally low and raises to 3.3V when movement is detected. This brings the base of the BC547 High, which allows current to flow through the BC547. This turns on either the LED or the buzzer depending on the switch position.

You can use the recommended white LED as a sensor light to illuminate a hallway or room at night , to provide basic illumination only when needed. Or you can just put in a 1.8v-2.1V coloured LED. Both options are included in the parts list, assembly guide and Component sorter.



Double sided tape for the battery holder

The battery holder goes over the pins at the back of the board,
It is advisable to use a piece of 2mm thick double sided tape (automotive tape is nice and strong) at the end of the battery holder. This will ensure that the battery holder is firmly secured to the board at both ends, and prevent it from being broken off.



Name and Group

There is room on the back for youth members to write their name and group. I recommend getting CD Pens to do this , as they dry a lot faster than any other pens on these boards.



Tape to insulate the battery pins

20mm width Kapton tape will do, you will need an 8mm length
get yourself a decent tape dispenser, they will make things a lot easier)

I use one of these.
Vevor - Zcut-9 tape dispensor,
https://www.vevor.com.au/electric-tape-dispenser-c_10891/vevor-tape-dispenser-zcut-9-automatic-electric-tape-cutter-220v-counting-p_010729727654?v_tag=dcfc0950-8cce-11ed-b7e8-e7d7baa28833.1



Assembly guide suggestion

Install the components in the following order (the board will stay relatively flat on the bench this way, and will not require you to splay the wires much to keep the component from falling out.

1. Resistors - 3 (use the lead bending tool - 10mm)
2. Switch
3. BC547 Transistor
4. LED
5. Buzzer
6. PIR

Test the Board before soldering in any more components.

It is important to test the board before letting them solder in the battery holder, as it is hard to unstick and desolder if one of the components underneath is not in correctly.

- Check the soldering before going any further, and ensure that they have put in all the components the right way round, and that the soldering is ok.
- To test it, put a battery in the holder put it into the board and twist it slightly so that it contacts the holes in the board. Then move the slide switch to LED and ensure that the LED comes on and then stops after a few seconds (you will need to point it away from any heat source, or any movement. Do the same with the switch in the buzzer position and ensure that the buzzer comes on.

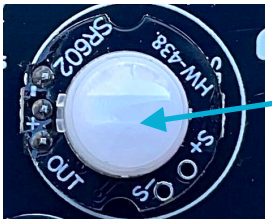
- If all is ok, then remove the battery, get the person assembling it, to remove the cover on the double sided tape and solder it in.

Get them to write their name and Scout Group on the back in the space provided.
It is recommended that you put a piece of Kapton tape over the battery pins on the front (20mm wide, and 8 mm length will do.)

To Do list before the Day

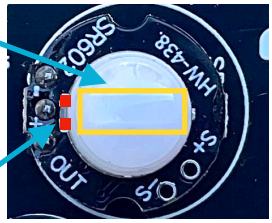
PIR LENS alignment

Some of the PIR's ship with the defused lens on incorrectly, you must straighten it otherwise the sensors do not work very well



Rectangular thinner section in the middle must go across the sensor as shown.

Look at the 2 pieces of plastic that stick out from the bottom of the plastic cover. Take off (it just pulls off) the plastic cover, and rotate it so that the 2 pieces of plastic are between the pins as shown



1) Order Boards

2) Order Components

3) Order the double sided tape for the battery holder.

4) **Solder requirements** - 30cm solder (approx 1.2g) (Can do it with about 20cm, if you are a good at soldering)

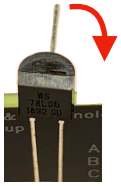
5) Cut the double sided tape and stick it on 5mm from the lower bottom edge of the battery holder, at least 24 hours before its soldered in as it takes time for the glue on the tape to fully cure.

6) Bend the transistor leads.
   The BC547 leads need to be bent so that it fits the pads on the board. This will help the youth members get the transistor in the correct way.

   - Bend the middle lead Backwards



   - Put it over the board, and bend the lead down, so it's flat against the back of the board.



   - It should look like this.



7) Package the kits in the bags. Only put in the 3-resistors, 1-switch, 1-transistor, 1-Led, Buzzer, BC547 Transistor and the PIR. Do not give out the battery holder or battery until the soldering has been checked, and board tested.

8) Print one copy of the Component Sorter per Soldering station, and laminate them. Stick these to the table so that the Scouts do not take them with them. These are used by the Scouts to sort the components, do not let them start soldering until you have checked that they have sorted them correctly

9) Print two copies of the Assembly guide (double sided) per table (4 - 6 scouts) - they can just share them. Laminate this as well.