

Nerve Tester

SUPPLIES YOU WILL NEED

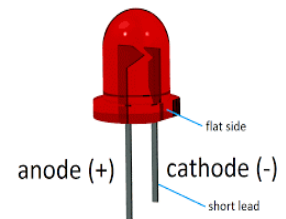
- 9V Battery (not supplied)
- 9V battery clip
- 3D printed 9V battery holder – supplied or DIY
- 1 Led (Colour your choice)
- Resistor
- Switch
- Buzzer
- 25cm of copper tape
- Lasered plywood top piece – so parts fit well
- 60cm 3/4" x 1" Wood side pieces
- 1/16 drill bit (hole for wire maze)
- 60cm single strand wire
- 340cm 14awg house wire
- Wood Glue
- 3/4" nails



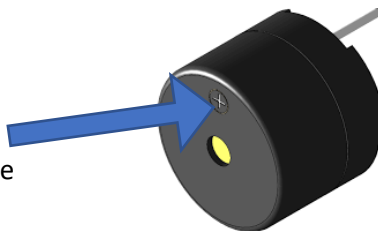
**Hot Glue gun (to hold LED, battery clip, buzzer and switch)

BEFORE STARTING

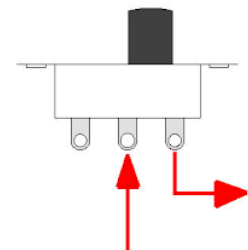
- 1) NEVER have the positive and negative of the battery touch through the copper tape. This is called a short circuit and will kill the battery.
- 2) LEDs have a positive and negative (see diagram). Make sure they are in the correct way around or they will NOT light up!!



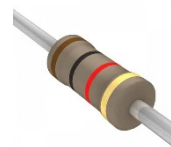
- 3) Buzzers have a positive and negative. If no "+" sign, then the longer leg on the buzzer is positive.

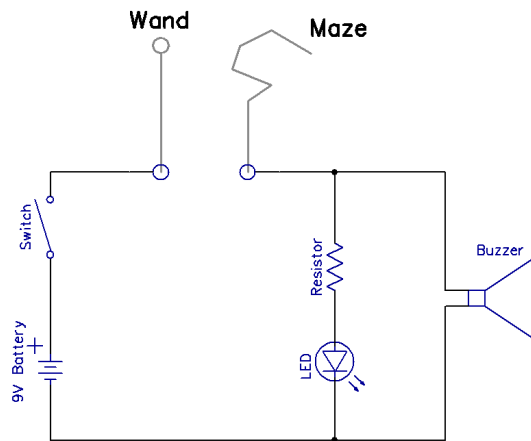


- 4) Switches – use the middle leg and an outside one. Do NOT use the two outer ones otherwise it will not turn on/off

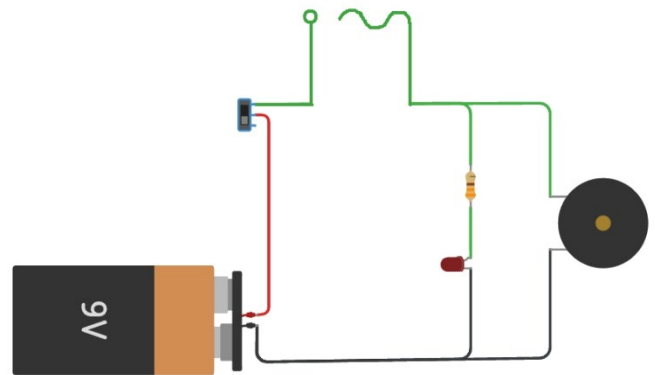


- 5) Resistors have NO positive or Negative so they can go in either way





Schematic Diagram



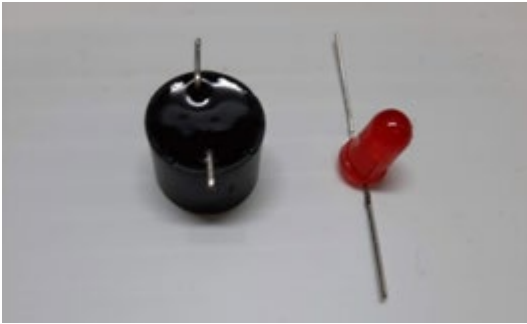
Pictorial Diagram

TROUBLESHOOTING THE CIRCUIT (Lots can actually go wrong here...)

- 1) Are the LED and buzzer soldered to the copper tape? Are they the correct way around? They both have a positive and negative. The longer legs are positive.
- 2) Do you have the battery clip red/black wires reversed?
- 3) Is the switch soldered correctly? One wire is soldered to the centre leg, the other is soldered to one of the outside legs (does not matter which one). Does the switch move freely? You can melt the innards of the switch. Use a multimeter to check if the switch works. Is the switch on?
- 4) Is the battery dead? Check it by connecting a buzzer to it or put it in another project that you know works or use a multimeter to test it. It should be 9 volts.



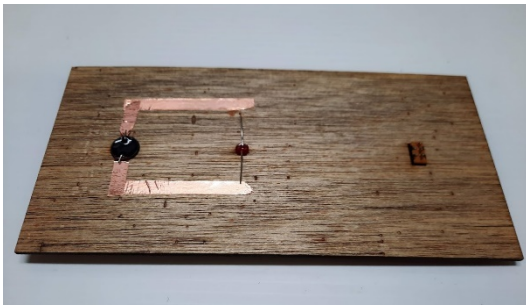
STUDENT INSTRUCTIONS



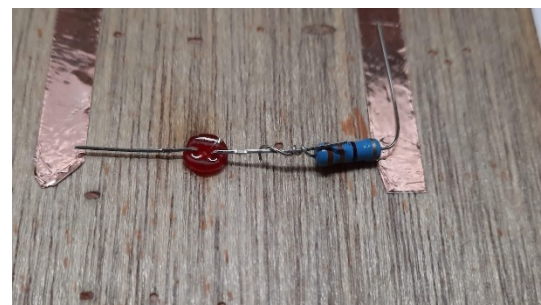
- 1) Bend the Legs of the Buzzer and LED as shown in the picture. The LONGER legs are the positive



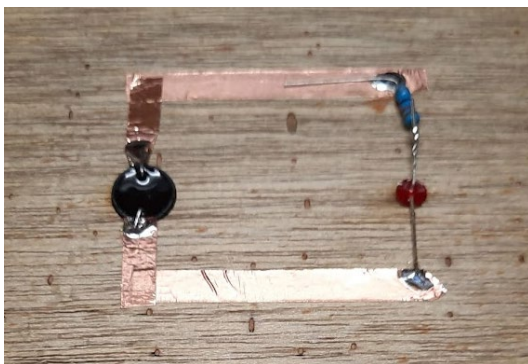
- 2) Insert the Switch, LED and buzzer as shown. Make sure the LONG leg on the buzzer and LED face UP like shown.



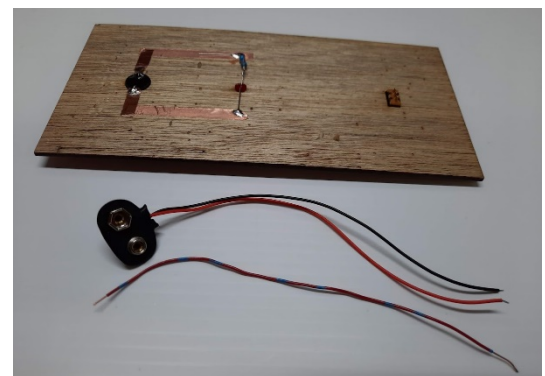
- 3) Layout the copper Wire as shown, make sure it is at least 25mm from the edge of the plywood to make sure the wooden walls will fit later



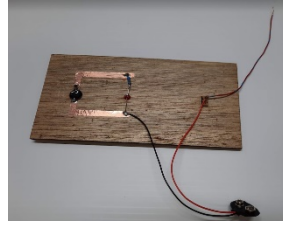
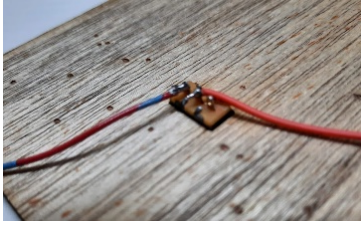
- 4) Wrap the resistor around the LONG leg of the LED (one that should be facing away from you)



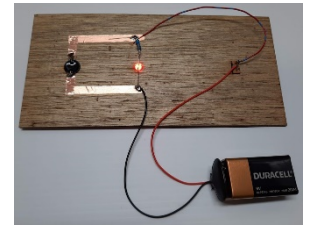
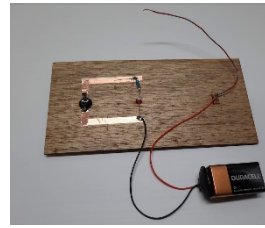
- 5) Time to SOLDER 😊. Solder the buzzer and LED positive legs in place. Solder the resistor to the LED short leg and then to the positive copper line, Solder the buzzer at the same time.



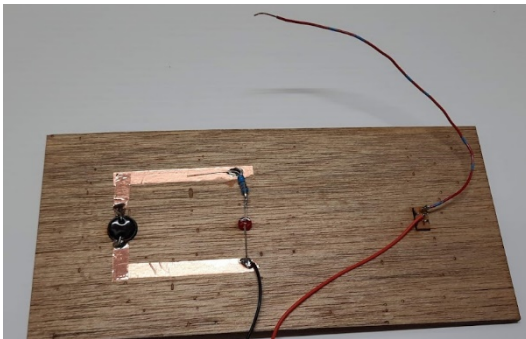
- 6) Now you will need a battery clip and ONE single strand of wire. Strip the wire at both ends so it is ready to solder



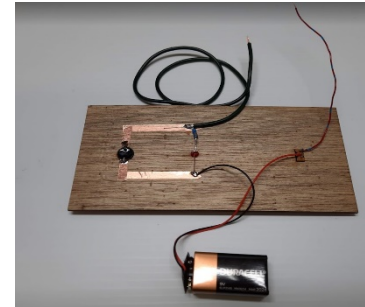
- 7) Solder the battery snap positive (Red Wire) to the centre leg on the switch AND the negative (Black) wire to the copper tape (Negative) as shown. Also solder the single wire to ONE of the outside legs of the switch



- 8) Get a battery from the teacher and connect it to the circuit. Touch the wire that was soldered to the switch to the POSITIVE side of the LED and Buzzer. The LED should light and the buzzer should sound, **IF the switch is on**. Turn the switch off, it should not work.



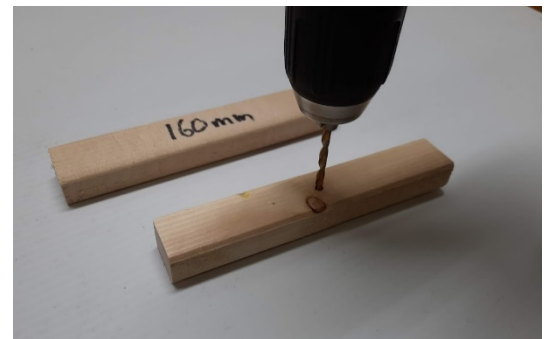
- 9) **Troubleshooting** - IF it DOES NOT work...
Is the battery dead? Are the LED/Buzzer Pos/Neg correct? Is everything soldered and CONNECTED? Are the wires connected to the switch in the middle and one on the outside? Was the switch on and battery connected when you tested?



- 10) Finish the electronic circuit portion of the project by attaching the Wand wire to the copper tape (side with the positive of the LED and the Buzzer) as shown



- 11) Get the piece of wood to make the base of the project from your teacher and using a saw and bench hook, cut the pieces to length. You need two pieces at 95mm and two pieces at 160mm.



- 12) In ONE of the long pieces (160mm) drill a hole for the Wand wire. The size of hole will vary between a 1/8" – 3/16" drill bit size depending on the wire you have.



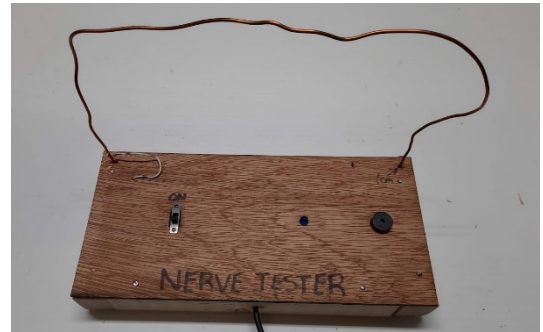
- 13) Tie a knot in the wand wire close to the copper tape as shown. This is called a strain relief. It is used to make sure the wire does NOT get ripped off the copper tape. Feed the remaining wire through the hole you drilled. Then glue and nail the project together as shown.



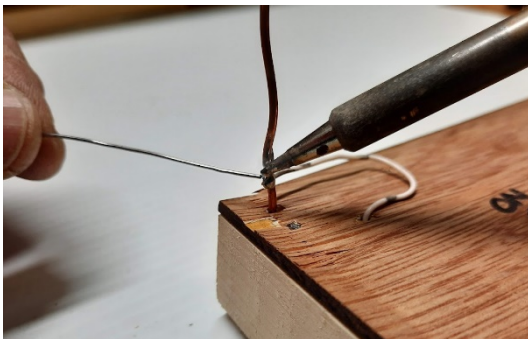
- 14) Drill 1/16" holes 1cm away from the edges as shown for the **Maze Wire** to eventually go into. Do this on BOTH top corners. See Step 16 below.



- 15) Drill ONE hole 25cm in from both edges for the wire that needs to connect from the switch o the maze. See Step 16&17



- 16) Feed the wire from the switch up through the hole you just drilled and also take the Maze wire and install it as shown.



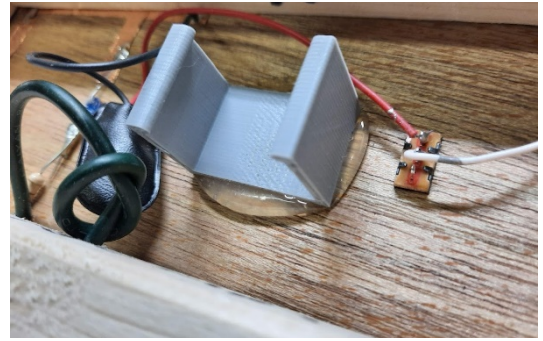
- 17) Solder the Maze wire and the small wire together. Wrap the thin wire around the thicker wire first.



- 18) Make a loop (as shown) with a spare piece of maze wire (stripped house wire) to the size you think you will want. Then **TIN** it and the wand wire as shown.



19) Connect the wand wire and the “loop” together. It will take a few extra seconds to join the 2 as the wires are thinner. **CAUTION** – It will also be hot afterwards as heat will travel up the wires!!



20) Using a hot glue gun, glue the battery clip in place under the project. Put it in a location so a battery can easily be clipped in.



You are finished! Test it and make sure it work 😊