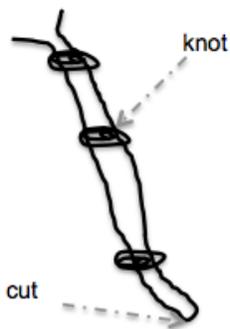# Make Fireflies

Parts

- index card
- black permanent marker
- 12 V grain of wheat bulb
- 20 feet black insulated single core wrapping wire
- 10 feet black insulated electrical or speaker wire, dual strand
- black heat shrink tubing
- black electrical tape
- 12 V battery box
- small, ideally black, fan that can be set so the air goes upward

Caution: These instructions assume knowledge of soldering and appropriate safety precautions. If you need a refresher on soldering please check out this web site: https://learn.sparkfun.com/tutorials/how-to-solder---through-hole-soldering
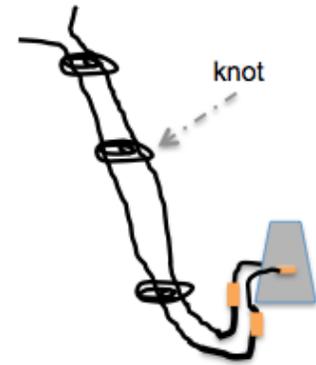
Instructions

1. Cut 3" x 1 1/2" rectangle from the index card and blacken both sides with the marker. Make a pinhole in the center trying not to bend the piece of index card.

2. Take the single core wire and loop it in half. Tie a knot 6" from each end and then approximately every foot. Cut the loop resulting in two wires tied together. Remove insulation 1/2" from the four wire ends.

3. Trim the bulb wires: cut about 1/4" off of each. Take one of the index card rectangles and place one bulb wire though the hole in the card such that there is a bulb wire on each side.

knot

4. Take the knotted wire and solder one wire to each of the bulb wires, with a piece of the heat shrink tubing above the solder joint. Cover solder joints with the heat shrink tubing and shrink it over the solder joint.
5. Use black tape to tape the end of the bulb wires to the card.
6. Remove 3/4" of insulation from each of the wires at one end of the speaker wire. Solder one end of one of the speaker wires to one on the wires of battery box using heat shrink tubing to cover the solder joint.
7. Solder the two wires at the other end of the speaker wire to the two ends of the knotted wires using heat shrink tubing to cover the solder joints.
8. Test with a battery in the battery box to assure the light is working.
9. Hang the firefly so the bulb is at about eye height. Put the rest of the wire over a tree branch or other means of holding up the firefly. Place the fan below and facing up towards the firefly. Adjust as needed to get the desired movement.
10. If using multiple fireflies, hang them at slightly different heights and far apart enough so there is adequate room so they do not run into each other.