

# Draw Bot

## How to Build It:

### Materials:

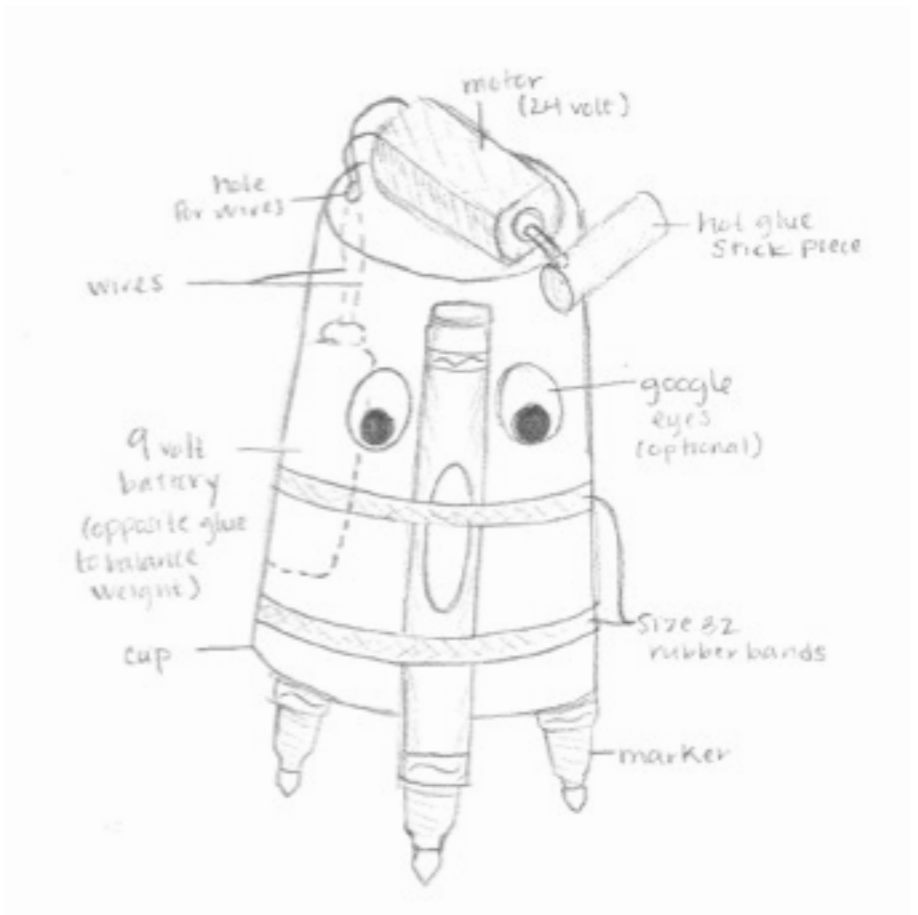
- |                                          |                                                    |                                              |
|------------------------------------------|----------------------------------------------------|----------------------------------------------|
| <input type="checkbox"/> Small DC motor  | <input type="checkbox"/> Plastic cup               | <input type="checkbox"/> Awl or x-acto knife |
| <input type="checkbox"/> 9V battery      | <input type="checkbox"/> Sharpies and Doodads      | <input type="checkbox"/> Rubber bands        |
| <input type="checkbox"/> 9V battery snap | <input type="checkbox"/> Hot glue                  | <input type="checkbox"/> Markers             |
| <input type="checkbox"/> Glue stick nubs | <input type="checkbox"/> Soldering iron and solder | <input type="checkbox"/> Paper               |

### Procedure:

1. Turn the plastic cup over and poke two holes in the bottom using the x-acto knife or awl.
2. Poke the two leads from the 9V battery snap through the holes so that the snap is on the inside of the cup.
3. Solder the leads to the small DC motor and use hot glue to attach the motor to the bottom of the cup making sure the spindle of the motor is completely off the edge of the cup.
4. Attach the glue stick nubs to the motor by poking a hole to one side of the center.
5. Snap the battery onto the 9V battery snap to test the motor. You can create a simple switch for the Draw Bot by leaving one side of the battery unsnapped and swinging the snap back and forth.
6. Hot glue the battery to the inside of the cup opposite the motor to balance the Draw Bot.
7. Decorate the cup with sharpie markers and doodads to give the Draw Bot a personality.
8. Use rubber bands or tape to attach markers to the outside of the cup, but make sure to leave enough space for the motor to spin freely.
9. Turn on the Draw Bot and set it on a piece of paper to watch what patterns it creates!

### How it Works:

The glue stick nubs acts to throw off the balance of the motor. Since we attached the glue stick nub off center of the stick, there is an unequal weight of glue stick



that is spinning around the outside of the motor. Since the motor is spinning really fast, it's really throwing the weight around and making the whole Draw Bot wiggle. As the Draw Bot wiggles around the paper, the markers leave a really cool design!

## **Experiment!**

What happens if you attach the glue stick nub to the motor in the exact middle of the glue stick?

What happens if you attach the glue stick nub to the motor at the very end of the glue stick?

Try using something other than the glue stick to create an unequal weight on the motor. What happens?

What happens if you put more weight on one side of the Draw Bot?

What happens when you change the way the markers are arranged around the outside of the Draw Bot?