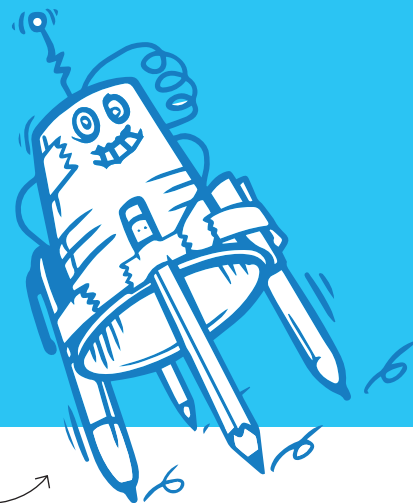


ScribbleBot Project Guide

PROJECT OVERVIEW:

Create a simple robot that can autonomously scribble or draw on paper.



Project Intro Video:
ScribbleBot



Inspirational Video:
Giant Wall Writer



PROJECT CATEGORY:

Tinkering

DIFFICULTY LEVEL:

Beginner

TIME RANGE:

45 - 120 minutes

ESSENTIAL SKILLS/ MINDSETS THAT YOU MAY LEARN:

Design Thinking

Iteration

Electronics

DC Motors

Tinkering

Collaboration

Resiliency

Failure Leading to
Success

TOOLS AND MATERIALS:

- DC hobby motor
- Alligator clips or short wires
- Batteries - two AA or one 9 Volt
- Recycled containers
- Disposable cups
- Sheets of paper (the larger the better)
- Markers, pens, or pencils
- Additional basic craft supplies

AT HOME SUBSTITUTIONS

- A DC motor is central to this activity. Look around your house for items that use rotational motion like old toy cars or electronics. If all else fails, just go to the local Dollar Store and buy a mini fan to take apart.

MATERIAL PURCHASE LINK:

<http://tiny.cc/Intelbuylist>

Project Steps Dream it!

This project is all about tinkering and iterating. Watch the introduction video and then think about what materials are available for your ScribbleBot creation. You can make a DC motor spin or even vibrate, and then use those motions to create a drawing device.

- 1 Set up your project area with a large sheet of paper as well as smaller sheets on which to test your ScribbleBots on. [03]
- 2 Look at the available materials and think about what type of device you will create. [04]

Draw It!

- 3 Sketch at least three ideas for your bot before you get your materials. [:03]

Build It!

- 4 Collect materials and build your bot. Don't think too much—just tinker. [:10]
- 5 As you build, change your bot to make it better or to explore new ideas.
- 6 Test out your creation and continue to iterate until it's just the way you like it. [:15]

Share It!

- 7 Show off your bot and participate in a scribble challenge to see what bots do best. [:20]
- 8 When you're all tinkered out, take a picture of your bot. Then, disassemble it back to its primary parts for others to use in the future. [:05]

Expand it!

Here are some ideas for taking this activity to the next level:

- **Upsize your ScribbleBot!** Use a cordless power drill, a five-gallon bucket, and sidewalk chalk to make a mega-ScribbleBot! We find that smooth concrete and a powerful (but light) cordless drill work best for this activity.
- **Create a mini-"VibraBot":** Go small by trying out some toothbrush bristle bots. You'll need a toothbrush (old ones work, although we prefer new ones), tape, and a miniature vibrating disc motor. Our favorite is the Adafruit version found here: goo.gl/2uu3fR
- The sky's the limit. Have fun as you tinker, explore, and build more autonomous creations.

THINK ABOUT IT:

- What will serve as the base of your bot?
- How will you get your bot to draw?
- Will your bot move on the paper, or move the paper itself?

PRO-TIP:

To make a motor vibrate, you can put a small offset weight on the motor shaft. This will cause the motor to vibrate. We like to jam short pieces of hot glue sticks onto our ScribbleBot's DC motors, as this really makes them jump around.



DASH OF DESIGN:

Iteration is one of the key components of Design Thinking. Watch our video to learn more:



NEED MORE HELP?

If you get stuck, watch the How-to make a scribblebot to see other people's ScribbleBot ideas. <https://goo.gl/cqDJJg>

SCRIBBLY CHALLENGES:

- **Ink Challenge:** Whose bot can put the most ink on a standard piece of letter paper in one minute?
- **Circle Challenge:** What group can draw the most circles, or spirals, on a standard sheet of paper in one minute?
- **Distance Challenge:** Start all the bots at one end of a table covered with butcher paper, and see whose can get to the other end first. <Cut this challenge if no room>
- **Most Artistic Bot Challenge:** Can you make a bot that will draw repeating patterns or other eye-catching, artistic drawings? Set a time limit, start the bots, hands off, and go for one minute.

HELPFUL RESOURCES:

- Need more help with your ScribbleBots? Take a look at the original guide produced by the Exploratorium: exploratorium.edu/tinkering/projects/scribbling-machines
- Exploratorium, build a scribblebot: <https://www.exploratorium.edu/tinkering/projects/scribbling-machines>
- The Art of Tinkering book: amzn.to/2ruwzKB

NEED MORE HELP AND INFORMATION?

Contact us at: intelfutureskills@intel.com