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# PIE

Playfully Inventing & Exploring  
with Digital & Other Stuff



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## Art Making Machines

Mix paint-brushes pigment, canvas and craft materials. In this workshop you'll use programmable bricks, buckets of paint, paper, canvas, and motors to make an animated art machine. Use sensors to explore color and light. Program your machine to react to an audience to spin faster and slower, to create complex abstract designs, or to simply fling pigment!

### Goals of the

### Workshop

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- Get inspired to design and build a machine that can paint
- Observe your machine and see how to re-engineer it to work as you planned.

### Materials

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- Computers
- Crickets or RCX bricks
- Lots of batteries
- A large cloth or paper dropcloth plus some large sheets of kraft paper for testing machines
- Tempera paints
- Tape
- Textured materials that hold paint (sponges, textured rollers for house painting, fun fur, that foamy craft stuff)
- A variety of 1/2" to 3" brushes (small, cheap craft brushes, metal rubber cement brushes, foam brushes)
- Other materials: cardboard tubes, cardboard, string dowels (get the size that fits into Lego holes) styrofoam balls plastic or paper cups, plastic or paper plates (use these to dispense paint as well as for making art machines) an assortment of colored construction paper
- Low-temperature hot melt glue

### Set Up

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We have held this workshop for groups of 9-12 year-old kids, and for younger kids (who came with a parent or other adult). With younger kids (ages 5-8) we needed more adult helpers.



We set up two tables of materials. One table-- the "dry" table --held all the building and construction materials. The other--the "wet" table-- held all the paint and water. This table was close to the tarp and had paper and brushes and space for kids to load their machines with paint.



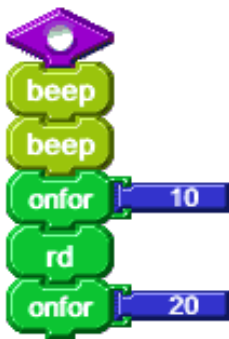
We taped down a large tarp (or paper painter's dropcloth) for painting. The tarp was large enough that many kids could try their machines at once. All the machines together created a huge painting.

## Introduction

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We begin workshop by gathering as a group and talking a little about the cricket. We demonstrate a couple of the painters, and talk as a group about what works and what doesn't work as well.



Next, we write a simple program the kids a simple program and try it out with a machine. We start with just a couple of beeps, then add the motion. It is handy to have a projector so everyone can see the program as you work.

## Working & Playing

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After a quick introduction to programming, it was time to build. We left samples out and partially built machines around.



In one of our workshops, we emphasized the art materials over the Lego pieces. In that workshop, kids built machines that were primarily art materials, using only the motors from the kits. They built pretty quickly and were then ready to program.



The kids generally tried out the program once without paint, just to trouble-shoot, and then went directly to load up with paint and try it out on the tarp.



We didn't worry too much about getting paint on stuff. Tempera paint is water-soluble and will wash off the floor or Lego pieces. Offer paint shirts to kids who might worry about getting their clothes dirty.



Testing often led to rebuilding. The paint doesn't go on the way you expect, or the machine doesn't move the same way once you attach pens.



In this photo the kids are reinforcing their design with tape. Kids moved back and forth between their computers, the supplies, and the paint table.



Kids had to vary how long the machine ran (they often thought 3 seconds would be a really, really long time), or make it change directions, or figure out how to build the machine a little differently to work better.



Most of the machines kids made were designed to moved the paint around the paper. It's also possible to make the paper move. That's the way this spin art machine works.

[Read how to make a spin art machine.](#)

## Other Thoughts & Reflections

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With young kids, we needed a lots of helpers, both for getting set up and for helping the kids once they were working. Parents helped the kids build, but we needed to talk them through programming, and they all got to that stage at about the same time.

Generally, the parents were really good about helping and let us work directly with the kids



Kids used both the art materials and the Lego bricks and other materials (wheels, etc.) Generally, it was easier to use the art materials for both the painter part and the machine, and use as few Lego pieces as possible. Cardboard and hot melt glue let you assemble something really quickly. The cups and plates were also good for basic machine structures.



What about take-home stuff? Kids could not take home the machines they made (except for the non-Lego portions), or the big tarp to which everyone contributed. Construction paper was available for smaller drawings, but we didn't really mention that. On the other hand, people seemed fine (as far as Margaret could tell), with the art-making experience, whether or not it resulted in a take-home product

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