

# Parts and Crafts

## our programs

Parts and Crafts is a family makerspace and community workshop in Somerville, Massachusetts. We encourage kids to think and make and learn and do through the exploration of the arts, science, computer programming, and engineering.

## in-school partnerships

Our hope, in partnering with SPS, is to develop a series of "maker" projects can be integrated with existing curriculum to support STEAM learning in grades K-8 and make these programs widely available to kids in Somerville Public Schools.



# What We Do



## Electronics

- Simple DC circuits
- Voltage, current, resistance
- Simple sensors
- Robotics and physical computing



## Programming

- Writing stories, animations, and video games in Scratch
- Teaching Python through Minecraft
- Java, Processing, Arduino



## Engineering

- Take-apart, building, reverse engineering
- How do things move?
- Mechanical systems



## Arts and Crafts

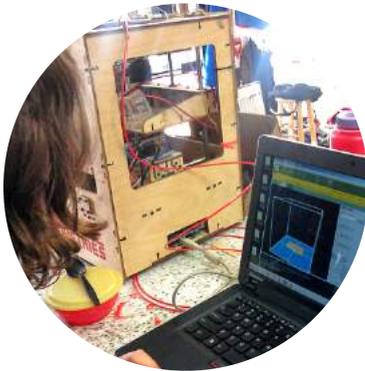
- Sewing and fabric arts
- Mechanical papercraft
- Drawing, painting, stop-motion
- Jewelry-making



## Design

- 3D printing
- Intro to woodshop
- Layout and graphic design
- Invention and creation

# Connecting to SPS



how do maker programs support traditional curriculum?



how do we leverage out-of-school resources to support these projects?

# Examples



## Grade 2: Earth's Systems

- Compare the effectiveness of multiple solutions designed to prevent wind or water from changing the shape of the land.
- Map the shapes and types of landforms and bodies of water in an area.
- Use examples obtained from informational sources to explain that water is found in the ocean, rivers and streams, lakes and ponds, and may be solid or liquid.
- Observe how blowing wind and flowing water can move Earth materials from one place to another and change the shape of a landform.

## Sample Projects

### Build a Watershed

**Goal:** Design and build a watershed system out of foam blocks. System should include elevation change and a tributary system

**Time required:** 3-5 days

**Tools and materials:** Foam, hot wire cutters, glue, exact knives, paint

### Sandbox Erosion

**Goal:** Build a portable sandbox system to model erosion with cornmeal, sand, and water.

**Time required:** Pre-build the box system, designed for use with 1 hour demonstrations

**Tools and materials:** Sandbox system, cornmeal, water.

# Examples



## Grade 4: Physical Science

- Use evidence to construct an explanation relating the speed of an object to the energy of that object.
- Make observations to show that energy can be transferred from place to place by sound, light, heat, and electric currents.
- Ask questions and predict outcomes about the changes in energy that occur when objects collide.

## Sample Projects

### Solar Powered Car

**Goal:** Build a solar-powered motorcar to test under artificial light

**Time required:** 1.5 hours

**Tools and materials:** Solar panel, wheels, motor, cardboard, decorative materials. Optional soldering component

### Build a Dynamo

**Goal:** Build a crank-powered dynamo to power an LED

**Time required:** 1.5 hours

**Tools and materials:** Wood scraps (for wheel and crank assembly), 12v motor, bolts, LED

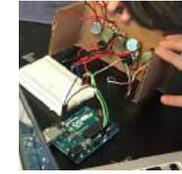
### Pinball Machine

**Goal:** Build a wooden pinball machine with rubber band

**Time required:** 1.5 hours

**Tools and materials:** Wood scraps (for wheel and crank assembly), 12v motor, bolts, LED

# Examples



## Grade 7: Life Sciences, Ecosystems

- Analyze and interpret data to provide evidence for the effects of periods of abundant and scarce resources on the growth of organisms and the size of populations in an ecosystem.
- Describe how relationships among and between organisms in an ecosystem can be competitive, predatory, parasitic, and mutually beneficial and that these interactions are found across multiple ecosystems.
- Develop a model to describe that matter and energy cycle among living and nonliving parts of an ecosystem and that both matter and energy are conserved through these processes

## Sample Projects

### Sheep / Grass / Wolves

**Goal:** Write a Scratch simulation that models a predator-prey ecosystem with sheep, grass, and wolves.

**Based on:** <https://scratch.mit.edu/projects/26812899/>

**Time required:** 1 week

**Tools and materials:** Computer lab with access to Scratch

### Modeling the Carbon Cycle

**Goal:** Write a Scratch simulation that models the carbon flow in a tree based on levels of photosynthesis.

**Based on:**

<http://www.carbontree.fi/>

**Time required:** 1 week

**Tools and materials:** Computer lab with access to Scratch

### Arduino Extension: Build a Controller

**Goal:** Build an Arduino-based controller that allows the user to manually change variables

**Time required:** 1 week

**Tools and materials:** Computer lab with access to Scratch, Arduino toolkit, sensors, resistors, various electronics components

# Resources



## Field Trip Programs

- Parts and Crafts is located just down the street at 577 Somerville Avenue
- Access to 3D printing, woodshop, electronics workbench, soldering stations
- Fridays only, morning or afternoon available



## On-site Programming

- Supplement in-school workshops with hands-on project component
- Good for: Table-top building projects, Scratch, computer programming, science demos
- Flexible schedule. Ideal times are late April / early May.



## Professional Development

- What tools can I use? Scratch, 3D printing, Arduino, electronics
- Free drop-in support at Parts and Crafts every Saturday from 12-2 pm
- Fridays only, morning or afternoon available