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Playfully Inventing & Exploring
with Digital & Other Stuff



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Smart House Workshop

Photos and descriptions from Smart House summer workshops at the Science Museum of Minnesota.

Create a high-tech dream home of the future. Using crickets, PICO crickets or RCX and found materials, build and design your mini-house. Add light, temperature, and touch sensors, and program the house to do whatever you want—control the volume of the stereo, open trap doors, scare away burglars, or dust itself!

Goals of the Workshop

- Get inspired to design and build a house with "smart" features
- Learn how you can combine familiar craft and building materials with digital materials
- Get involved in a process of design and redesign, and working through problems when things don't turn out as expected.

Materials



- Crickets, motors, and cables.
- Sensors - light sensors, touch sensors, and resistance sensors are especially useful
- Copper foil
- Building supplies: cardboard, 1" pink insulation foam, tagboard, wood scraps .
- Stuff to attach with: cable ties, pipe cleaners, hot glue, glue sticks, masking and duct tape
- Interesting recycled stuff: tubes, cups, spoons, plastic stuff
- Stuff to decorate with: fabric scraps, glittery paper, tinsel, and mylar, construction paper, "doo-dads" (little plastic toys & beads), yarn
- Foam
- A selection of LEGO pieces: gears, axles, axles connectors, beams, [small grey pieces]. See the EZ modules pages for ideas on LEGO supplies.

Set Up



The Smart House workshops at SMM are offered as a summer class. They meet 3 hours a day for five days. This class was for kids ages 9 to 12.



We set up our room with two large tables in the center for building, with computers around the edge of the room (but very close by) so it is easy to go back and forth between building and working on the computer.



We put materials out on tables, grouped (roughly) by category: building materials, craft supplies, Cricket materials, LEGOs.

We set up two glue gun stations on tables in different parts of the room.

Introduction



On the first day of the workshop we designed and built fantasy chairs out of a selection of craft materials (no boxes, no LEGO pieces). Before we started building, we looked at and talked about some chairs made by designers out of unusual materials or in unusual shapes.

Next, we looked at and talked about a variety of interesting houses. I looked for examples of houses that did smart things (like opening or closing skylights in response to temperature) or that used unusual materials (like recycled shipping containers or packed mud).

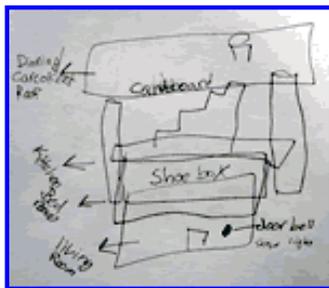
We found that [Dwell magazine](#) often features articles about futuristic houses that are made of unusual materials or have high-tech or eco-friendly features.

We also took some time during the week to explore "smart" features in the museum. We checked out the sensors on the elevators and doors and in the bathrooms, and visited the Science House, a smartly designed, zero-emissions building.

[Read more about the Science House.](#)



We gave the students some time just to experiment with the motors and sensors. We assigned the class a 15-minute mini-project: program your cricket to turn the motor on with a sensor.



We asked the students to pair up and to start thinking about their house together. Before they started building, they needed to show us a drawing of their house and talk to one of the facilitators about their plan.



We set out supplies on a separate table. We showed some of the more interesting materials. And we shared examples of houses we've made or are working on.

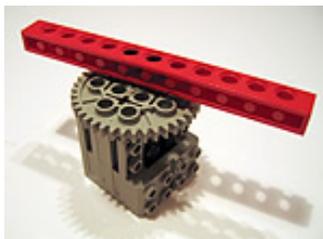
Working & Playing



Most of the groups started out by constructing the structure of their house. We helped groups find materials that would make the building easier.



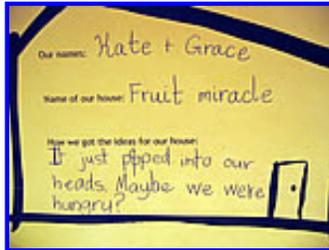
Once the groups were making good progress on constructing their houses, we checked in with the groups to see how they were thinking about incorporating smart features.



Because it is sometimes hard to imagine how to put parts together to make a door open and close (for example), the EZ modules can be really useful. We showed a few examples of the EZ modules to the class, then helped groups figure out if any of the modules would be helpful with their project.



In one group, the partners insisted they did not want to work on a single house. As a compromise, they made a house with two wings connected by a tube. Even though they worked mostly separately, the two sections of the house did have lots in common.



Near the end of the workshop, we ask the teams to write a label for their house. They came up with a name for the house and a bit about where they got the idea for the house.

Other Thoughts & Reflections



Shoe boxes are okay, but when we don't provide lots of boxes, the houses are much more creative.

This, for example, is a pear-shaped fruit house. It had an apple-shaped garage.



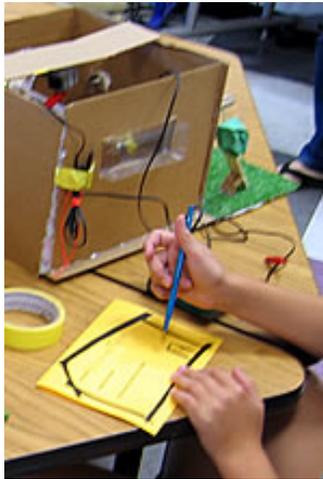
Fewer LEGO pieces is/are better. At the beginning of the class we explained that you can take home what your build out of recycled materials, but that LEGO pieces need to stay at the museum (another good reason to use fewer LEGO pieces).

This cool drawbridge house used only a few LEGO pieces only for the mechanism that moved the drawbridge.



I worked on a house during the week. It was partially built on the first day, and I added to it and changed it each day. It was a good way to introduce new materials and programming ideas during the week.

This team wanted a retractable roof for their house, so I showed how I sometimes use accordion-folded paper in projects.



Writing labels for the houses helps the builders reflect a little on what they made and where they got their ideas. It helped to ask them questions during the week (Who lives in this house? What's special about it? What would you call this house?) so they're thinking about it.

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