Overview and Agenda

2010 STREAM Workshop – Artbotics Session

Overview

The purpose of this session is to provide you with a sense of what students experience during an Artbotics course. Exploring STEM concepts using robotics from an artistic perspective is a practiced and evolving educational method. You will have the opportunity to create your own interactive character. This creation will involve sculpting with wire, incorporating sensors, lights, and motors into the design, programming interactivity using the Super Cricket board, and exhibiting your work to the group.

Introduction (15 min)

- What is Artbotics?
- Artbotics history and sample projects produced during education courses

Hardware and Software Tools (30 min)

- Artbotics kit (see reference handout for details)
- Wire cutters
- Three gauges of wire: 22, 26, and 28
    a. 22 gauge is sturdy enough, yet malleable, to create a small-size frame.
    b. 26 gauge is more malleable and useful for securing sensors, lights, and motors to the framework.
    c. 28 gauge is very malleable and most useful for esthetic aspects.
- Hands for manipulating the wire
- Miscellaneous supplies such as tape and glue (available in the back)

- Laptop containing Cricket Logo for programming
- Sample code (see reference handout for details)

Creative Activity (1.75 hours)

- ***Create an interactive character using the materials provided.***
  You are welcome to use the cube as a frame to build your character; this is not required. Make use of any source of inspiration such as: children in your life, favorite animated movies, pets, etc.
- ***Feel free to collaborate with your neighbors.***
  Your neighbors are your friends. Feel free to work with them on brainstorming ideas, working with the materials, and troubleshooting.
- ***Ask questions.***
  We are here to help you as well.

Exhibition (30 min)

- ***Prepare your piece for display.***
  The purpose is to model the Artbotics course. At the end of the course, students exhibit their work either in a gallery or for the class. In this session, pieces are setup on the tables for display.
- ***Walk around and check out the other interactive characters.***
  This is your opportunity to see all of the finished pieces created by your colleagues.

Hardware Reference

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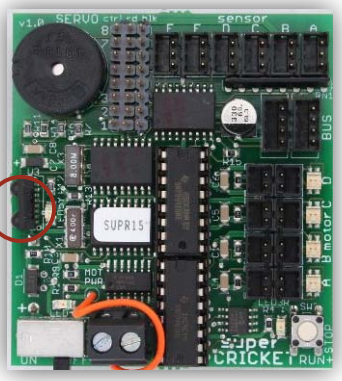
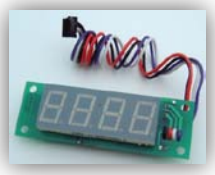
The brains of your interactive character...

The code you write will be downloaded from the laptop to the Super Cricket board via the USB cable and Beamer. The Super Cricket is shown on the left. It has six sensor ports marked a through f, two bus ports, and four pairs of motor/light ports. The Cricket is powered by four AA batteries. The beamer on the right connects to the laptop via the USB cable. It beams your code to the Cricket board through the IR devices (see circles below).



How your character moves and responds...

DC motors enable the character to move. You can program the direction of motor rotation, the speed of rotation, and how long it rotates. Your character will be able to beep, light up, or output four characters. The LCD display plugs into a bus port. The lights plug into motor ports.



How your character senses...

Your character interacts with the world using three sensors: IR distance sensor, snap switch and a photocell light sensor. Each plugs into a sensor port. The distance sensor returns a range of 0 – 255; 0 represents far and 255 represents close. The snap switch returns true for on and false for off. The light sensor returns a range from 0 – 255; 0 is bright and 255 is dark.

Software Reference

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Motor/Light Commands

a,	*Selects motor/light a*
b,	*Selects motor/light b*
ab,	*Selects both motors*
on	*Turns on the motor/light*
off	*Turns off the motor/light*
onfor *x*	*Turns on for x tenths of secs*
thisway	*Motor direction defined on initial Cricket startup*
thatway	*Opposite motor direction*
rd	*Reverse direction*
setpower *x*	Sets power level 0-8; default is 4

Example statements:

a, on	*Turns motor or light*
b, setpower 2	*Sets the power to 2*
c, onfor 10	*Turns c on for 1 second*
d, off	*Turns d off*

Sensor Commands

switcha	*Reports the state of the switch, as true or false, in the 'a' port on the Cricket; replace 'a' with 'b' through 'f' depending on what port the switch is in*
sensora	*Reports the sensor value, between 0 and 255, in the 'a' port on the Cricket; replace 'a' with 'b' through 'f' depending on what port the sensor is in*

Sound Commands

beep	*Plays a short beet*
note *pitch x*	*Plays a note of defined pitch for x tenths of secs*

Example statement:

note 119 10 *Plays C note for 1 second*

Control Examples

repeat *x* [*body*]	*Repeats execution of the code statements in body for x number of times*
loop [*body*]	*Continually executes the code in body*
if *condition* [*body*]	*If the condition is true, the code in body is executed*
ifelse *condition* [*body1*] [*body2*]	*If the condition is true, the code in body1 is executed; otherwise the code in body2 is executed*
waituntil [*condition*]	*Repeatedly checks the condition statement until it is true*

Example code:

```
To flippy
   Repeat 10 [a, onfor 10 rd]
end
```

```
To flippy-forever
   loop [a, onfor 10 rd]
end
```

```
To flippy-forever
   A, onfor 10 rd
   flippy-forever
end
```

```
to on-wait
   a, on
   Waituntil
[switchb]
   off
end
```

```
to switch-controls
   a, on
   loop [
      ifelse switchb
         [thisway]
         [thatway]
   ]
end
```

Refer to http://handyboard.com/cricket/program/ for the full program manual.

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