ARTBOTICS
Attracting Students to STEM

[Logos for NSF, UMass Lowell, CAITE, and FCEP]
Artbotics is...

- An interdisciplinary program, which started as a collaboration between the University of Massachusetts Lowell and the Revolving Museum, starting in the Summer of 2006.

- Learning art, computer science, and robotics by creating interactive, kinetic sculpture.

- The Artbotics curriculum has been adapted for many timeframes and age levels.
Artbotics Funding and Partnerships

- National Science Foundation
- Broadening Participation in Computing Program (CNS-0540564)
- Commonwealth Alliance For Information Technology Education (CAITE) (CNS-0837739)
- Expanding Computing Education Pathways (ECEP) Alliance (CNS-1228355)
Artbotics at a Glance

http://www.youtube.com/watch?v=IJZeNiDsef0
Artbotics Curriculum

- Two-dimensional art
  - Soldering lights and LEDs (if applicable)
  - Controlling lights (command sequencing, properties)
  - Touch sensors (boolean values; if statements)
  - Car drawing (continuous rotation motors, looping)
- Three-dimensional / two-and-a-half dimensional art
  - Mechanisms (continuous motion to linear, waving, etc.)
  - Distance, light, and sound sensors (variable values; ifelse statements, nested if statements)
  - Position-based movement (servos, if applicable)
- Final projects
Artbotics Technology

- Lego Mindstorms NXT and EV3
  - Elementary to high school
  - Block-based drag-and-drop programming

- Super Cricket (Gleason Research)
  - Middle school to college
  - Text-based programming, unlike many languages

- Arduino
  - High school to college and beyond
  - Text-based programming very applicable to real world
Artbotics Curriculum

- Curriculum has been designed to be modular

- Components can be chosen to fit your time frame and desired content or outcome

- For a half-semester or entire semester-long settings:
  - Entire curriculum can be used to build towards a final project
  - Choose a few components that can be expanded upon and modified

- For day-long or only a few hour sessions:
  - One or two modules can be used as activities
Artbotics Curriculum

When used comprehensively, knowledge and skills gained from previous modules are built upon.

When used individually, enough instruction is provided such that prior knowledge is not needed.
Artbotics and ECS

Begun exploring links between Artbotics and the Exploring Computer Science (ECS) Curriculum

- **Unit 6: Robotics**
  - Use many of the same kinds of programming exercises outlined in the “Dancing Robot”
  - Have not formalized an alternative unit for ECS with Artbotics yet, but are working on fitting it
College Courses

- Taught at UMass Lowell
- Science Gen Ed. for Art students
- Arts and Humanities Gen Ed. for CS students
- Class twice per week with one lab
- 4 credit course
Final Projects

“Whaddayalookinat?” Spring 2007 College Class
https://www.youtube.com/watch?v=GFBaNmcOVzQ
Final Projects

https://www.youtube.com/watch?v=BEHBHkbZ2TM
After School Classes

• Took place at the Revolving Museum in Lowell, MA
• High school students from Lowell High School
• 10-12 weeks long, meet twice a week
Other Side by Spring 2011 class
Primal Spirit by Fall 2009 class
Workshops and Camps

- 1-day or 2-day workshops for educators and high school students
- Week-long middle school summer camps
Artbotics has been adapted to many curricula outside of our core program.

Weston Middle School, Lexington High School, MassBay Community College, Holyoke Community College

Beyond Massachusetts: Adler Planetarium in Chicago, IL; Del Mar High School in San Jose, CA

And many more!
All previous programs have used the Super Cricket microcontroller.

We are currently expanding the Artbotics curriculum to be used with Lego Mindstorms and Arduino.

Many classrooms already have Lego Mindstorms kits.
Questions?