Building an Interactive, Friendly Monster

Grade 7

Developed with i2 Learning by MIT Media Lab

In this course, students will learn fundamentals of electronics and programming as they create their own interactive stuffed monster. Using a small computer called a LilyPad Arduino, conductive thread, and some simple programming, students combine sewing and circuitry in the form of a friendly monster that can light up, make noise, and respond to touch. No prior knowledge of programming or working with electronics is required.

Course Schedule

4 hours per day | **20** hours per week | Student-Led Showcase

5 additional hours of curriculum available

Sample Activities

Students will have the chance to create their own interactive stuffed monster using knowledge they gain through experiences like those listed below.

Build a Bookmark

Students learn about simple circuits as they create a bookmark that includes an LED.

Sewing for Beginners

Students practice sewing using two different types of stitches: a running stitch and a hemming stitch.

The LilyPad Arduino

Students are introduced to the components of the LilyPad Arduino and learn how to write a simple program that runs on the LilyPad.

Real-life Interactive Monsters

Students learn about several ways interactive robots are being used to help people.

Understand Code Structure

Students learn about variables and how to correctly write code.

Experiment with LED Patterns

Students learn how to use statements and create LED blinking patterns using these statements.

Design Your Monster

Students design the circuit and code for their interactive monster.

Materials and Classroom Requirements

Curriculum guide and materials kits provided for all activites

Tables where students can collaborate are ideal.

Hardware: 1 PC per 2 students. PC must include USB post.

Software: Lilypad Arduino Software (free to download)

Additional materials to be provided by the school

- Scissors (that can cut through felt)
- Paper
- Rulers
- Pens/pencils

Standards Addressed in the Unit

Massachusetts Digital Literacy and Computer Science Standards (Draft)

6-8.CAS.c Interpersonal and Societal Impact
6-8.CAS.c.1 Describe current events and emerging technologies in computing and the effects they may have on education, the workplace, individuals, communities, and global society.
6-8.DTC.b Collaboration and Communication
6-8.DTC.b.2 Collaborate synchronously and asynchronously through online digital tools (e.g., not necessarily in the same time and place).
6-8.CS.a Computing Devices
6-8.CS.a.4 Identify and describe the use of sensors, actuators, and control systems in an embodied system (e.g., a robot, an e-textile, installation art, smart room).
6-8.CS.a.5 Design and demonstrate the use of a device (e.g., robot, e-textile) to accomplish a task, individually and collaboratively.
6-8.CS.a.7 Identify steps involved in diagnosing and solving routine hardware and software problems (e.g., power, connections, application window or toolbar, cables, ports, network resources, video, and sound) that occur during everyday computer use.
6-8.CT.a Abstraction
6-8.CT.a.2 Define a simple function that hides the complexity of a task/problem and can be reused to solve similar tasks/problems.
6-8.CT.b Algorithms
6-8.CT.b.1 Design solutions that use repetition and two-way selection (e.g., IF/ELSE, FOR, WHILE).
6-8.CT.b.2 Use logical reasoning to predict outputs while showing an understanding of inputs.
6-8.CT.b.3 Decompose a problem and create a sub-solution for each of its parts (e.g., video game, robot obstacle course, making dinner), individually and collaboratively.
6-8.CT.b.4 Recognize that more than one algorithm can solve a given problem.
6-8.CT.b.5 Recognize that boundaries need to be taken into account for an algorithm to produce correct results.
6-8.CT.d Programming and Development
6-8.CT.d.2 Use functions to hid the detail in a program (e.g., perform abstraction).
6-8.CT.d.3 Create a program that implements an algorithm to achieve a given goal, individually and collaboratively.
6-8.CT.d.4 Implement problem solutions using a programming language, including all of the following: looping behavior, conditional statements, expressions, variables, and functions.
6-8.CT.d.5 Engage in collaborative program development (e.g., pair programming).
6-8.CTd.7 Use iterative development and debugging to explore the problem domain.

Common Core standards

Reading Standards for Literacy in Science and Technical Subjects

1. Cite specific evidence to support analysis of science and technical texts.
2. Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.
3. Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
10. By the end of grade 8, read and comprehend science/technical texts in the grades 6-8 text complexity band independently and proficiently.

Mathematics

6.G Solve real-world and mathematical problems involving area, surface area, and volume.
7.G Draw, construct, and describe geometrical figures and describe the relationship between them.
7.G Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.
8.G Understand congruence and similarity using physical models, transparencies, or geometry software.

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TECHNOLOGY REQUIREMENTS

Hardware

This course can run with any of the devices below:

- PC Desktop or Laptop with a USB port
- Mac Desktop or Macbook with a USB port

Number of Devices: 1 device / 2 students

Software

This course uses 'LilyPad Arduino', an open-source programming software.

The software will need to be downloaded and installed prior to the start of the course on each device. The software is available for download from the link below.

https://www.arduino.cc/en/Main/Software

We recommend creating a desktop shortcut for the Arduino application for students to easily access the software.

Internet Connectivity

Students do not need access to the internet during the course week.