Micro:bits Art Bots

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Target Grade: 9-10 Visual Arts or STEM

Time Required: 3 block periods (prior lessons on Micro:bits and Python as needed)

Standards:

Tennessee Visual Arts Standard

- HS1.VA.CR1.A: Formulate and develop creative approaches to art-making

ISTE Student Standards

- 4 Innovative Designer:
  - 4a Students know and use a deliberate design process for generating ideas, testing theories, creating innovative artifacts or solving authentic problems
  - 4c Students develop, test and refine prototypes as part of a cyclical design process.
  - 4d Students exhibit a tolerance for ambiguity, perseverance and the capacity to work with open-ended problems.

Lesson Objectives:

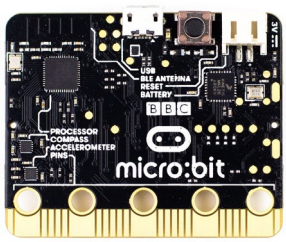
- Students will utilize prior knowledge of Micro:bits, python, the engineering design process, and 3D printing to design an art bot.
- Students will use a rubric and teacher supplied directions to explore movement of exterior components controlled by Micro:bits to design a working art robot.

Central Focus:

Students will combine the use of coding, 3D printing, and the design cycle all while creating a work of art. They will use Micro:bits to create a moving Art Bot that will make a unique piece of artwork. In the end, students will create a reflection video which documents the entire process.

Background Information:

Micro:bits are small, single board microcontrollers for use in computer education. They are small, affordable, and a great option to bring computer science to your students. A Micro:bit has multiple inputs and outputs that can allow for integration with other devices and add-ons. Micro:bits are primarily programed using MicroPython and Microsoft MakeCode (drag and drop).



Materials

- Micro:bit boards
- Edge Connector Breakout Board for BBC Micro:bit - Pre-built
- Mini 180 Degree Servo with Accessories
- Micro:bits battery pack
- 3D printed holder for Micro:bits, breakout board, and add-ons.
- Markers
- Rubber bands
- Ink pens
- Misc. art supplies
- Ipad, phone, or some other kind of video recording device

Instruction

Introduction:
Students will explore how to add a servo motor to a Micro:bit and what basic code is needed to get it to move using the following tutorial: https://www.kitronik.co.uk/blog/using-bbc-microbit-control-servo/ . This will serve as the spring board for designing art bots. Upon completion of this tutorial, students will be assessed based on the ability to successfully attach the servo, create the correct code, and troubleshoot problems. Assessment comes in the form of the documentary video made by students and turned in at the end of the project.

Design Process:
Students will use the Engineering Design Process and the Creative Process to prototype an Art Bot that meets the following requirements:

- Must use Micro:bits and servo motors
- Must use coding for movement
- Must use art materials
- Must us at least one 3D printed component (can be removed if no 3D printer available)
- Must write directions for recreating your Art Bot
- Must record a video tutorial documenting the process
- Must present to class

Students will brainstorm, sketch, and pitch a proposal to the teachers based on the idea behind their Art Bots. Upon acceptance of a clear and precise proposal, students will begin prototyping their Art Bots.

Questions to ask:

- What does your Art Bot do?
- What components are needed for success?
- What will you 3D Print?
- How will you use art materials? I.e. Markers, Ink Pens, etc.
- What problems do you feel could arise?
- How can I help you make this better?

Construction / Prototyping:
Students will work to prototype their Art Bots using the requirements and knowledge from past engineering challenges. Students should carefully document this phase as this is where the information for the final video will come from. Teacher should circulate and facilitate learning. Let the students discover what will and will not work. Answer questions with questions in reference to the Engineering Design Process. Point students back to where they are and which area they may need to revisit. Once success is achieved, students can begin using craftsmanship and professionalism to refine their Art Bot into a product that is ready for presentation.

Video:
Students will document their use of the design process throughout the planning, building, and testing of the art bot. The video should include brief documentation of the actions taken at each step of the design process. The video should also include the working final product, as well as a reflection of how the student would improve the product if time and materials were not a factor.

Differentiation

The beauty of this lesson is that it meets students where they are. Students can write their own code in traditional python or use block code. They can use more than one servo, tap into the Bluetooth components on the Micro:bit board, and use their phone as a controller for their Art Bot. They could add a musical element. They can research various other add-ons to be used with the Mirco:bit board. There is always the option for group work as needed if a student needs the extra support of a partner.

Assessment

Formative: Teacher understanding gained through proposal pitch and rounds made by teacher during construction and prototyping time:

- Identify procedural steps related to a specific art task.
    - Identify problem-solving skills needed to solve visual art tasks. Examine relationships among the visual and organizational components to solve specific visual art problems.

Summative: Grade the final presentations and process videos:

- Communicate how criteria are used in the creation of a work of art.
    - Integrate visual concepts with subjects, themes, or symbols to improve communication of intended meaning in a work of art. Design visual concepts with subjects, themes, or symbols to improve communication of intended meaning in a work of art.