MY FIRST ANIMATED CHARACTER

Subjects:
Language Arts, Social Studies, & SEL

Required Learning Modules:
Position Servo

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MY FIRST ANIMATED CHARACTER

OVERVIEW

Students will create a character from a book, historical figure, or a representation of themself using cutlery and a position servo.

LEARNING GOALS

Students will be able to design a character and add motion by programming a position servo.

MATERIALS NEEDED

- Hummingbird Robotics Kit (1 kit : 2-3 students)
- Programming device (Mac/Windows laptop, Chromebook, tablet, iPad, or smartphone)
- Plastic cutlery
- Paper cup, chip can, or box to mount servo
- Crafting supplies such as scissors, glue, tape, markers, pipe cleaners, etc.
- My Robot Design Notebook (pages 6 & 11)

Total Estimated Time

135-180 minutes, depending on experience level

Need more differentiation?

Students that are ready for a challenge can incorporate an element of music or speech. See Common Modifications for more info!

Have extra time?

Have students incorporate a sensor to make their character interactive. See Classroom Tips for more info!

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SAMPLE SCHEDULE

SESSION 1
(45-60 minutes)

- Students learn to code position servos with the Hummingbird Robotics Kit.
- Teacher explains project and students choose a character to build.
- Students create a plan for how they will make their character.

SESSION 2
(45-60 minutes)

- Students will finish building, decorating, and coding their physical robot.

SESSION 3
(45-60 minutes)

- Students present their robots and reflect on their process.

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Teacher Preparation

DESCRIPTION: Below are some suggestions for teachers to complete prior to the lesson.

Become familiar with Hummingbird Bit:

- Before learning about Hummingbird, you will need to decide which programming language you would like to use. Use our Software Guidance Chart to help you decide!
- Now that you have chosen the programming language, watch the corresponding video course. These free videos will teach you the basics of programming, building, and teaching with the Hummingbird Robotics Kit.
    - We recommend completing the challenges given in the video course. By doing the activities yourself, you will see where students might encounter issues or need extra guidance.
- View the programming tutorials on the topics below and have them available for student viewing:
    - Position servo
- View our simple hacks for adding servos to projects.

Before the first day of the project:

Complete the following before students enter the room to prepare for each team of students (we suggest 2-3 students to each Hummingbird Kit)):

- Print or share electronically the My Robot Design Notebook (pages 6 & 11)
- Put 4 AA batteries in each Hummingbird Battery Pack
- Make sure the desired programming app is available on student devices. If using BirdBlox, make sure the app is downloaded for all groups.
- Set up craft supplies and tools
    - This is a recommended list–not all items need to be used/supplied.
- Set aside space in the classroom for student projects to be stored between sessions.

To keep in mind:

- Do not put hot glue on Hummingbird Bit controller or micro:bit.
- Turn off or unplug battery packs after each session to conserve batteries.

Lesson Plan: SESSION 1

DESCRIPTION: Students will learn to code the position servo of a Hummingbird Robotics Kit using the My Robot Design Notebook. Students will create a plan and prototype of their project using the My Robot Design Notebook.

ONLINE
Students will need Hummingbird Robotics Kits and programming devices

TIME: 45-60 minutes

LEARNING GOAL:
Students will learn to use the position servo of their Hummingbird Robotics Kits. Students will incorporate robotic and programming elements into their developing plans and prototypes.

RESOURCES:
Hummingbird programming tutorials:

- BirdBlox
- Snap!
- MakeCode
- Python
- Java

1. **Learn to program the Hummingbird Robotics Kit with the BirdBrain Website Learning Portal and the My Robot Design notebook** (10-20 minutes)
    - On the BirdBrain Website Learning Portal, select your robot, programming device, and programming language to begin.
    - Click on the "PROGRAM" tab to access programming video tutorials.
    - Begin with the Set Up tutorial.
    - Skip to the position servo website tutorial and work through the steps together. Pause as a class and make your way through the position servo page of the My Robot Design notebook.

2. **Project introduction** (10 mins)
Introduce the My First Animated Character project. The goal will be to create a moving cutlery character using the Hummingbird Robotics Kit. Consider creating characters from books, historical figures, or a student's representation of themself. Present any requirements and constraints. Share criteria for success, and the grading rubric/process. Share examples of projects, either one you have created or via the gifs on the next page. Consider the sample requirements below, and create your own to suit your needs:
    - Students must choose a person from a book or from history. They will be responsible for knowledge of the person they choose. Alternatively, students may choose to create a representation of themselves.
    - The character must repeatedly move to at least two different angles.
    - Students must present their work to the class (or to an audience of your choice) and justify their design choices.

Lesson Plan: SESSION 1, continued

DESCRIPTION: Students will learn to code the position servo of a Hummingbird Robotics Kit using the My Robot Design Notebook. Students will create a plan and prototype of their project using the My Robot Design Notebook.

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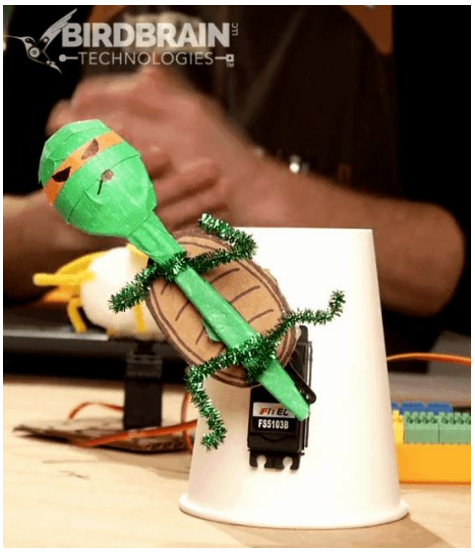
- Java

3. **Students Select Character** (10 mins)
   Have students select their character. Let them know they should be ready to start planning during the next session.

4. **Planning Time** (15-20 minutes)
   - Have students complete the page 6 of their Robot Design notebooks, creating a 2D drawing of their planned design.
   - Students should label where the robotic components will go on their design.
   - If they would like more space to create a detailed plan, students may plan on a separate piece of paper.
   - If they plan to incorporate color into their design, they should include the color on their plan.
   - During this step, you may also find it helpful to ask students list materials for their projects. Students should consider their sketch and create a list of materials they will need. If you have limited materials, let students know what is available.



Lesson Plan: SESSION 2

DESCRIPTION: Students will work in small groups to code and build their My First Animated Character projects based on the given criteria and constraints.. Building and coding their projects will require 1 class period.

ONLINE
Students will need Hummingbird Robotics Kits and programming devices

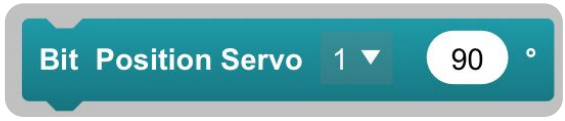
TIME: 45-60 minutes

LEARNING GOAL:
Students will incorporate robotic and programming elements into their My First Animated Character projects.

RESOURCES:
Hummingbird programming tutorials:

- BirdBlox
- Snap!
- MakeCode
- Python
- Java

1. **Building and Programming** (30-45 minutes)
   - Allow students time to build.
   - Students are creative problem solvers! Empower students to solve their own building and programming problems.
   - Debugging is part of the creative process! Solving building and programming problems through creativity doesn't distract from the lesson; it *is* the lesson.
   - Check out these videos for tips on how to add position servos to projects.
   - **TIP:** Before putting the servo horn and cutlery character on the position servo, set the position servo to 90°. You can do this by clicking a position servo block set to 90°. See below:



Lesson Plan: SESSION 2, continued

DESCRIPTION: Students will work in small groups to code and build their My First Animated Character projects based on the given criteria and constraints.. Building and coding their projects will require 1 class period.

ONLINE
Students will need Hummingbird Robotics Kits and programming devices

TIME: 45-60 minutes

LEARNING GOAL:
Students will incorporate robotic and programming elements into their My First Animated Character projects.

RESOURCES:
Hummingbird programming tutorials:

- BirdBlox
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- MakeCode
- Python
- Java

Suggestions for build days:

1. **Have BirdBrain Programming Portal tutorials on standby**
   Students will need reminders and assistance troubleshooting, especially those new to robotics and programming. Have tutorials ready.

2. **Normalize iteration, troubleshooting, and frustration**
   These critical components of the building and programming process can sometimes be new and frustrating for students. Proactively introduce each concept to set students up for success.

3. **Empower students to take control and work independently**
   Students should push themselves out of their comfort zones with collaboration, problem solving, and giving and receiving feedback. This project is designed to be student-centered. Teachers should be ready to give assistance when asked, but should otherwise stand back and observe.

4. **Timing**
   - For students that finish early, encourage them to incorporate a sensor to make their character interactive. See Classroom Tips for more info!

Lesson Plan: SESSION 3

DESCRIPTION: Students will reflect on the design and engineering process, and share their work with an authentic audience.

OFFLINE
No technology necessary

TIME: Depends on chosen presentation method

LEARNING GOAL: Students will present how the lights and motors make the character come to life and reflect on the design and engineering process.

RESOURCES: Reflection and Self-Assessment Questions

1. **Presentation** (time depends on chosen presentation method)
   Students can present their projects in a variety of ways. Here are a few examples:
   - *Gallery walk*: Students walk around to observe and play with each other's projects. Consider having one student from each group stay with the project to explain it and answer questions. Students can switch out of this role so everyone has time to explore.
   - *Presentations*: Each group presents their project to the class, sharing their artist statement and discussing reflection questions.
   - *Share with an external audience*: Consider how you could put these Moving Masterpieces on display for an authentic audience, such as parent-teacher conferences, an exhibition in the community, or creating a museum for other classes or grades.

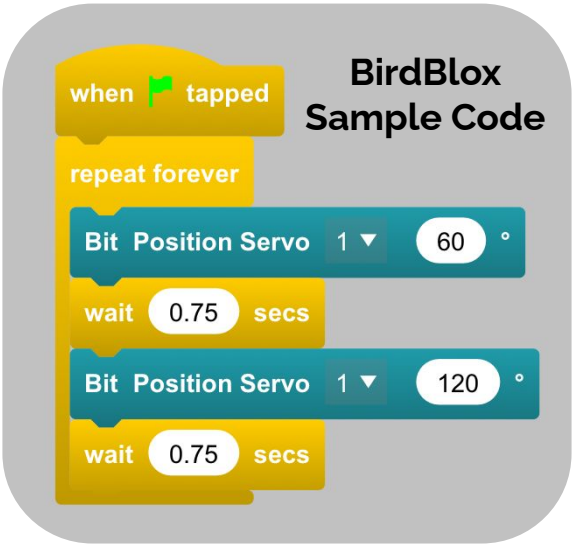
2. **Reflection** (10-20 mins)
   Reflect on the process as a whole class discussion, small group/partner discussion, writing assignment, or questions for students to ask each other as they do the Gallery Walk.

   Optional step: Student Self-Reflection
   Consider using the questions from the BirdBrain Reflection and Self-Assessment Question documents (here for grades 3-5, here for grades 6+), and make a copy which can be customized to meet your specific needs

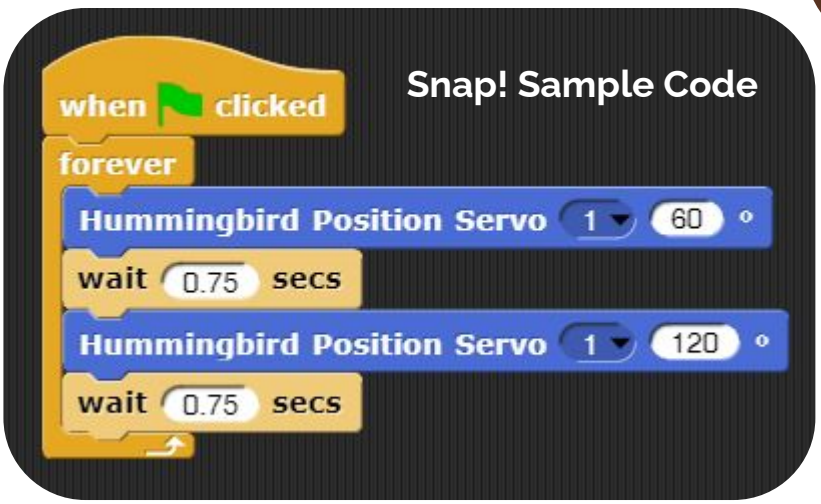
Sample Solutions

DESCRIPTION: The codes below are sample codes for the image on the right. The position servo moves the cutlery character back and forth.

SAMPLE CODE:



BirdBlox Sample Code



Snap! Sample Code

MakeCode Sample Code

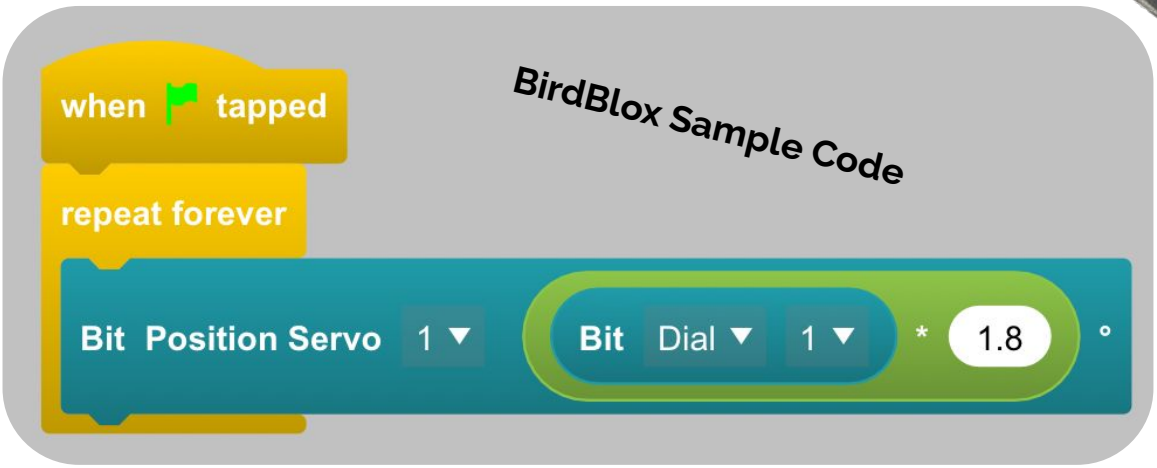
Sample Solution for Extension

DESCRIPTION: The codes below are sample codes for using a dial to change the degree of the position servo. Tutorials for sensors using BirdBlox, MakeCode, and Snap!

Since the dial sensor creates values from 0 to 100, we need to multiply the value by 1.8 to get values between 0 and 180.

SAMPLE CODE FOR EXTENSION (USING SENSORS):

BirdBlox Sample Code



MakeCode Sample Code

Snap! Sample Code

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STANDARDS ALIGNMENT

Common Core

COMMON CORE: ENGLISH LANGUAGE ARTS

This project offers a way for students to research and create a summarizing paragraph using informational texts. It also provides opportunities for students to present their research and writing to an authentic audience. This project meets multiple standards from the Common Core English Language Arts Standards, including Reading: Informational Text, Writing, Speaking and Listening, and Language (as well as multiple strands within each standard).

Visit this page for a more detailed explanation of how working with the Hummingbird Robotics Kit applies to meeting ELA Standards.

STANDARDS ALIGNMENT

CSTA Standards for Students

COMPUTER SCIENCE TEACHERS' ASSOCIATION (CSTA)

CSTA Standards are split into different grade levels: 3-5, 6-8, and 9-10. Working with the Hummingbird Robotics Kit meets multiple standards across these grade-level delegations.

Visit this page for a more detailed explanation of how working with the Hummingbird Robotics Kit applies to meeting CSTA Standards.

Classroom Tips

Answering student questions:

Try open-ended answers that guide and empower students to solve problems and seek solutions themselves. These are two of our favorites:

- What problem are you trying to solve right now?
- What solutions have you tried so far?

Quick debugging:

- Power Supply: If motors aren't moving, check or replace power.
- Programming: Check that students used pause blocks correctly. Position servos need time to arrive at the requested angle before moving again.
- Device Connection: Check that the Hummingbird is connected to the programming device. Check the USB or Bluetooth connection.
- Visit support.birdbraintechnologies.com for more tips.

Problem solving:

Remember, there's always another way to solve a problem! Empower your students to share their code with each other. No two programs will be the same. Seeing examples of how others achieved the goal will help students understand the relationship between the code on the screen and the movement in the real world.

Have extra time?

If you have 15-30 minutes to add to the lesson, we suggest incorporating the distance, light, sound, and/or dial sensor pages from My Robot Design Notebook. Tutorials for sensors can be found on the BirdBrain Website Learning Portal or our free video courses. Sample code using a dial sensor can be found on the Sample Solution for Extension page.

Additionally, consider prompting students to reflect by using the questions from the BirdBrain Reflection and Self-Assessment Question documents (here for grades 3-5, here for grades 6+), and make a copy which can be customized to meet your specific needs. These documents could also be used for group discussion.

COMMON MODIFICATIONS

SHORT ON TIME?

- If your teaching schedule allows, collaborate with teachers across subject areas to create meaningful, interdisciplinary projects and dedicate more time to the project. Work can be shared between the classes and different aspects can be assessed. For example, a Spanish teacher and Art teacher can collaborate on art by famous Spanish painters.
- Hummingbird Projects make perfect after school programs. If it works for you and your school community, consider beginning a Robotics Club or inviting students to stay after school to work.
- Try a simplified build! Our Simple Builds and Hummingbird Hacks are helpful for tight schedules.

SHORT ON EQUIPMENT?

- If you need to work with groups larger than the intended 2-3 students, consider adding roles to each group. For example: Students can research, document the process, explain robot design, etc.
- If necessary, multiple groups can share by taking turns with one Hummingbird Robotics Kit. Split the components evenly between groups, and set a timer for each group to get a turn with the controller (the Kit's brain). Groups can work on the building and programming of their robot while the controller is with another group; they can then test their creations and tweak their code when it is their turn.
- Check out our Grant Assistance page for info on where to find grants and answering application Qs.

TEACHING REMOTELY?

- There are number of ways to engage students with creative robotics via a remote or hybrid learning environment, whether or not students have kits at home. Check out our website to learn more!

NEED MORE DIFFERENTIATION?

- If you have some students that need a challenge, consider adding additional criteria to their assignment such as adding music by using a buzzer in any language or recording or importing sound in Snap! and BirdBlox.
- For students who need more support or scaffolding, printable resources like our Hardware Guide, Block Descriptions, Coding Cards, and Troubleshooting Cards may be helpful.

NEED MORE EXTENSION?

- Extend your showcase! Invite members of the community, other grades, administrators, etc. Challenge students to tweak their projects to fit the new audience, or even teach the audience how to change the robot's behavior. Can they teach visitors to make the robot move?
- What if students' robots could be manufactured in real life? Consider assigning a "Shark Tank" style business pitch (written or presentation). Why should someone invest 1 million dollars in creating a moving character?

ADDITIONAL INFORMATION

WHAT IS A HUMMINGBIRD?
WHAT IS A ROBOT?

- **Sense:** Light Sensor, Dial Sensor, Distance Sensor, Sound Sensor
- **Think:** Hummingbird Controller
- **Act:** Single Color LED, Tri-Color LED, Position Servo, Rotation Servo, Buzzer

ONLINE RESOURCES

- **WHAT IS BIRDBRAIN TECHNOLOGIES?**
  - **Math Tools** - Owlet Cube and Glow
  - **Robots** - Hummingbird Robotics Kit and Finch Robot.
  - A suite of FREE printable and digital **learning support materials**.
  - **Professional development** online and **FREE Self-Paced Video Courses**.
- **BIRDBRAIN LEARNING PORTAL**
  - Start Teaching: This guide has everything you need to start teaching with the Hummingbird Bit Robotics Kit.
  - Programming Page: Step-by-step video tutorials to program your Finch (with BirdBlox, go through the portal and select a different programming device if desired)
  - Build Page: Instructions and tips for building robots
  - Projects Page: Projects to integrate the Hummingbird Bit with your curriculum
  - Printables Page: Classroom-tested printables, planning tools, and more

CONTACTS

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SHARE WITH US!

How did it go? Do you have photos or videos to share? We love hearing from you!

- Reach out to us on:
  - Twitter, Instagram, Facebook, YouTube

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