Marieke Thomas
SEDC 73600

Lesson Plan 8-9: Servo Robot Project

Unit: Arduino Motors Unit

Previous lesson: Servo Motors
Next lesson: Stepper Motors

Main objectives:

Standards:
- 9-12.IC.7 Career Paths: Investigate the use of computer science in multiple fields.
- 9-12.CT.4 Abstraction and Decomposition: Implement a program using a combination of student-defined and third-party functions to organize the computation.
- 9-12.CT.8 Abstraction and Decomposition: Develop a program that effectively uses control structures in order to create a computer program for practical intent, personal expression, or to address a societal issue.

Skills assessed:
- Wiring motors correctly using an external power supply
- Incorporating a library into code
- Using custom functions and library functions
- Using control flow in code to respond to input
- Writing complex code to address a real-world application
- Designing and incorporating physical hardware into Arduino projects

Timing: This is a 2-period assessment completed in pairs.

In-class exercises: The students will complete the assignment below.

Notes: If using the 3-D printer or laser cutter, teacher will need to plan with students when to print the designs.

Resources: Servo projects: https://create.arduino.cc/projecthub/projects/tags/servo
Paul McWhorter Understanding and Using Servos in Projects tutorial:
https://www.youtube.com/watch?v=aFHu65LiFok&list=PLGs0VKk2DiYw-L-RibttcvK-WBZm8WLEP&index=30

Materials: Elegoo uno circuits kits (including Arduino Uno, breadboard, servo motor, power supply module, battery wire, jumper wires, USB cable), 9V battery, student handouts, computers, screwdrivers, cardboard, 3D printer (optional), laser cutter (optional)

Assignments: The class assignment for students is below.

Summative assessment: This assignment is a summative assessment for the unit.

Lesson:
5 min: Intro

- We are going to build robots to do something useful! The robot could pick things up, open a door or trash can, wipe a window, etc.
- Go over project specifications
    - Servo motor controls physical hardware (10%)
    - Physical hardware designed for the purpose of the robot (20%)
    - Robot responds to input data (20%)
    - Robot successfully performs intended task (20%)
    - Code uses self-defined functions and functions from servo library in order to create a clear, concise, and understandable program (20%)
    - Worksheet below is completed (10%)

40 min: Work time
- Students work with partner on the assessment

Day 2:
5 min: Intro
- Address any common questions or issues that came up yesterday

40 min: Work time
- Students work with partner on the assessment

The Bronx High School of Science   Physical Science Department
Ms. Thomas   Electrical Engineering

Names: _____   **Period:** _____

Servo Robot Assessment

Robots are an essential part of modern life, performing tasks like cleaning floors, lifting and transporting merchandise around Amazon warehouses, and welding car parts. In this project, you will be working in pairs to design your own robot to help make life easier. Your robot should use a servo motor to control a physical mechanism in response to some sort of input. This could be user input, like a button or remote, or sensor data like the light or distance sensor.

This assignment counts 40 points in the Assessment category of your grade.

Technical specifications/grading criteria:
- Servo motor controls physical hardware (10%)
- Physical hardware designed for the purpose of the robot (20%)
- Robot responds to input data (20%)
- Robot successfully performs intended task (20%)
- Code uses self-defined functions and functions from servo library in order to create a clear, concise, and understandable program (20%)
- Worksheet below is completed (10%)

Optional extensions:
- Use the 3D printer or laser cutter to create custom-designed hardware
- Incorporate input data from a new component, such as the joystick or tilt switch

Before you start building/programming: sketch a design of your project, showing the physical hardware and how the motor connects.

Video of functioning robot. Make sure to include your names in the video. Make sure the video shows the robot responding to input.

Paste your completed code here:

What task does your robot perform?

Identify one bug that you encountered while coding (OTHER than mistyping a word or forgetting a semicolon). What was your original code and why didn't it work? What did you change it to and why

did that work? *(If you didn't encounter any bugs while programming, then you haven't challenged yourself enough—make your program more complex or add some of the extensions until you encounter a bug)*