

Teacher: Steve Sabaugh

Unit Plan: Advanced Button Logic: Rotary Emulation using micro:bit

Grade and Content: 9th-grade Engineering

Date: Day 3 of Rotary Logic Unit

Lesson: Advanced Button Logic: Volume with a Graphical Display

Overall Goal/Objective of Lesson: Students will learn how to emulate a potentiometer (variable resistor) by creating software using if/else statements, a formula to convert bit values(0-127) to scale a user-friendly scale (0-5), and ‘for’ loops to make an entire row of LEDs (pixels) appear or disappear on a button click

<p>Content Objectives (nouns)</p> <ul style="list-style-type: none">-Students will understand how ‘for’ loops can make a display multiple LEDs at a time-Students will understand how analog functions in components can be emulated with software-Students will understand how the computer stores volume data as bit values 0-127 according to the MIDI protocol-Students will gain further understanding of using decision statements.-Students will understand the importance of using defined constants in their program and avoid using “magic” numbers	<p>Assessments</p> <p>Call on students for review of key concepts</p>
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Skill Objectives (verbs/Common Core Standards)

- Students will be able to convert bit values(1-127) into a user-friendly scale

9-12.CT.5

Modify a function or procedure in a program to perform its computation in a different way over the same inputs, while preserving the result of the overall program.

- Students will be able to to define constants to use in their program and formulas
- Students will be able to create a program that emulates a potentiometer in a volume control.
- Students will be able to create a graphic display of a “volume meter” that goes up or down with volume.

9-12.CT.8

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.

Assessments

Students will create a program in the micro:bit IDE that lowers volume with button A and raises volume with button B. The rows of LEDs on the micro:bit will turn off, starting from the top as the volume is lowered, and turn on as volume is raised.

Key Content Vocabulary:

potentiometer

bit values

scale

Materials

Chalk Board, Smartboard for projection, Chromebooks

‘Assignments With Notes and Announcements’ Google sheet

Students Glitch web page

Time Allotment	Anticipatory Set	Plans for Differentiation/ Culturally Responsive Instruction
3	1. Do Now: Students will log into the google classroom. Get there ‘Assignments With Notes and Announcements’ doc open.	

12	Mini-Lesson/Direct Instruction (with Modeling) 1. Mini-Lesson: Using the 'for' loop to turn rows of LEDs on and off. How each LED is addressed (coordinates) explain that as volume goes down, the y values go up because 0 position of the y values are at the top of our display. 2. Modeling: I will demo some of the projects trickier tasks as well as demo what it should look like. Students will have a guided lesson for doing it on there own.	Plans for Differentiation/ Culturally Responsive Instruction -A guided lesson will be provide to all students. -Modeling is done so students can see how to use this strategy -Problems are dissected and explained in detail as I model the strategy
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20	Independent Practice (with Teacher Monitoring) 1. Independent Assessment: Students will work independently on 'volume' program in micro:bit	Plans for Differentiation/ Culturally Responsive Instruction -All students will have a step-by-step guide to work from including pictures. -myself and co-teacher are available for direct assistance
5 minutes	Closure 1. Share-Out: Teacher will ask students to review concepts they have learned in their own words and explain the assessment for tomorrow's lesson	Plans for Differentiation/ Culturally Responsive Instruction