Lesson: Temperature Indicator #3 (Thermometer)

Big Picture

This lesson will introduce built in sensors while allowing students to be more acquainted with the BBC micro:bit microcontroller hardware and *Javascript Blocks Editor* software tool. The students will create a program that will active two LED lights depending on the temperature is above or below a fixed threshold. If the temperature is above the threshold, then only the red LED should be lit. Otherwise, if the temperature is below the threshold, then only the green LED is activated. The program should start once button A is pressed on the microcontroller.

Objectives

Students will be able to:
- Define Variable
- Define Sensor
- Define temperature sensor

Alabama Standards Alignment

7 (Fifth Grade): Identify Variables.

– Examples: Determine if a variable is required for use later in the program.

8 (Fifth Grade): Demonstrate the programs require known starting values that may need to be updated appropriately during the execution of programs

– Examples: create a program that sets a variable to an initial value then later updates (changes) the value of the variable.

Links to Resources

Micro:bit Temperature Sensing: https://youtu.be/mrHn8eZ9eqg

Preparation
- Temperature indicator3_student_handout: Tutorial handout found on lesson page

Choose a presentation method:
- Instructor can walk the students through using the student tutorial handout
- Students can work at their own pace using the tutorial handout. You may also post the video and tutorial locally and allow students to choose.

Materials Required

Each student (or pair of students) requires:
- Tutorial handout
- micro:bit kit
- USB cable
- MakeCode editor
- Internet connected computer with modern browser
  Note: Browsers known to work with micro:bit software includes Firefox, Chrome, Safari, and Microsoft Edge

- Source of heat or cooling (ex. Fan), useful if you would like to test by changing temperature quickly (optional)

Vocabulary and Concepts

Variable: An element, feature, or factor that is liable to change; in a programming language, a symbolic representation of some state or property of the program.

Sensor: An input device that reads or measures a physical property and converts it to a numerical value.

Temperature Sensor: a sensor that measures the temperature in degrees Celsius (scientific units)

Teaching Guide

Getting started (10 mins)

Tell the class that they will create a micro:bit program with a Temperature Sensor today. Before they start programming, everyone needs to learn the new vocabulary terms.

Activity (40 mins)

The class is now ready to create their micro:bit with the sensor . Use your chosen method to demonstrate how to complete the activity. Students should be able to start their program and either the red LED or green LED should be lit. Make sure the LED corresponds with the correct temperature meaning red should be activated when the temperature is below the threshold and green LED is activated when the threshold is above the threshold. Encourage students to share their display with the class. Make sure the program works when button A is pressed. It is important to build a sense of accomplishment early in CS Making so that students will be engaged quickly and are more likely to persevere when projects become more challenging.

Wrap Up (5 mins)

Review the 3-vocabulary words.

Variable: An element, feature, or factor that is liable to change; in a programming language, a symbolic representation of some state or property of the program.

Sensor: An input device that reads or measures a physical property and converts it to a numerical value.

Temperature Sensor: a sensor that measures the temperature in degrees Celsius (scientific units)