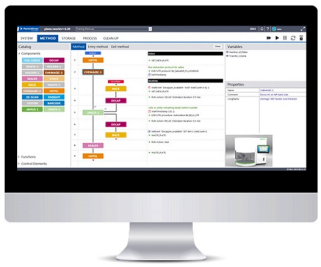

Verizon Innovative Learning Lab Program Smart Solutions Instructions

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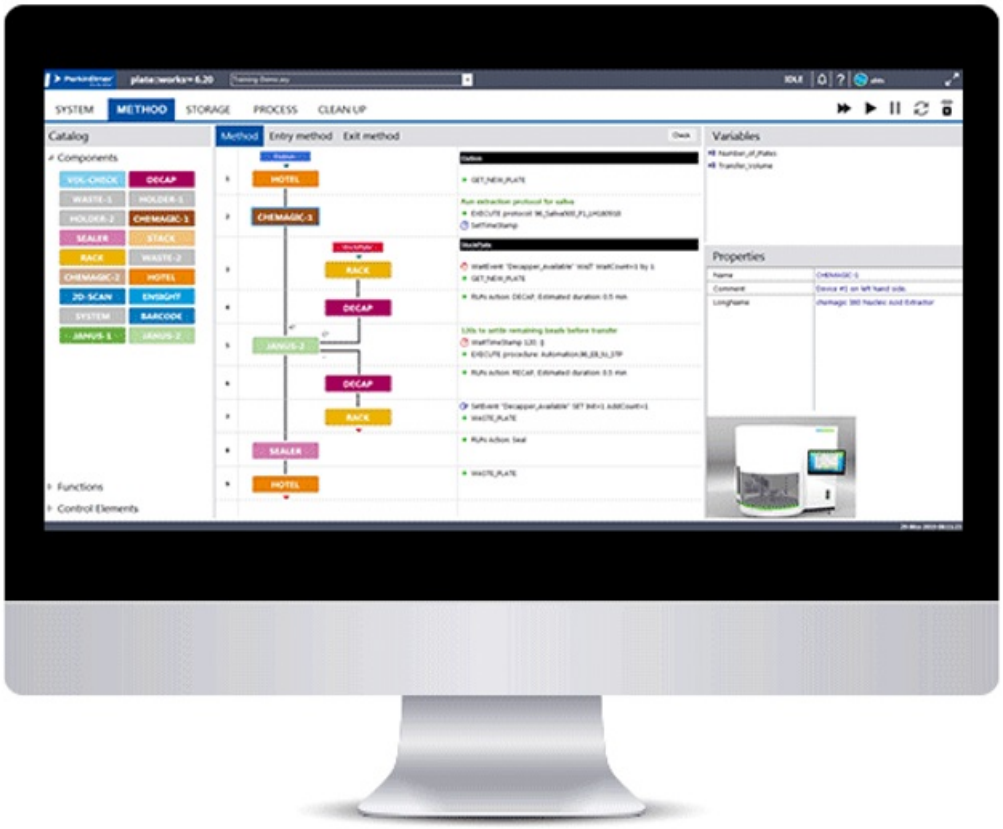
Verizon Innovative Learning Lab Program
Smart Solutions
Lesson Facilitator Guide: Advanced Inputs and Outputs



Contents

Overview

This lesson should take 2 class periods, or about 100 minutes to complete.
In this lesson, students learn how to wire and program advanced inputs and outputs like buzzers, color-changing lights, and touch sensors to wire and code an educational toy for Killbot's younger cousin, Lil Vil.

Lesson objectives

Students will be able to:

- Wire and program advanced inputs and outputs like buzzers, multi-colored LEDs, and touch sensors.
- Wire and code an educational toy for VilBot's younger cousin, Lil Vil.

Materials

To complete this Lesson, students will need:

- Access to: Makonde
- 1 BBC Micro: bit
- 1 Micro USB Cable
- 1 Passive Buzzer Module
- 1 Touch Button Module
- 1 Neo Pixel LED Ring
- Several Female-to-Female Wires
- LED Module
- Button Module
- Servo Motor
- This lesson's activity worksheet

Standards

- Common Core State Standards (CCSS) – ELA Anchors: L.6, SL.1, W.10
- Common Core State Standards (CCSS) – Mathematical Practice: 2
- Next Generation Science Standards (NGSS) – Science and Engineering Practices: 2, 8
- International Society for Technology in Education (ISTE): 4, 5
- National Content Standards for Entrepreneurship Education (NCEE): 2, 5

Key vocabulary

- Passive Buzzer: allows you to make sound and music with the Micro: bit.
- Neo Pixel: a ring of LED lights that allows you to program and change the color
- Touch Button: provides input; it works just like the screen of a smartphone: it can detect the touch of your finger

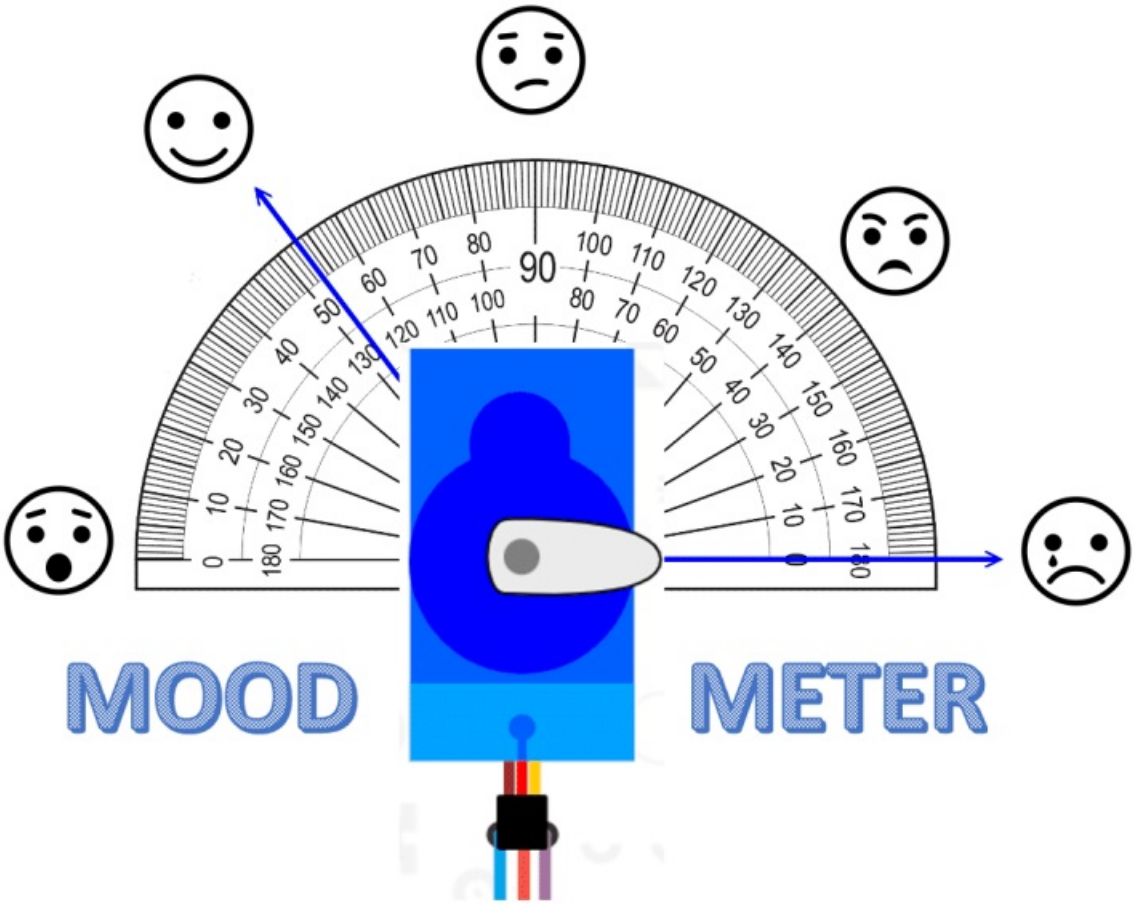
Before you begin

- Gather necessary materials (or ensure remote students can access needed materials).
- It's recommended to pass out ONLY the components students will need for this lesson. That way, the other electrical components don't become a distraction or get lost.
- Ensure students can digitally access this lesson's activity worksheet.
- **Note:** wiring with the expansion board requires great attention to detail! Students should take their time and systematically follow all steps in the tutorial video and wiring diagrams.

Lesson Procedures

Warm up (5 mins)

- Welcome students to class. Say to students: VilBot's is designing a new smart product called the "Mood Meter." What Makonde command would rotate VilBot's Mood meter to the "happy" setting?



  o Answer: servo write pin P0 to 127 degrees.
- Discuss responses with the class.

Mini-lesson: Advanced inputs and outputs (15 mins)

- **Say to students:** So far, you have learned how to program LEDs, buttons, and the servo motor with a Micro: bit expansion board. There are many more advanced components you can learn to wire and program as well! In this section, you will learn about the passive buzzer, Neo Pixel, and touch sensor:
- **Passive Buzzer:** The passive buzzer allows you to make sound and music with the **Micro: bit!** Use MakeCode to program alarms, sound effects, notifications, or even design your own

instrument!

- **Neo Pixel:** The Neo Pixel is a ring of LED lights that allows YOU to program and change the color! Program the lights to change color based on temperature or light levels. You could even create a wearable piece of jewelry that changes as you walk.
- **Touch Button:** The touch button provides input. It works just like the screen of a smartphone: it can detect the touch of your finger! Use it like the button module to control lights, sounds, and motors.

Activity: Make it move with Servo Motors (30 mins)

- Digitally distribute this lesson's activity worksheet. Additionally, pass out the Micro: bits and components to the students. Students will work in pairs to follow the steps in the worksheet to wire advanced inputs and outputs. Then, they will put their skills to the test to create an educational toy for Lil Val!
- Say to students: It's time to learn how to wire and code the passive buzzer, neo pixel, and touch button, and then design your own educational toy for LilVil! Follow the instructions of this lesson's activity worksheet!

Wrap up, deliverable, and assessment (5 mins)

- Wrap up: If time permits, allow students to share and discuss their programs with a partner!
- Deliverable: Students will submit their programs and lesson activity worksheets.
- Assessment: The deliverable will be used for this lesson's assessment. Additionally, you may use this lesson's checkpoint as an exit ticket.

Differentiation

- **Additional Support #1:** Print out and provide students with vocabulary.
- **Additional Support #2:** Guide students step by step through the creation of their programs, frequently checking student progress.
- **Additional Support #3:** allow students to work with a partner to create their programs.
- **Extension:** Team up with another student and design an educational toy that uses two or more Micro: bits communicating with radio! For example, maybe pressing the button module on the first Micro: bit causes a song to play from a buzzer attached to the second Micro: bit.

Additional resources

- Download the complete Micro: bit wiring diagram and coding booklet here: https://www.adeept.com/learn/detail-32.html

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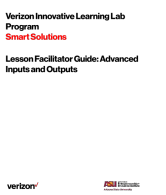
Documents / Resources

	**Verizon Innovative Learning Lab Program Smart Solutions** [pdf] Instructions Innovative Learning Lab Program Smart Solutions, Innovative, Learning Lab Program Smart Solutions, Lab Program Smart Solutions, Program Smart Solutions, Smart Solutions, Solutions

References

- **Adeept Sensor Kit for BBC Micro:bit - Adeept Learn**

Manuals+,