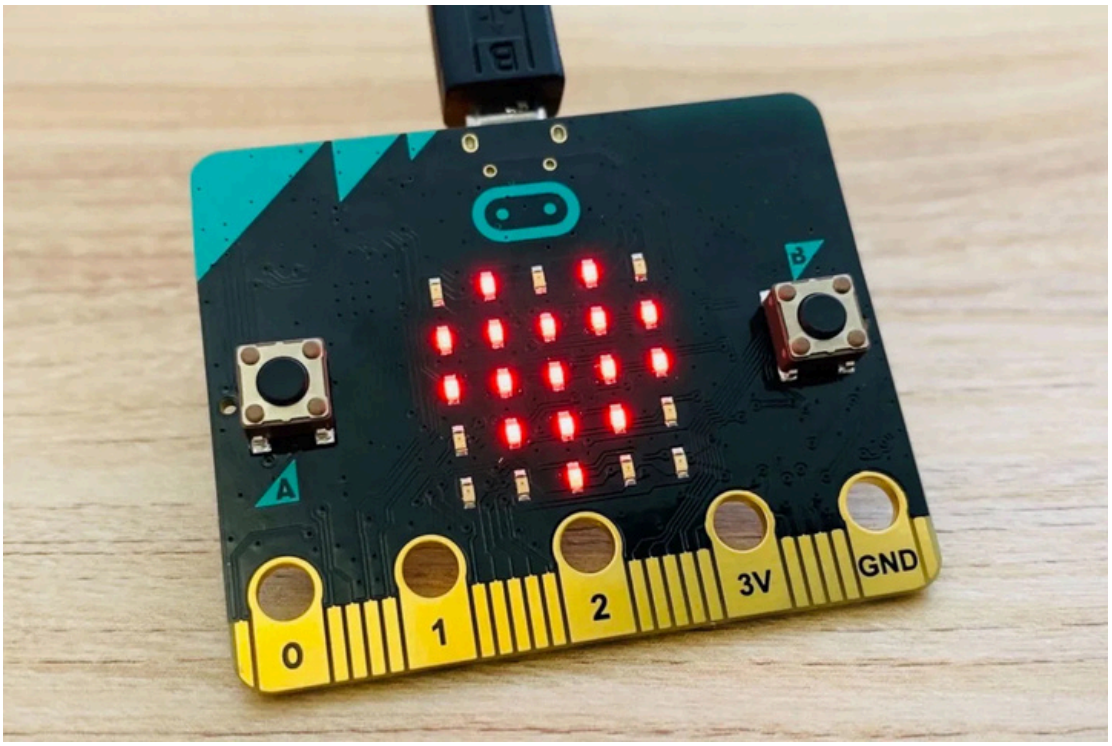
Micro:bits



Mid-Valley
STEM-CTE HUB

www.midvalleystem.org
midvalleystemctehub@linnbenton.edu
Linn-Benton Community College
Albany Campus - CC-212

Mid-Valley
STEM-CTE HUB

Micro:bits

The Micro:bit STEAM Kit introduces students to the world of coding, electronics, and real-world problem-solving using a compact, beginner-friendly microcontroller. Equipped with buttons, LEDs, sensors, and Bluetooth capability, the Micro:bit empowers students to design interactive projects, learn programming logic, and explore digital systems in an accessible and hands-on way. It's ideal for cross-curricular projects in computer science, math, science, and even art or storytelling.

Grade Level

4th - 12th

Group Size

1–2 students per Micro:bit

Time Duration

45–90 minutes (intro to intermediate); advanced/extension projects may span multiple class periods

Content of Kits

Components

- 30 Micro:bits
- 30 Battery packs

Pair this kit with

- Tablets (not included)
- Chromebooks (not included)
- Smart phones (not included)

Mid-Valley
STEM-CTE HUB

Usage

Getting Started

1. **Familiarize Yourself with the Hardware**
   Take a few minutes to explore the Micro:bit—identify its buttons, LED grid, sensor area, and edge connector. Plug it in using a USB cable to ensure it powers on and connects to your computer.

2. **Visit the MakeCode Editor**
   Go to makecode.microbit.org and try a few of the built-in tutorials. The drag-and-drop coding environment is beginner-friendly and ideal for first-time users.

3. **Do a Test Upload**
   Try a simple "scrolling message" or LED blink program and upload it to the Micro:bit to confirm everything is working correctly. This is a great way to build confidence before introducing it to students.

4. **Organize Materials and Charging**
   Sort any USB cables, battery packs, or accessories. If your kit includes batteries, ensure they are charged or replaced. Having each device ready to go makes class time more efficient.

5. **Plan for Pairs or Stations**
   Micro:bits work well in pairs or 1:1 settings. Decide how you'll group students and whether each group will share a computer or take turns coding and testing.

Storage

- Separate Power Components. Unplug battery packs before storing after an activity.
- Store each Micro:bit set in its own container before returning it to the larger storage bin.

Troubleshooting

- **Code Not Uploading.** Confirm that the Micro:bit appears as a drive on your computer. If not, try a different USB port or cable. Be sure you're downloading the .hex file from MakeCode and dragging it directly onto the Micro:bit drive.
- **Buttons or Sensors Not Responding.** Make sure your program includes the correct blocks for those inputs, and test with a simple button program to isolate the issue.
- **LED Grid Not Displaying as Expected.** Verify your code is targeting the LED grid correctly. Dim or inconsistent lights may be due to low battery power—try switching to USB power for consistency.
- **Micro:bit Not Showing in Bluetooth Pairing.** Reset the Micro:bit by pressing the reset button, and make sure Bluetooth mode is enabled on your coding device.

Mid-Valley
STEM-CTE HUB

Activity Guide

Beginner

Scrolling Name Badge
Students use the MakeCode editor to program their Micro:bit to scroll their name or a short phrase across the LED screen. This activity teaches basic sequencing, inputs/outputs, and how to upload code to the device.

Intermediate

Digital Dice
Students program the Micro:bit to act as a digital die that generates a number between 1 and 6 when shaken. This builds logic skills and demonstrates how sensors can be used to trigger code-based actions.

Advanced

Temperature Monitor & Alert System
Students write a program that monitors the temperature using the Micro:bit's sensor and displays a warning message if the temperature falls outside a safe range. This activity introduces data monitoring, thresholds, and environmental science integration.

Extension Activities:

Build a Wearable Step Counter
Students code their Micro:bit to count steps using motion sensing, then incorporate the device into a wearable (wristband, lanyard, etc.). They'll collect and chart step data over time, making connections to health, math, and data visualization.

Classroom Reaction Timer
Students will program the Micro:bit to display a "GO!" signal after a random delay, then track how fast the user presses a button in response. Students can compare their reaction times, graph results, and even modify the code to include multi-player functionality. This integrates coding with math, human biology, and data analysis.

Environmental Data Logger
Students will create a basic data logger using the Micro:bit's onboard temperature sensor (or connect external sensors, if available) to record temperature over time. Data can be exported, graphed, and analyzed to answer questions like "How does classroom temperature vary during the day?" or "Does direct sunlight change indoor temperature faster?" This encourages investigation, hypothesis testing, and STEM inquiry.

Mid-Valley
STEM-CTE HUB

Learning Extensions

STEAM Connections: Electrical Engineering - Computer Science

Learning Objectives:

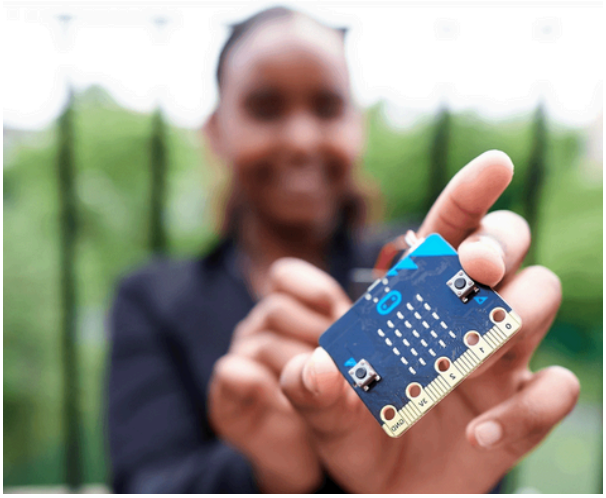
- Understand the basics of computer programming through block-based and/or text-based coding.
- Apply coding to control hardware outputs such as LED displays, buttons, and sensors.
- Collect and analyze real-world data using built-in inputs.
- Design, test, and debug interactive programs in a hands-on environment.
- Integrate coding into creative or cross-curricular projects involving math, science, and the arts.

Career Connections:

- **Software Developer –** Builds code that powers apps, websites, and physical devices.
- **Embedded Systems Engineer –** Programs microcontrollers for smart devices and electronics.
- **Robotics Technician –** Uses programmable controllers and sensors in automation and robotics.
- **Game Designer –** Applies logic and interaction design in user-friendly interfaces.
- **STEM Educator or Tech Coach –** Uses tools like Micro:bit to teach foundational computer science and technology skills.

Essential Employability Skills:

- Problem-Solving
- Critical Thinking
- Creativity
- Attention to Detail
- Collaboration



Mid-Valley
STEM-CTE HUB

Resources and Accessibility

Safety Guidelines

- **Handle Electronics with Care** – Avoid dropping or forcing connections into the Micro:bit to prevent damage to the board or USB port.
- **Use Proper Power Sources** – Only use recommended USB cables or battery packs to power the Micro:bit; never attempt to wire other sources.
- **Keep Liquids Away** – Do not use the Micro:bit near water or beverages to avoid electrical shorts or corrosion.
- **Supervise Battery Use** – Ensure correct battery polarity and avoid mixing old/new batteries to prevent leakage or overheating.
- **Disconnect When Not in Use** – Unplug USB or battery packs after use to preserve battery life and reduce wear on components.

Accessibility

- **Use Block-Based Coding for Accessibility** – The MakeCode editor is visual and drag-and-drop, making it ideal for students with reading or writing challenges.
- **Provide Alternative Roles** – Allow students with physical or processing challenges to participate through planning, directing, or documenting group work.
- **Incorporate Assistive Technology** – Allow students to use screen readers or voice-to-text tools to support interaction with the coding environment.

Library Catalog

Library Resources

Feedback

QR to feedback survey