Workshop 3: Programming Edge/IoT Systems with AI

Shared Group Workspace · April 25, 2026 · 8:30 AM–12:00 PM PST

🔧 **This is our shared lab notebook for today.** No hardware needed — everything runs in the **MakeCode simulator** (*makecode.microbit.org*). Drop a radio block in and a **second simulator appears** — that's the IoT we're building. Your **BBC micro:bit V2 kit ships AFTER the session** once you complete both surveys and post a draft two-node lesson in this doc. The .hex files you save today will flash straight to the real device.

Quick links: MakeCode · MicroPython · Pre-Survey · Post-Survey · IoT Lesson Template · Agenda

🔍 Contextualize: IoT as a Two-Device Conversation (9:10-9:25)

Every IoT system — smart farms, weather stations, wearables, traffic sensors — is a conversation between two roles: Sensor Nodes (Role A) that read the world and broadcast, and Aggregator Nodes (Role B) that listen, aggregate, and decide/display.

> Name a real-world two-node scenario from a topic you teach. (Soil-moisture sensors in a garden → irrigation controller. Pedometers on students → class activity dashboard. Pressure plates on a bridge model → load display.)
> Then ⭐ your favorite from someone else (copy / paste the star)

#	Group Number	Sensor Node senses…	Aggregator Node does…	Topic / Standard it Connects To	⭐ Peer-Starred?
1.	Group 2 (K-2)	Shakes the bit	Generates 2 numbers	Students practice addition	
2.	Group 1	CBR motion sensor	Distance/Time Mapping	Physics, linear and/or quadratic functions What we need: The devices, school funding	⭐⭐
3.	Group 3	(Physics:)Light sensor (Geometry:) **Thermal Infrared Sensors** mounted on trees throughout a high-risk zone.	(Physics:)displays number of light intensity (Geometry:) A **Central Relay Tower** positioned on a high ridge that collects data from all surrounding trees to map the exact coordinates of a "hot spot.	(Physics:)Measure brightness vs. distance from a light source • Shadow and angle experiments • Simulate light attenuation • Wave behavior and electromagnetic spectrum basics (Geometry:) G.12A	

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4.	Group 4	Microbial concentration in water over time	Graphs the changes in concentration	Aquatic science/biology (ecosystems)	⭐
5.	Group 5	Motion sensor light, LLM (language)	Turns on light, language	Computer Science/ PHYSICS (light)	
6.	Group 6	Solar energy	Moves toy car forward	Renewable energy & Physics	⭐
	Bonus	Lego color scanner	Determines next move of robot	Planet data (Roads Challenge Venus)	
	Bonus	Detect acceleration	Simulate earthquakes	Earth Science	
	Bonus				

🔄 Reframe: Teaching Hardware Without Hardware (9:45)

Exploring an IoT Lesson Plan Generator: https://www.cxedhub.com/resources/iot-lesson-template.html

🌐 Transfer: IoT Lesson Idea Board (11:45) — 🚚 Kit-Ship Gate

Draft your lesson here. What does the micro:bit do? How do the students interact with the micro:bit NGSS/CTE standard? Student-facing Check the Machine prompt?
Both surveys done + this row filled = your BBC micro:bit V2 kit ships this week.

#	Your Name	Lesson Title	Subject / Grade	NGSS / CTE Standard	Sensor Node Senses…	Aggregator Node Does…	Role Assignment (which students hold which role)	Student-Facing CtM Prompt
1.	Kylee Robinson	“Covert Signal Investigation”	11-12 forensics	FS(6)(A–C) Evidence collection and interpretation	A sends cipher to B	B receives cipher from A	Students act as detectives to decode the ciphers	Investigators discovered that two suspects may have communicated during a crime using coded wireless signals. Your forensic team must capture, decode, and interpret the communication between two micro:bits acting as suspect devices.
2.	Amanda del Rio Suarez	Electromagnetic Waves with micro:bit Sensor Networks	10-12 Physics	TEKS.9.D	LED matrix as a light sensor (Visible light spectrum EM Waves)	A number from **0 to 255** • `0` = very dark	Sensor engineer, network engineer CTM, Data scientist and	How much light is reaching this location relative to other locations? Prompt the AI for code or explanations

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						• 255 = very bright	experimental scientist	Predict what the AI output should do Compare AI claims vs real data Lead group discussion on discrepancies
3.	Collin Clark	Multiplying Polynomials of real world data	9th	HSA-CED.A.1 HSA-APR.A.1	Temperature Light	Displays data	Students will compare results of factored vs standard for equations for given data points	“What happens when you multiply two linear expressions representing real-world data?”
4.	Megan Edlund	Solving Systems of Equations	9-12 Math	HSA-CED.A.3, HSA-REI.C.7	Reads ‘temperature’ and ‘light level’ blocks, transmits via ‘radio send value’ block on group channel 1, displays current temperature on LED matrix	Receives radio packets via ‘on radio received value’ block, displays received value on LED, optionally logs to serial console for teacher to project	Students will collect temperature and light-intensity data using micro:bit v2 sensors, then construct and solve systems of equations that model relationships they observe	If I had three micro:bits reporting temperature from three rooms, and I wanted to model when all three temperatures are equal, how many equations would I need? What form would they take?

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							in the real data	
5.	Isabella Gutierrez	Determining the rate of reaction using light intensity	9-12 Chemistry	–	Light and temperature	Relays light and temperature every 2 seconds	Students will collect temperature and light-intensity data using micro:bit v2 sensors and plot the reaction, finding the rate using the slope. Each group will work with different concentrations and share their data	“How can light intensity be used to measure reaction rate in a precipitate reaction?”
6.	Desteny Becerra	photosynthesis and cellular respiration	7th	MS-LS2-2	Light and Buttons	Shows data	students will measure results and see how if one system goes, so does the other one. They will	”How can light be used to measure how two systems are interconnected?”

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							see light show one system decreasing and the other decreasing too	
7.	Tori Roper	Graphing Motion: From Raw Acceleration to Kinetic Insights	9-12: Math, Physics	HS-PS2-1	Radio link from Sensor Nodes: Accelerometer & Compass	Receives and prints to Serial. Outputs to MakeCode Data Logger to export to a CVS /spreadsheet	Students create “Motion Tracker.” Maneuver toy cars or student arms with micro:bit attached.	"Describe the acceleration graph of a car that starts at a stoplight, speeds up to 30mph, stays at 30mph for 10 seconds, and then hits the brakes hard." Check if the AI response matches the graph.
8.	Michael Logue	Micro-Climates: Uncovering the science of Unequal Heating	7th grade	MS-ESS2-6	Temperature sensors	MakeCode Data logger to export to spreadsheet	Program and attached device to take measurments	Students ask an LLM: "I am heating a globe with a lamp 30cm away. The sensor at the equator is at 0 degrees and the pole is at 90 degrees. Write a

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								MakeCode program to show which one gets hotter.”
9.	Kyla Baker	Thirsty Plant	9th-bio	HS-LS1-3	Insert the two metal probes into the soil. The micro:bit sends a small amount of electricity out of **Pin 3V** and tries to "read" it at **Pin 0**.	Command center	Students work in specialized teams; Biologists, Hardware Engineers, Software Developers, and Data Analysts—to build and manage an IoT system that monitors plant health.	
10.	Karely Rodriguez Haro		6-8					
11.								
12.	Dr. Miller	Insect Life Cycles and Helpful Habitats with micro:bit Sensors	K-2	K-LS1-1 2-LS4-1 K-2-ETS1-1 CSTA:	Temperature, Light	micro:bit v1 can sense temperature and light levels in the simulator,	Students use the simulator to create different light	Students draw and label the insect habitat and explain their reasoning

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						helping students observe conditions that insects might experience.	conditions and record simulated temperature and light readings. Each group predicts which insect habitat would best support a specific insect or life cycle stage (egg, larva, pupa, adult)..	using collected data.
13.	Lindanni Arriaga	Distance and Acceleration	9-12	HS-PS2-1, HS-PS2-2	Accelerometer, Compass, Buttons A/B, LED Matrix	The Micro:bit will use its sensors, accelerometers to capture data.	Students investigate the relationship between acceleration and displacement by using micro:bit v2 sensors as digital accelerometers to	Students work in pairs to perform a "Sled Pull." One student moves the micro:bit along a meter stick at a perceived "constant acceleration," while the other records the peak acceleration displayed. They will then use

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							capture real-time kinematic data.	kinematic equations to predict the distance traveled and compare it to the physical mark on the meter stick.
14.	Paula Richards	Temperatures and Earth systems	6-8				Creating a model that shows the Earth Systems working together	
15.	Joseph Morrison	Earth, Sun, and Moon Interactions: Modeling Seasons with micro:bit Tilt Data	Earth & Space, Science Computer Science, 6-8	MS-ESS1-1	Accelerometer	The sensor micro:bit = Earth model measuring tilt, and the aggregator micro:bit = central station collecting everyone's tilt data.	Students work in pairs, with one student managing the micro:bit Earth model and sensor positioning while the other builds/checks the MakeCode program and records the data, then	Ask an AI to write a MakeCode program that uses micro:bit tilt data to decide "summer" or "winter," then test whether its answer matches your real sensor data.

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							they switch roles so both participate in measurement and coding.	
16.	Melissa Lara	Solving one variable inequalities with IoT Light Sensors	Math, 7th grade	7.EE.B.4b, 7.EE.B.4b	Light sensor	Helps to show if test point is a part of the solution to the inequality		
17.	Noel Sandoval	The “Noise” in the Signal: IoT Calibration and Function Transformations	10th and 11th Algebra II	TEKS 2A.4B, 2A.4C, and 2A.8C	A capacitive soil moisture sensor buried in the root zone of a corn crop. It broadcasts a “Volumetric Water Content (VWC) percentage.	An Irrigation Controller (Gateway) in the pump house. It listens to the VWC data and uses a mathematical model to predict when the soil will reach the “Wilting Point” at which time it triggers the pumps.	Role A: The Sensor Node and Role B: The aggregator node	See if the AI understands the "messy reality" of your classroom sensor as well as you do. **Task:** Ask the AI: I have a micro:bit temperature sensor that is consistently reading 5 degrees too high. Give me the algebraic transformation to fix this for my Aggregator Node.

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18.								
19.								
20.								

💬 Group Debrief Wall

One row per person before you close the tab.

#	Your Name	💡 My "Aha Moment"	🏫 How This Changes My Classroom	🤝 What Support I'd Need to Implement This
1.	Michael Logue	The usefulness of this and the website for my next years lessons	Increase in the integration of technology with my students	Im sure i will find this out as i move forward.
2.	Amanda del Rio Suarez			
3.	Lindanni Arriaga	Learning how to use the Lesson plan creator and how to understand the code it was trying to give me for the Micro:bit..	I think it allows students to do more than just sit down, take notes and take tests. It allows students to be innovative and have some fun in the classroom.	Have enough for a classroom to utillise.

#	Your Name	💡 My “Aha Moment”	🏫 How This Changes My Classroom	🤝 What Support I’d Need to Implement This
4.	Collin Clark	Learning about how to code my microbits	Allows me to create more interactive lessons that encourage students towards computer science	A class set of physical microbits
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Resources:

Where to buy microbits?

- *https://www.adafruit.com/search?q=microbit*
- *https://www.newark.com/bbc-microbit*
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