LESSON 96

Overview of ALT 4: Introduction to Embedded Systems

80 minutes (2 periods) | Applied Learning Tasks (ALTs) | Outcome 3.11 | Outcome 3.12 | Outcome 3.13 | Outcome 3.14 | Outcome 1.19 | Outcome 1.20 | Outcome 1.23

WHAT THIS LESSON DOES

In this lesson, you'll explore the basics of embedded systems for ALT 4. Learn about the task requirements, review key skills from past modules, brainstorm creative project ideas, form teams, and plan your approach to building automated applications.

CURRICULUM OUTCOMES

Outcome	What the specification asks for
3.11	use and control digital inputs and outputs within an embedded system
3.12	measure and store data returned from an analogue input
3.13	develop a program that utilises digital and analogue inputs
3.14	design automated applications using embedded systems
1.19	identify features of both staged and iterative design and development processes
1.20	collaborate and assign roles and responsibilities within a team to tackle a computing task
1.23	reflect and communicate on the design and development process

WHAT STUDENTS SHOULD BE ABLE TO DO

- Understand the fundamental concepts and societal impacts of embedded systems.
- Apply prior knowledge of digital and analogue inputs to design automated applications.
- Develop skills in team collaboration and role assignment for project success.
- Create innovative ideas for embedded system projects addressing real-world problems.
- Formulate a structured plan to guide the development of an embedded system artefact.

BEFORE THE LESSON

- This is a planning and discussion lesson, so no environment needs testing. Have the ALT 4 task outcomes visible so students can see what the finished artefact must demonstrate.
- Decide in advance how you want teams formed and whether you will assign or let students self-select, so team-forming does not eat the brainstorming time.
- Have the micro:bit kit visible or to hand as a reference point, so students can connect prior sensor work to what they are about to plan.
- Confirm your own ALT sequencing: if you run three ALTs to leave room for the Coursework Project and mocks, adjust the time you give this.

Overview of ALT 4: Introduction to Embedded Systems

HOW THE LESSON RUNS

Introduction
Reviewing Key Concepts
Understanding the Task Requirements
Forming Your Team
Brainstorming Artefact Ideas
Your Plan
Reflection Time

TEACHING MOVES

- 1. Introduction. Anchor the abstract term with a concrete Irish example students know: a boiler thermostat, a car parking sensor, a washing machine cycle. Establish early that an embedded system is a dedicated computer inside something else.
- 2. Reviewing Key Concepts. Draw the through-line explicitly: the micro:bit projects they built were embedded systems. Ask them to name which used analogue input (accelerometer, light) and which used digital, so the vocabulary is live before planning.
- 3. Understanding the Task Requirements. Read the required outcomes aloud together and have each team restate them in their own words. Make sure every team knows the artefact must use and control both digital and analogue inputs and outputs.
- 4. Forming Your Team. Push teams to assign distinct roles now, not later: sensor integration, code, planning and documentation. Point out that the ALT is formative and team-based, so contribution matters more than a polished result.
- 5. Brainstorming Artefact Ideas. Timebox this and insist each idea names at least one analogue input and one digital output before it counts. Steer teams away from ideas too complex to build with the sensors available.
- 6. Your Plan. Have each team state the problem in one sentence before listing features. A vague goal produces a vague artefact. Ask them to divide tasks against the roles they assigned in the previous step.
- 7. Reflection Time. Keep this spoken. Prompt teams to name one societal impact of embedded systems and one challenge they anticipate, so reflection connects to Strand 3 rather than being a wind-down.

WHAT TO WATCH FOR

- Students conflate ALT 4 with the Coursework Project and worry their planning is being externally graded. State clearly that the four Applied Learning Tasks are formative in-class work and are not the externally assessed project. This lowers the stakes so teams take real design risks.
- Students treat every sensor reading as digital, or cannot say which of their ideas involve analogue values. Reuse the micro:bit review: a button press is digital, a light or temperature reading is a range of values and so analogue. Ask each team to classify their planned inputs before moving on.
- Students plan an artefact far too ambitious to build with the hardware they have. Ask each team what physical sensors and outputs their idea needs, then compare against the kit available. Scale the idea down to something buildable now.

DIFFERENTIATION

- Emerging: Give them a ready framing question: what everyday annoyance could a sensor detect and respond to? Let them pick from the worked examples rather than inventing from scratch. Pair them with a team member who did the micro:bit sensor projects confidently so the review carries over.
- Developing: Ask them to draw a simple input to output flow for their idea before writing the plan, so they reason about the system rather than just listing features. Have them explain their team's role division back to you to check everyone has a genuine task.
- Proficient: Ask them to name which specification outcomes their planned artefact will evidence and how they would show it, useful preparation for documenting the ALT. Push them to include data storage and a decision rule in the plan, moving toward a Higher Level treatment of the sensing loop.