

SCIENCE 8 BY SARAWAK ENERGY

Auto Dashboard Challenge

Secondary School Category • Theme: Driving Innovations

Rules, Guidelines & Scoring System

1. Competition Overview

SCIENCE 8 is the 8th annual Sarawak Community Innovation & Engineering Convention, organised by The Learning Curve and sponsored by Sarawak Energy. The Secondary School Category challenges teams to design, build, and demonstrate a functional EV Dashboard that simulates real automotive instrumentation — integrating sensors, actuators, and microcontroller programming.

This challenge is Phase 1 of a two-phase EV project. Teams that excel here will carry their skills forward to build a complete EV racer later in 2027

Key details

Format: Live demonstration only — no slides or verbal presentation required

Team size: 3 participants per team

Duration: 10 minutes per team (judging session)

Main event: 20-21 June 2026 @ Makeramai Makerspace, Plaza Merdeka

2. Hardware Specifications

2.1 Primary Microcontroller (mandatory)

All scored functions must be programmed and controlled by the **Cytron EDU:PICO (RP2040)**. Coded in MicroPython via Thonny IDE. Any scored function that is offloaded to or controlled by a secondary board will receive zero marks for that criterion.

Project must be powered by DC Batteries or USB 5V DC via an adapter. No direct AC connections are permitted.

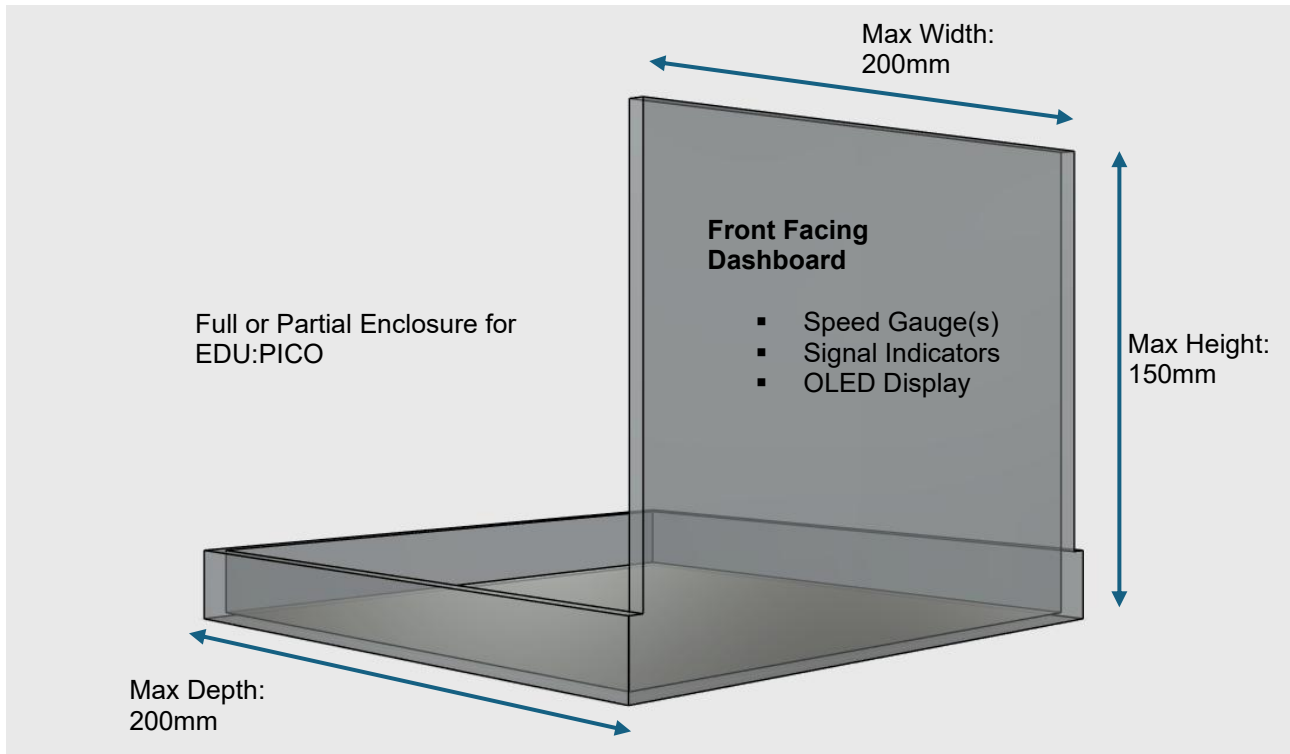
2.2 Secondary Boards (optional — aesthetics only)

The following boards are permitted for decorative or ambient effects only:

- UNIHAKER K10
- Arduino (any variant)
- BBC micro:bit

Secondary boards may drive ambient LEDs, decorative displays, or sound effects that are not part of the scored functions. They must not control any mandatory sensor or output.

2.3 Physical Constraints



Dimension	Width	Height	Depth
Maximum	≤ 200 mm	≤ 150 mm	≤ 200 mm
Max weight	≤ 2.0 kg		

Measurement is taken at maximum extents including all mounted components. 3D printed enclosures and parts are permitted and will not affect scoring.

3. Mandatory Functions

All three functions below must be operational before formal judging begins. Judges will carry out a pre-judging check. Teams that fail a function will be given up to 15 minutes to resolve the issue; persistent failures receive zero marks for that criterion.

3.1 Wheel Speed Measurement

The dashboard must measure simulated wheel rotation using any appropriate sensor (encoder, hall effect, IR slot sensor, or equivalent). During judging, a calibrated test wheel will be spun at a known and fixed RPM. The reading is considered acceptable if it falls within $\pm 20\%$ of the actual value.

Judging method: A fixed-RPM test wheel will be used. The judge will spin it and observe the reading on the OLED and servo gauge.

Acceptable tolerance: $\pm 20\%$ of actual RPM / speed.

Required outputs: RPM and/or m/s on the SSD1306 OLED display; needle/pointer deflection on the servo gauge.

3.2 Signal Indicators

Left and right turn signals must be activated by dedicated push buttons. Both directions must work independently. Pressing both buttons simultaneously must activate a reverse mode.

Required outputs: RGB LEDs flash at a minimum of 1 Hz. Left button = left LEDs only; right button = right LEDs only; both buttons = reverse

Judging method: Judge will press each button and verify correct behaviour.

3.3 Reverse Proximity Sensor

A distance sensor (e.g. HC-SR04 or equivalent) must detect obstacles at the simulated rear of the simulated vehicle.

Required outputs: Live distance reading on the OLED display; buzzer beep rate increases as the obstacle approaches; continuous alert tone or maximum beep rate when distance is below 5mm

Judging method: Judge will place a hand or object at varying distances and verify OLED reading and audio response.

4. Scoring System

Scoring is based on live demonstration only. The maximum base score is 80 points. Bonus points of up to 20 may be awarded for additional features, bringing the absolute maximum to 100 points.

4.1 Core Functions (50 points)

Function	Scoring Criteria	Points
Wheel speed — accuracy	Reading within $\pm 20\%$ of actual RPM/speed during test	10
Wheel speed — display	RPM and/or m/s shown on OLED; servo gauge responds proportionally	10
Signal indicators	Correct directional flashing; reverse mode when both buttons pressed	10
Reverse sensor — display	Accurate distance shown on OLED in real time	10
Reverse sensor — audio	Buzzer rate increases with proximity; max alert at < 0.5 cm	10
SUBTOTAL		50

4.2 Build Quality & Code (30 points)

Criterion	Description	Points
Circuit & wiring	Clean, secure connections; no bare wires or visible short-circuit risks	10
Code quality	Functions named clearly; meaningful comments present; no large redundant blocks. Judge may request a 60-second code walkthrough.	10
Dashboard design	Intuitive layout; OLED information legible and well-organised; aesthetic finish within size constraints	5
Reliability	All three mandatory functions operate without reboot or reset throughout the full demo	5
SUBTOTAL		30

4.3 Bonus Features (up to +20 points)

Bonus points are awarded at the judging panel's discretion. A maximum of 20 bonus points may be awarded in total. Partial points apply.

Bonus Feature	Example Implementation	Up to
Temperature / humidity sensor	Climate or engine data displayed on OLED with correct unit, or warning notifications	+2
Ambient light sensor	Ambient brightness that changes LED brightness	+3
Automatic wiper simulation	Servo sweeps activate automatically based on rain or light sensor input	+5
Automatic emergency braking	Front distance sensor triggers dashboard alert and light or gauge response	+5
Additional innovative feature	Any extra feature relevant to the Automotive and A.I. theme — judged on creativity and integration quality	+5
MAXIMUM BONUS		+20

4.4 Scoring Summary

Component	Maximum Points
Core functions (wheel speed, signal indicators, reverse sensor)	50
Build quality & code	30
<i>Bonus features</i>	+20
TOTAL POSSIBLE SCORE	100

Tiebreaker rule: In the event of equal total scores, the team with the higher Core Functions score is ranked higher. If still tied, Build Quality & Code score is the tiebreaker.

5. Judging Process

5.1 Pre-judging Check (Gate)

Before formal scoring, judges will verify:

- Dashboard is within size and weight limits
- All three mandatory functions (wheel speed, signals, reverse sensor) are operational

Teams that fail any check are given up to 15 minutes to resolve the issue. Any function that remains non-operational after this window receives zero marks for all criteria under that function.

5.2 Demonstration Session

Each team is allocated 10 minutes for live demonstration. The judge leads the session by triggering inputs, observing outputs, and requesting a brief code walkthrough if assessing code quality. No verbal presentation or slides are required — the dashboard must communicate its functions through its operation.

5.3 Judging Panel

A panel of 2–3 judges with expertise in embedded systems, automotive technology, or engineering will evaluate each team independently. Final scores are the average of all judges' marks. Panel decisions are final and not subject to appeal.

6. Eligibility & General Rules

- Each team consists of exactly 3 secondary school students.
- All programming must be completed prior to competition day. No coding is permitted during the judging session.
- Teams may bring pre-built dashboards. Modifications on competition day are limited to wiring fixes only, within the 15-minute pre-judging grace window.
- 3D printed parts are permitted and will not affect scoring positively or negatively.
- Secondary boards (K10, Arduino, micro:bit) are permitted for aesthetic/decorative functions only. See Section 2.
- Organisers will provide a standard test wheel with known RPM for the speed measurement check. Teams are not required to bring their own test rig.

7. Disqualification Criteria

A team will be disqualified if any of the following are found:

- Dashboard exceeds any physical dimension or weight limit
- Scored functions are controlled by a secondary board (K10, Arduino, micro:bit)
- Clear evidence of parental or external adult hands-on involvement on competition day
- Dashboard presents a safety hazard: exposed high-voltage wiring, fire risk, or structural instability
- Dashboard is a commercially purchased product with minimal or no student modification
- Team fails the pre-judging check and does not remedy within the grace period

8. Awards & Prizes

	Award	Prize
1st	First Place	RM 1,500 + Certificate
2nd	Second Place	RM 1,000 + Certificate
3rd	Third Place	RM 750 + Certificate
★	Special Award	Certificate + Special Recognition

Note: Prize money is awarded per team in cash

This document is for participant and teacher distribution. Subject to revision — refer to the official event page for the latest version.