MindSET-do

Year 7 – Ultrasonic Sensors 70min Lesson 4

Learning Intentions	Lesson Outcomes
• Revise for driving and indicating light programming – using forward, pause, different motor speeds, LED lights and timing • Students explore the features of an ultrasonic sensor • Students explore and modify algorithms to change speeds of motors • Students experiment with patterns, algorithms, loops, and create solutions to challenges with debugging and tinkering	• Understand the design brief for today • STEM knowledge used in the lesson • Computational thinking skills • Revise driving and indicating light programming • Understand what an ultrasonic sensor is and how it works • Work collaboratively to complete tasks • Set up and complete challenges 1, 2, 3

Australian Curriculum Content Descriptors	Australian Curriculum General Capabilities
• **Digital technologies** - Design algorithms represented diagrammatically and in English, and trace algorithms to predict output for a given input and to identify errors (ACTDIP029) • **Digital technologies -** Implement and modify programs with user interfaces involving branching, iteration and functions in a general-purpose programming language (ACTDIP030) • **Design technologies -** Analyse how motion, force and energy are used to manipulate and control electromechanical systems when designing simple, engineered solutions (ACTDEK031)	• **Critical and creative thinking** – inquiring identifying, exploring, and organising information and ideas • **Critical and creative thinking** – generating ideas, possibilities, and actions • **Critical and creative thinking** – reflecting on thinking and processes • **Critical and creative thinking** – analysing, synthesising, and evaluating reasoning and procedures

Assessment

Formative assessment

Observations and feedback on understanding of retrieving, saving, modifying algorithms, and programming an ultrasonic sensor.

Phase/Slide	Learning Activity	Resources
Slide 1 - 3	• Greetings / Introduction • Acknowledgement of Traditional Custodians • Lesson outcomes	PowerPoint

Phase/Slide	Learning Activity	Resources
Slide 4 -6 Engage	• Introduce the Design Brief • Discuss STEM knowledge that will be used • Discuss Computational thinking • Discuss the concepts and approaches they will use in the lesson today	PowerPoint
Slide 7 - 8 Revision / Engage	• Revise – how did you use programming to control a car? – ask for feedback / discuss	PowerPoint
Slide 9 - 11 Explain	• Using the sensors on the micro:maqueen • Infrared sensors x 2 on bottom • LEDs to sense the levels of light • Ultrasonic sensor at the top • Discuss location, performance, which one will we use for the Design Brief	PowerPoint Example micro:bit & micro: maqueen
Slide 12 - 15 Explain / Discuss	• What is an Ultrasonic sensor, what does it do, and how does it work • Why do self-driving cars have so many different types of sensors? • Discuss, explain, feedback	PowerPoint
Slide 16 - 20 Explain Explore	• Explain safety and respect of equipment • Explain how to set up the equipment • Explain how to connect, pair and download • Explain how to download the extension: maqueen	PowerPoint, micro:maqueen kits, laptops for students
Slide 21 - 22 Explore Evaluate	• Explain Object avoidance - Task 1 • Ask students to hypothesise about what code they will need, what commands to choose, explain their reasoning • Introduce the code – *forever, show number, read ultrasonic sensor, measurement* • Test – tinkering and debugging	PowerPoint, micro:maqueen kits, laptops for students

Phase/Slide	Learning Activity	Resources
Slide 23 - 28 Explore Evaluate	• Explain Object avoidance - Task 2 • Ask students to hypothesise about what code they will need, what commands to choose, explain their reasoning • Introduce – logic and branching - if … then; and if … then … else • Explain using pseudocode (code in generic English terms) what the code should do • Introduce program elements – *true/false, and/or/not; comparison; ultrasonic sensor* • Test – tinkering and debugging	PowerPoint, micro:maqueen kits, laptops for students
Slide 29 - 33 Explore Evaluate	• Explain Object avoidance - Task 3 • Ask students to hypothesise about what code they will need, what commands to choose, explain their reasoning • Reusing program elements – *forever, if … else, left/right motor speeds, distance, pausing, forward speeds, ultrasonic sensor* • Test – tinkering and debugging	PowerPoint, micro:maqueen kits, laptops for students
Slide 34 - 38 Revise Pack up	• Discuss learning outcomes of programming a car using an ultrasonic – limitations, if … else statements, and loops • Saving work, Questions • Packing up equipment • Acknowledgements	PowerPoint