

Learning Intentions		Lesson Outcomes
<ul style="list-style-type: none"> Students recognise the need for a complete circuit to allow the flow of electricity Students explore the features of a motor drive board and electric motor Students explore the features of an Arduino and follow and modify algorithms to change speeds of motors Students experiment with loops and create solutions to challenges 		<ul style="list-style-type: none"> Revise electrical circuits Describe in general terms how an electric motor works Assemble a small car with motors and a motor control board Create algorithms to control motors at varying speeds Work collaboratively to complete tasks
Australian Curriculum Content Descriptors		Australian Curriculum General Capabilities
<ul style="list-style-type: none"> 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) 		<ul style="list-style-type: none"> 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		
Students record algorithms as well as critical learning points.		
Phase/Slide	Learning Activity	Resources
Slide 1 - 3	<ul style="list-style-type: none"> Greetings Introduction Acknowledgement of Traditional Custodians Lesson outcomes 	PowerPoint

Phase/Slide	Learning Activity	Resources
Slide 4 -5 Engage	<ul style="list-style-type: none"> • What makes a motor go? • Explain electrical energy 	PowerPoint and video
Slide 6-7 Explain	<ul style="list-style-type: none"> • Show the new equipment to be used today • Explain the purpose of the motor drive board, and how it works with the motors and battery pack 	PowerPoint
Slide 8 Explain	<ul style="list-style-type: none"> • Create the following setup • Students use Arduino board, motor drive board, battery pack and two dc-motors with wires to create the setup shown in the image 	PowerPoint Car kits for students Arduino kits for students
Slide 9-10 Explore	<ul style="list-style-type: none"> • Explain what connector pins on motor control board do 	PowerPoint
Slide 11-12 Explore Evaluate	<ul style="list-style-type: none"> • Explain using pseudo-code (code in generic English terms) what the code should do • Write code to make a motor spin • Students hypothesise what will happen and then try themselves 	PowerPoint Car kits for students Arduino kits for students Computer with Arduino IDE
Slide 13-14 Explore Elaborate	<ul style="list-style-type: none"> • Challenges for students such as... • What happens when we change the HIGH and LOW outputs around? • What happens if all outputs are on (HIGH)? • Add code to make a second motor spin 	PowerPoint Car kits for students Arduino kits for students Computer with Arduino IDE
Slide 15-18 Engage Explore	<ul style="list-style-type: none"> • Changing the speed of the motor • Ensure students' motors are off • Explain PMW (pulse width modulation pin) • Explain how pin 9 & 10 have symbol ~ next to them signifying PMW • Explain how PMW allows the speed of the motor to be changed • Revisit slide on analogue vs digital 	PowerPoint Car kits for students Arduino kits for students Computer with Arduino IDE

Phase/Slide	Learning Activity	Resources
	<ul style="list-style-type: none"> Give example of changing the speed of the motor 	
Slide 19 Elaborate	<ul style="list-style-type: none"> Discussion How code can be manipulated to control where our car would go 	PowerPoint Car kits for students Arduino kits for students Computer with Arduino IDE
Slide 20 Evaluate	<ul style="list-style-type: none"> Students get in groups and write down 5 most important facts about today Students copy down the code used today for later use 	PowerPoint Notebook/online journal
Slide 21-22	<ul style="list-style-type: none"> Pack up resources Acknowledgements 	PowerPoint