Year 10 'On the Move'
Unit Outline

Teaching Sequence	Resources	Learning Intentions
Introduction to the course ▪ Talk about the two term unit and a basic breakdown of the topics of the 20 week module. ▪ Show practical examples of previous class solutions and booklets. ▪ Stationary requirements. ▪ Emphasis Expectations of presenting work in the students booklet.	• Year 9 term 4 A3 Technology cycle chart • Student booklet • 2 previous class robot solutions	• Understand the aims of the course
Knowledge and Skill Development – Electronics **PART1** ▪ Introduce electronics and how it has developed during the 20th century. ▪ What major developments and inventions have led us to the present day. ▪ Introduce symbols and their importance. ▪ Introduce circuit diagrams. ▪ Introduce Systems and the fact that all electronic products and solutions can be broken down into an INPUT, PROCESS and OUTPUT. ▪ State some everyday examples of systems and ask the students.	• student booklet • symbols handout • examples of products	• Relate technology to the modern century • Realize that communication in electronics is international • Understand how a system is broken down
PART2 ▪ USING the DEMONSTRATION SYSTEM KIT. ▪ Introduce the INPUT components and their physical appearance. ▪ Introduce the PROCESS components and their physical appearance. ▪ Introduce the OUTPUT components and their physical appearance. ▪ Connect a typical Input, Process and Output Board together using crocodile clips and explain the function. ▪ Work through the examples of different boards involving the students to demonstrate to the rest of the class. **PART3**	• Demonstration Kit • Demonstration support board	• Recognize input and output components • Know the physical appearance of

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▪ Students will design and complete 3 circuits of increasing complexity working with components on copper track. ▪ <u>Circuit 1</u> – Draw a circuit diagram for a system that will illuminate an Lamp with a battery and switch. ▪ Follow the circuit diagram and plan the copper track layout for the circuit onto the grid provided. ▪ Assemble and solder the circuit on cardboard provided. ▪ <u>Circuit 2</u> – Follow the same procedure above for a system that will illuminate an LED with a battery and switch. ▪ <u>Circuit 3 –</u> Follow the same procedure above for a system which will illuminate a lamp through a transistor when it gets dark. ▪ p.s. the power source for the circuits is taken off the bench terminals at each student station.	• Crocodile clips • 9v battery • student booklet • copper track • components to suit • soldering station	everyday electronic components • Learn simple circuits and how they can be constructed very simply to work • Realize that in a circuit there is an input, process and output
<u>Disassemble and Assembly of a Working Product – Telephone</u> • disassemble the outer casing of the telephone • identify and describe the input ,process and output components of the telephone • re assemble the telephone	• set of 12 telephones	• Relate electronics to an everyday product and look inside to realize its construction
<u>Technology Cycle</u> ▪ Revise Technology Cycle from Term 4 in year 9. ▪ Recap on stages. ▪ Introduce and discuss where the Technology cycle is leading to in year 10 and where the emphasis of the stages will be on.	• Technology cycle chart from yr 9 term 4 • Y10 technology chart	• Review yr9 technology and how the y10 course builds on it
<u>Introduce Issue and Class Brief</u> • Introduce issue and class brief. • Discuss advantages and disadvantages of robots.	• Student booklet	• Have an overview of the course and

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		realise the problem they have to address
Planning • Complete the chart in the booklet to plan the keystages, time and resources of the project	• Whiteboard	• Allocate and reflect on time • Realize that resources need planning ahead
Knowledge of I.C.'s or Chips • Explain that integrated circuits are at the heart of modern electronic circuits. • Reinforce that the I.C. forms part of the PROCESS in a SYSTEM. • Talk about programmable chips. • Introduce the PICAXE CHIP as a programmable educational component.	• Examples of I.C.'s and programmable chips	• Learn that modern electronics products are centred around an I.C.
Knowledge of the Picaxe Chip • Students need to know how the chip functions not what's inside its casing. • Draw out on the whiteboard the schematic diagram for the picaxe chip. • Label on the drawing the pinout connections. • Explain the function of each pin on the chip. • Relate the pins to the INPUT/PROCESS/OUTPUT SYSTEM. • Set up some examples of systems using inputs and outputs and ask the students which possible pin connections they can use.(eg. A switch is going to drive an L.E.D., which pin combinations can I use?). Learning about PICAXE Programming • On the whiteboard give an example(s) of programming a sequence of instructions which uses some of the basic commands. • Cover the following commands so that students will be capable of attempting programming exercises using the TEST CIRCUIT Board. PIN	• P.C. station • Picaxe test circuit board • Education revolution software	• Learn that chips can be programmable • Learn the protocol for making the picaxe chip work in a circuit • Learn the commands for the picaxe chip • Realize the potential of solutions the picaxe chip is capable of.

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IF GOTO HIGH LOW WAIT PAUSE FOR SOUND • Set the class the following challenges in the computer room • 1. Turn an L.E.D. on. • 2. Turn an L.E.D. on for 10 seconds and then turn off. • 3. Make an L.E.D. flash every 100mS (milliseconds). • 4. Make an L.E.D. flash every 100mS for a short period of time. • 5.Using a switch make the L.E.D. light for 5 seconds. • 6. Using a switch, sound the piezosounder when it is pressed. • 7. For extension work set the student more complex challenges. • For recording their work students have to copy and paste all working programs to Microsoft word and print.	• P.C. station • Internet access • Download cable	• Structure together a sequence of commands to perform an operation
Knowledge of remote control circuitry • teacher to explain the circuitry behind the picaxe driving 2 motors as outputs • explain how we can transmit a signal through radio waves from one picaxe circuit to another picaxe circuit to drive the 2 motors	• Examples of a transmitter and receiver radio circuits	• Learn how to communicate between two remote circuits using radio frequency signals
Initial Brief and Initial Specification • Write an initial brief stating the purpose of the robot, who it is for, and any special considerations you have identified. • Write an initial specification to state basic requirements the solution will have at this stage.	• booklet	• Be able to write the first stage of their brief development and
Research • Research on the internet existing solutions of toy, entertainment, educational robots.		

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• Find 3 examples and copy paste to Microsoft word or publisher. • Go over the research and write comments as to the suitability of the research. • Analyse – Function, price, complexity, target audience, design and cost.	• internet access • catalogues • library access	specification • Be able to analysis and evaluate research information
Introduce Concepts • Evaluation of stakeholder profile (to link to concepts. • Class to brainstorm some initial ideas (group work). • Sketch in 2D and 3D three different ideas. • Include possibilities for input / output options. • Include possibilities for casing. • Think of 3 possible different solutions. • Solutions should include packaging and circuitry • Use annotation to explain function, parts and stakeholder's interests. • Evaluate ideas with the stakeholder.	• Stakeholder • A3 paper • Whiteboard • Student booklet • Stakeholder	• Develop presentation skills and written communication to others • Realise that it's for the stakeholder's interests and not their own • Can use appropriate terminology and symbols

Concept Screening
  • develop a table that judges each concept out of a total of 5 against the following criteria------
  • 1. Meets interests of key stakeholder.
  • 2. is fit for its purpose (function)
  • 3. is considered by wider stakeholders to be a suitable solution.
  • 4. Will function in the desired Location.
  • Summarise the concept screen findings, include any important stakeholder feedback to be considered as well.
	• booklet	• Evaluate and agree which is the most suitable concept for the stakeholder's needs and interests.

Modelling using Breadboards • model your final circuit using a breadboard • test	• Breadboard • Components	• Realize that a solution can be

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	• Concept circuit diagrams • Power supply	modelled before manufacture to test ideas to its function and suitability
Introduce Final Development • Develop one or combine concepts into one final solution. • Make changes where required to make the solution function. • Show clearly detail between input and output. • Evaluate with stakeholder. • List the resources required for manufacture. • Annotate all diagrams. • Develop a Test program for testing the working function of the robot.	• Examples of completed solutions. • Student booklet	• Can develop through drawing. • Can reflect needs of stakeholder • Can plan resources
Working Drawing • using instruments, draw a plan view and front elevation full scale of the casing mould for the vacuum forming.	• Drawing boards.	• Learn orthographic drawing • Can develop presentation skills.
Flowchart • Devise a flowchart that shows a sequence of manufacturing. • Include some quality control checks.	• booklet	• Students can plan and sequence their manufacturing steps in advance
Final Brief and Specification • Formulate a final brief and list of specifications of their developed solution. • Final brief will include what the solution is, the purpose, who it is for, and where it will be located. • Final specification will list the details of the toy, type of movement, special features, size, colours weight, form, materials and finish to be used. • Provide an example before class completes exercise.	• Whiteboard • Examples of a final brief	• Can formulate a final brief and specifications that can accurately describe the finished solution, its purpose and who it is for.

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Manufacture • assemble the remote control box P.C.B. and test • assemble the robot motor P.C.B. and test • House the remote P.C.B. in a suitable casing • Mount the robot P.C.B. to the vehicle casing • Program the two picaxe chips and test communication • Fault finding may occur at any stage Using blocks of 18mm MDF the mould for the body of the robot is manufactured. Students should be familiar with All machinery and handtools required to make the mould. • Re- demonstrate use of vertical drill, bandsaw, vertical sander and handtools. • Discuss with students quality control measures. • Evaluate their proposed timeline with actual time of how long stages have taken to complete.(modify).	• Workshop facilities • Soldering iron stations • Electronic specific handtools • Components associated with their final development	• follow codes of practice • follow their plan of making • develop skills in soldering and circuit board assembly • be capable of packaging an electronic solution
Evaluation discuss with students the key points of evaluation: • Evaluating final solution against your brief and intended specification. • Evaluating the solution against the needs of the stakeholder. • Evaluating the success or not of the solution. • Evaluate solution in its location and photograph • Evaluating students own practice.	• Student folders and completed solution Stakeholder	• Can evaluate the success or otherwise of the solution against the brief and specifications.