

Programming Pioneers : Design & Technology : Year 5/6

	Learning Objective	Overview	Assessment Questions	Resources
Lesson 1	To explain how computers and computer programs are used in a variety of products.	Children will learn that many more complex electrical products are controlled using embedded computer systems, often with microcontrollers with specially written programs on them. They will begin to explain, in human language, the algorithms that monitor and control these systems.	<ul style="list-style-type: none"> Can children communicate and develop their ideas by discussing, annotating diagrams and writing instructions? Can children begin to explain how embedded systems monitor and control products? Can some children explain how computer scientists have helped shape the world? 	<ul style="list-style-type: none"> Slides Teacher's Notes A Brief History of Computer Science 1 Worksheet 1A/1B/1C
Lesson 2	To develop ideas for a product with an embedded computer system that controls it.	Children will learn about the work of computer hardware and software engineers, and about some famous computer engineering partnerships. They will go on to design and program a computer-controlled pelican crossing using Scratch 2 coding software.	<ul style="list-style-type: none"> Can children develop prototypes of a computer-controlled electrical system? Can children incorporate one or more different electrical components in their system? Can children improve their prototype designs by 'debugging' their software and/or hardware? 	<ul style="list-style-type: none"> Slides Teacher's Notes Worksheet 2A/2B/2C Challenge Card 2 (FSD...? activity only) Scratch project: 'pelican crossing.sb2' & 'pelican crossing solution.sb2' (FSD...? activity only)
Lesson 3	To develop, model and communicate ideas for an embedded system which monitors and controls a door, a room or both.	Children will consider how a range of electronic components in products might work. They will discover how pioneering computer scientists made computers easier to use over time. After that they will start to design a product such as an automatic light or an alarm/door entry buzzer that could be installed in a room.	<ul style="list-style-type: none"> Can children develop a design brief for a product? Can children develop their ideas for their product through discussion and annotated sketches? Can children incorporate electrical systems in their product design? 	<ul style="list-style-type: none"> Slides Teacher's Notes Worksheet 3A/3B/3C Cardboard boxes e.g. shoe boxes Design an Embedded Room System (FSD...? activity only)
Lesson 4	To develop ideas for a product and start to write programs to monitor and control them.	Children will learn more about why and how microcontrollers are used to control electronic products, then attempt to 'debug' a simple program written by some children to control a switch and an LED. They may then either program electronic components for their own room system designs from the previous lesson, or consider how a novelty electronic toy might be programmed.	<ul style="list-style-type: none"> Can children suggest ways in which a given product idea might be developed and improved? Can children debug a defective algorithm for a given product idea? Can children develop and debug their own computer-controlled product ideas? 	<ul style="list-style-type: none"> Slides Worksheet 4A/4B/4C Raspberry Pis, electronic components etc. (see Teacher's Notes) Connecting Components cards Teacher's Notes Worksheet 4D (FSD...? activity only)
Lesson 5	To model and communicate ideas, using either prototype models or computer-aided design.	Children will consider why we make prototype models, and how using models to explain ideas can be interesting and inspiring. They may then either make shoebox model rooms to show how their previously designed electronic systems might work, or use 3-D CAD software to create 3-D models.	<ul style="list-style-type: none"> Can children suggest ways in which models can better communicate ideas than written/verbal descriptions alone? Can children make prototype models to communicate their ideas? Can children control their prototypes using electronic components and computers? 	<ul style="list-style-type: none"> Slides Worksheet 5A/5B/5C Either: cardboard boxes e.g. shoeboxes and Art/DT materials e.g. card, glue, art straws; Or: www.tinkercad.com or equivalent simple CAD software Teacher's Notes
Lesson 6	To evaluate your design for a computer-controlled system and consider the views of others to improve your work.	Children will reflect on their learning during previous lessons in this scheme of work, then evaluate their own product designs and design process. They will also consider ways in which the ideas of others helped them, and how they were able to help others, too.	<ul style="list-style-type: none"> Can children explain ways in which they debugged and improved their programs for controlling products? Can children explain how they learned from others and improved their own designs? Can children identify ways in which their DT and programming skills have developed, and ways in which they could further develop their learning? 	<ul style="list-style-type: none"> Slides Worksheet 6A/6B/6C Worksheet 6D (FSD...? activity only)