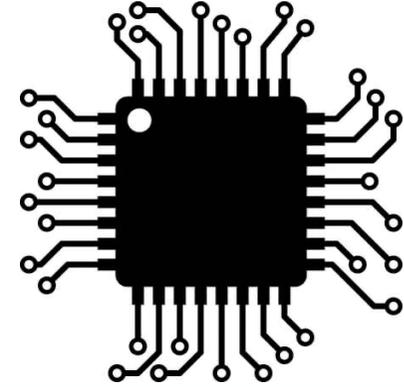


Knowledge Organiser



Learners explore how programmable devices and electronic components are developed systematically to form physical systems controlled by computer code

Learning Content

Learners demonstrate thorough knowledge and understanding of coding principles and hardware components and are able to apply them in familiar and unfamiliar contexts. They can analyse client briefs in order to interpret operational requirements and can produce plans to comprehensively test the operation of their proposed system, under a variety of conditions. Learners can develop and deliver an optimised system with consideration of enhanced user experience that demonstrates thorough understanding of the relationship between the program and hardware. They test the full functionality of the system in a structured way, including unexpected events, and make critical judgements on the conformity of what has been developed against the brief. Learners follow their structured development process and are able to provide technical justifications to support their solution

Unit Overview

Programmable devices are already used in numerous systems and products, such as car engine control, wearable and health technology products, environmental control and process control systems. A popular programmable device is a microcontroller, it contains all the internal components of a computer on a single chip and it runs a stored computer program to achieve the intended purpose. The advantages of microcontrollers are that they are cheap, small, have low power consumption, are readily available and can be programmed to control products and systems, making them economical for developing products and systems. Microcontrollers and their programs form an important part of the rapidly growing 'Internet of Things' (IoT), a network of billions of interconnected physical objects, which is bringing the next information revolution with it. In this unit, you will investigate how microcontrollers are applied to solve engineering problems and learn how to program or code them. You will explore the hardware used to create a physical microcontroller system or product and consider the interfacing between the microcontroller and the input/output devices. You will develop an understanding of the constructs (instructions or commands) used to program a microcontroller and how to represent both hardware and logical instructions in diagrammatic format. You will design and develop a prototype microcontroller system to solve a problem.

Learning Outline:

- AO1** Demonstrate knowledge and understanding of computer coding principles, electronic hardware components and the development process
- AO2** Apply knowledge and understanding of computer coding principles, electronic hardware components and of the development process to design and create a physical computer system to meet a client brief
- AO3** Analyse test results and evaluate evidence to optimise the performance of a physical computer system throughout the development process
- AO4** Be able to develop a physical computer system to meet a client brief with appropriate justification

Numeracy links:

Programing contains values and often uses algebraic formula to solve issues.

Work Related Learning:

Gaining knowledge to assist in a manufacturing or Engineering career.

SMSC and British Values

Understanding how programming solutions can be used to solve many of the word issues

Command or term	Definition
Client brief	Outlines the client's expectations and requirements for the system.
Integrated Development Environment (IDE)	A specialist piece of software in which computer programs are created. It contains a number of tools to help the programmer code.
Microcontroller	Contains all the internal components of a computer, for example processor and memory, on a single integrated circuit chip.
Project log	A document to record the progress made, key activities and decisions taken during the development of a project.
Test plan	A document that provides a structured approach for testing hardware and software. It describes the purpose of the tests, any input test data, actual test results and comments/justification.