Lesson Plan (for educators)

Manufacturing Team Challenge

worldskillsuk
excellence at work

Lesson plan - 20 minutes

AIM:

Developing your skills in microprocessor programming.

ACTIVITY:

Using a visual programming method, develop a program to output required states to an LCD panel, for given input states.

Suitable for

Students undertaking: BTEC L3 Extended Diploma in Engineering.

Resources needed

1. Video & LMS access (link)
2. Task brief
3. Marking criteria/Scheme
4. Infrastructure List
5. H&S Checklist
6. Skill Fact Sheet (WSUK)
7. End of assessment quiz

Skills

Use software to develop a solution to a common engineering problem.

Problem solving.

Planning.

Software development.

Logical thinking.

Learning outcomes

After completing this activity learners will be able to:

- use inputs to a microprocessor to determine LCD display output.
- use switch inputs to determine LCD outputs
- use an analogue input to determine a variable value
- use calculations to process a variable value.
- develop a simple program to draw together all elements.

Delivery modes

1. Students can go through the online materials independently – either at your facilities, if you have access to enough computers, or can go through the materials at home in their own time.

2. You can download and print all relevant resources, access the video demo and deliver the activity in the classroom.

Section	Timings	Key teaching points
Introduction	5 minutes	In the world of engineering many systems, mechanical or electrical, employ some kind of human-machine interface.
		Increasingly these are microprocessor controlled and have LCD panels to provide information to the user.
		A significant move in engineering is for engineers of all disciplines to multi-skill. Part of this is being able to program at some level to aid in product development, for maintenance of systems when faults occur and of course to be able to change the function of a machine in some way.
		Ask class to think of examples?
		Examples where this is often found:
		A mobile phone has lots of software.
		The ECU in a car has software to manage the engine and onboard systems, such as lights.
		CNC machines use software to control the movement of the cutting tools.
		Central heating systems some have digital control systems for timing and temperature.
		Programming can be a long process, learning some languages is a difficult task that takes time to do and of course finding programme faults is not the easiest task.
		This is commonly known in the engineering world and moves to develop fast, simple and very visual programming systems are being developed.
		One of the early examples is using ladder logic to develop software for PLC's.
		This simplifies the interface, allows for more visual debugging and is often easier to learn.
		Flowcode 8 is one of these systems and today we are going to learn how to develop a simple program that in some other languages would take several weeks to learn.
Infrastructure & H&S checklist	10 minutes	Prepare the workspace so the learner can work comfortably. Chair height, keyboard and mouse position should be set ergonomically, and the monitor should be positioned and set so as not to cause eye strain. The required Infrastructure for this task is: A desktop or Laptop PC. Flowcode 8 free version installed on the machine. Optional is an Arduino uno board, an Arduino LCD Keypad shield (Links provided ain the extension task section.) A 5KΩ potentiometer and 4 push switches. The optional parts allow for the system to be built and used, serving as an extension task. This can be done by simulation only.
Video OR photo demonstration (ensure descriptors are provided for each photo)	5 minutes	For those working at home this is how to install the free software version of flowcode 8: WorldSkills UK MTC Flowcode Installation 2-minute video.
		For those who have the software already installed and for those who have now installed it:
		WorldSkills UK MTC Flowcode Getting Started video: 2-minute video.

Task Brief (below)	30 minutes	The links to the following videos should be provided to learners, so they can follow and replicate the steps, make notes as appropriate to be able to use and understand the steps in each video. WorldSkills UK MTC Flowcode Video: Writing to an LCD panel. WorldSkills UK MTC Flowcode Video 2: Digital Inputs to control outputs. WorldSkills UK MTC Flowcode Video 3: Using variables. WorldSkills UK MTC Flowcode Video 4: Analogue inputs to control outputs. Steps: • watch videos • replicate the program in each video • note any settings or information using the Work Sheet. • using the brief specification, develop your own program to meet the requirements. • test the program • extension task: build the hardware to test the program. The video for staff "Possible Solutions to the task" can be played or given to learners failing to complete the task but is also provided for staff information.
Task completion	35 minutes	The brief details a small program to be developed using the skills demonstrated in the previous videos. Learners should put together the elements in order to develop a solution to the problem.
Marking criteria	2 minutes	Provide markings to the students and encourage learners to record their received marking on LMS. (Marking scheme link – excel). Flowcode Program Marking Scheme. Do not forget to feedback to WorldSkills UK.

WorldSkills UK is registered in England at 157-197 Buckingham Palace Road, London SW1W 9SP. Charity number 1001586. Company number 02535199. VAT registration number GB945610716.

3