



National Workshop 2



LEAVING CERTIFICATE
COMPUTER SCIENCE

Session 2: ALT4 Embedded Systems I

Learning Outcomes / Intentions

Outcomes:

- To experience and apply stages of the design process in a computer project.
- To appreciate the value of each of the stages.
- To experience project work, analysing benefits and issues.

Intentions:

- To brainstorm ideas and design solutions for ALT4 using the different stages of the design process.

Applied Learning Tasks – the Specification

Artefacts...

...Students Lives and Interests (p10 /11) ...beneficial

Artefacts...

...include programs, games, webpages, simulations, visualisations, digital animations, robotic systems and apps... (p10 /11)

Students develop their ...understanding as they grapple with computer science practices... (p10 /11)

Specification - Snapshot

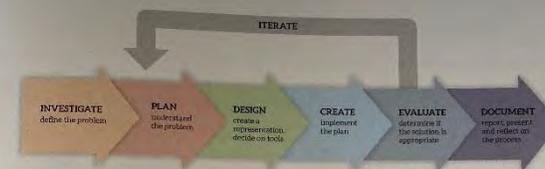


Figure 3: Overview of a design process

The output from each task is a computational artefact and a concise individual report outlining its development. In the report, students outline where and how the core concepts were employed. The structure of the reports should reflect the design process shown above in Figure 3. Initial reports could be in the form of structured presentations to the whole class. As students progress, reports should become detailed and individual. Reports are collected in a digital portfolio along with the computational artefact and must be verified as completed by both the teacher and the student. The (separate) externally assessed coursework will be based on all learning outcomes, with those of strand 3 being particularly relevant.

Strand 1: Practices and principles	Strand 2: Core concepts	Strand 3: Computer science in practice
<ul style="list-style-type: none"> Computers and society Computational thinking Design and development 	<ul style="list-style-type: none"> Abstraction Algorithms Computer systems Data Evaluation/Testing 	<ul style="list-style-type: none"> Applied learning task 1 Interactive information systems Applied learning task 2 - Analytics Applied learning task 3 - Modelling and simulation Applied learning task 4 - Embedded systems

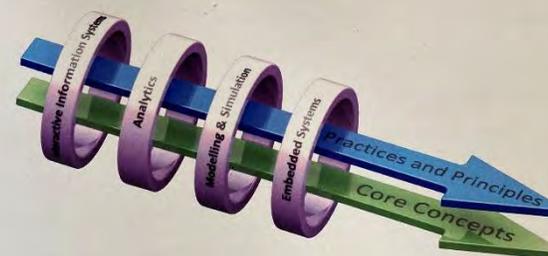


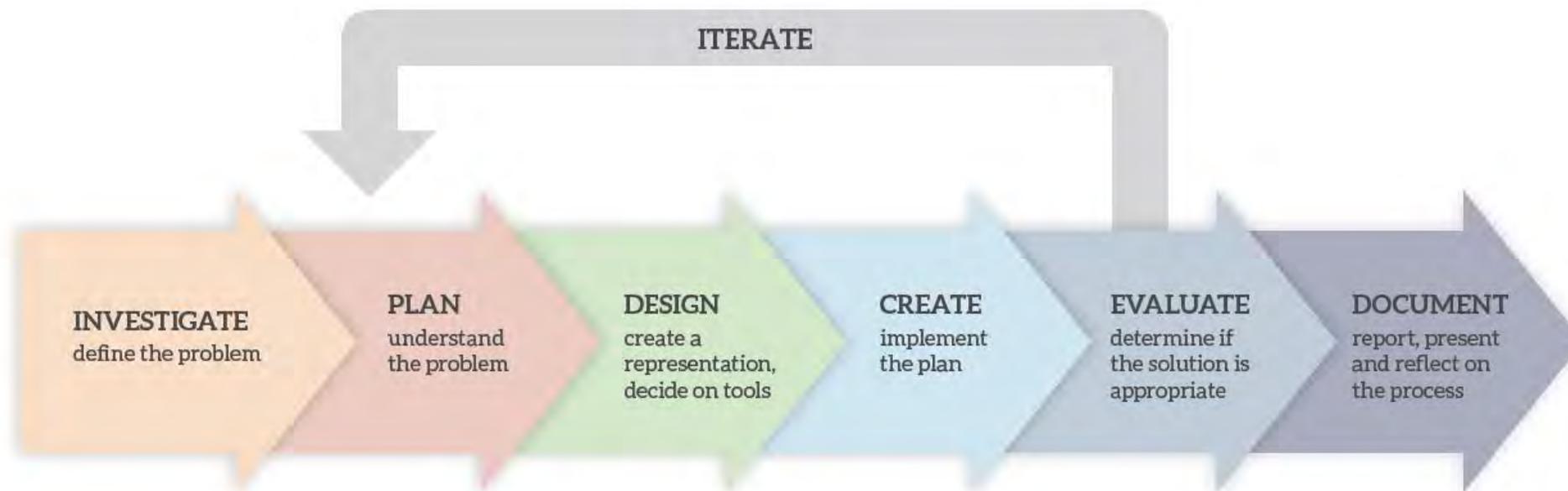
Figure 4: Structure of Leaving Certificate Computer Science

Quick Quiz

Which stage of the design process involves:
“creating a representation, deciding on tools”?

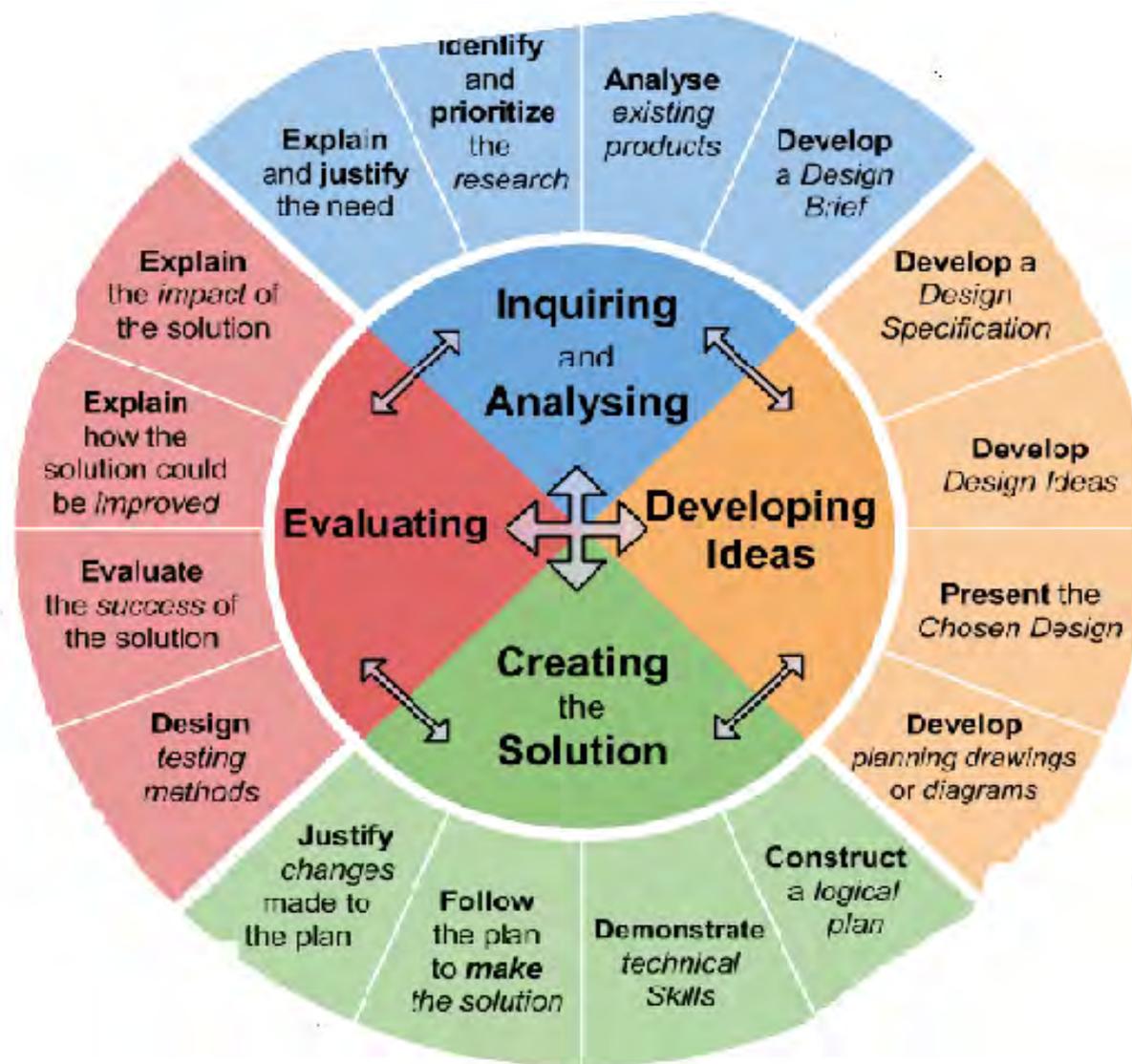
1. Investigate
2. Plan
3. Design
4. Create

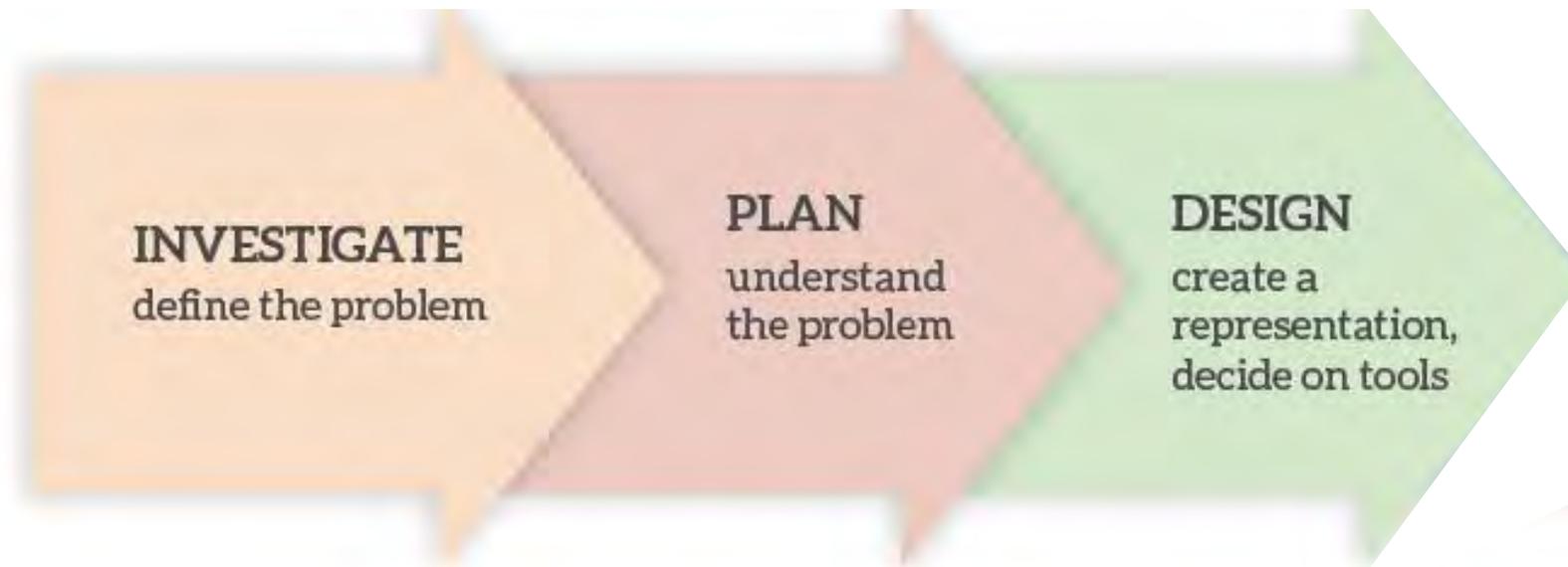
Answer via direct message on chat.



The Design Process

Design Cycle





Session 4 - ALT4 Embedded Systems (Part I)

1

INVESTIGATE
define the problem

ALT 4 - Spec

Microprocessor systems ...

Sensors....

Controls digital and analogue inputs, and digital outputs...

Computers embedded in our everyday environment...

Home, school, farm, society, sport, game, transport.....

Inuit school

ALT 4: Inuit Children



System for Inuit children –

LED built into hoods to flash when light is low,

Built-in heating system with sensors in positions

Investigate Phase: Prompts

What is an embedded system? Examples from the world around us.

What are sensors? Digital inputs/outputs? Analogue inputs/outputs?

What are your hobbies/interests/passions? Can you think of example embedded systems that might support these?

What about other examples – for users other than yourself e.g. family members, friends, school, community organisation?

ALT 4: Brainstorming example

padlet

PDST LCCS 1m
ALT4 Brainstorm
Started in NW1 but built on at NW2

REMAKE SHARE

PDST LCCS 19m



PDST LCCS 30m

micro:bit Fidget Spinner Speed Test



Episode 16 - micro:bit Fidget Spinner Spe...
by MicroMonsters
youtube

PDST LCCS 1h

3.13

develop a program that utilizes digital and analogue inputs

PDST LCCS 27m

micro:bit pinball game



PDST LCCS 1h

Help the community

PDST LCCS 1h

3.14 design automated applications using embedded systems

PDST LCCS 19m

bit plant water pump



micro:bit plant water pump
by Microsoft MakeCode
youtube

PDST LCCS 1h

Sports related theme

PDST LCCS 1h

3.11

Use and control dig inputs and outputs within embedded system:
input- keyboard/broadcast messages
output- leds/sound/ broadcast messages

PDST LCCS 1h

design a system that sends a message when the pressure drops.

PDST LCCS 1h



Micro:bit Educational Foundation
microbit

PDST LCCS 1h

DIY micro:bit pinball game
by PinkyPepper
youtube

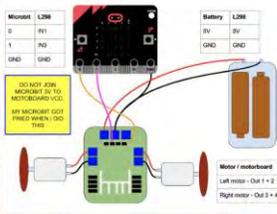
PDST LCCS 1h

robot sensing an obstacle

PDST LCCS 1h

Health and Wellbeing theme

PDST LCCS 1h



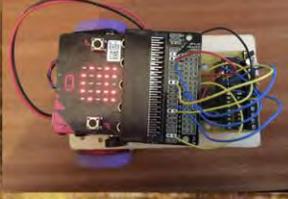
Micro:bit L298
Battery L298
DO NOT JOIN MICRO:BIT TO THE MOTORBOARD VCC! PIN MICRO:BIT GND1 (PINS 1 AND 2) MUST BE JOINED TO THE MOTORBOARD GND1 (PINS 1 AND 2).

Motor / motorboard
Left motor - Out 1 + 2
Right motor - Out 3 + 4

PDST LCCS 1h



PDST LCCS 1h



PDST LCCS 1h

sensing pitch , roll and yaw using an accelerometer

PDST LCCS 1h



<https://www.youtube.com/watch?v=jANCdtkJAKY>

PDST LCCS 1h

3.12

PDST LCCS 1h

Elderly

PDST LCCS 28m

micro:bit Part 4: Remote

PDST LCCS 1h



padlet

1. In your assigned groups start brainstorming again as to possible project ideas for students for ALT4.
2. Aim for as many ideas as you can.
3. Fill in your ideas on the Padlet board supplied – can be text / images / videos etc.



padlet

Click to your padlet:

NW 2 Day 2 Thursday

Group 1: <https://pdstlccs.padlet.org/cpd/nno2lm4ll0i5zrc>

Group 2: <https://pdstlccs.padlet.org/cpd/1h005671t1gd1vvf>

Group 3: <https://pdstlccs.padlet.org/cpd/q4lbhd61qi4lxoii>

Group 4: <https://pdstlccs.padlet.org/cpd/w8dmk6o7do5id0zs>

Group 5: <https://pdstlccs.padlet.org/cpd/rlsycspt08t0hpi5>

Group 6: <https://pdstlccs.padlet.org/cpd/t3kn5g6l63nf0zf1>

Group 7: <https://pdstlccs.padlet.org/cpd/7exo3x02rcnwuonr>

Group 8: <https://pdstlccs.padlet.org/cpd/a5xq3jp74iukferu>

