Workbook AS2.8

Use advanced processes to develop an outcome

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Advanced processes

The advanced process are the steps taken to develop a digital technology outcome. Depending on the project you have to complete, there are a range of process that may be used

- Electronic circuit construction
- Programming
- Enclosure Development
- Webpage Development
- Server-Side PHP and MySQL

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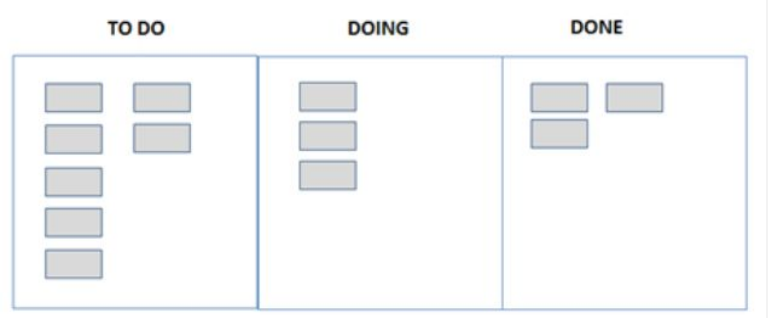
Stage 1 - Project Management

1 Project Management | 2 Decomposition | 3 Relevant Implications | 4 Development - Trialling & Testing | 5 Evaluation, Discussion

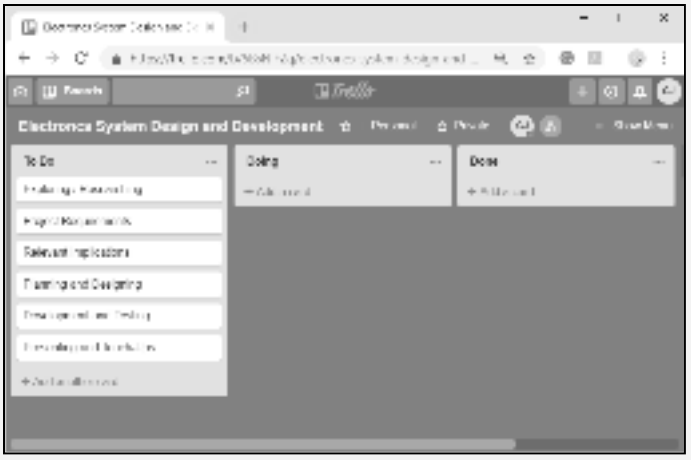
Managing Tasks with www.trello.com



A Kanban board
A kanban board is a visual method of organising tasks within a project. It allocates tasks into three categories.

- To-do
- Doing
- Done

Keep it together with trello.com
Trello.com is a web application that allows for the allocation of a task in the style of a Kanban board. It enables you to place due dates on tasks, break tasks into list or items and most importantly give you the ability to move tasks from to-do -> doing -> done columns.



Sign up to www.trello.com and create a "board". Share this with your teacher

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Stage 2 - Decomposition

Project management is all about how we can create software despite this enormous size and complexity and hopefully get a working outcome in the end. We will rely on a technique called decomposition. Decomposition is the process of breaking an electronic system, or any digital outcome, into smaller components.

Example Decomposition of Temperature sensor

Decomposition into smaller components for Temp Sensor.

1. To-do Trial components and select components for use in the development of temperature sensing, radio transmission.
2. To-do Construct Temperature Sensor electronic interface. Write Arduino C++ code to read the temperature value
3. To-do Trial temp and radio transmission on long range line of sight. Record results

Depending on the tasks allocated student may also need to decompose the HTML web page development and the PHP - MySQL connection, queries and echo-ing of data to an HTML page

Decomposition or your task

Decompose your development into smaller components.

Set up a Trello.com board with your "to-do list"

Place in a screenshot of your trello board

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_____

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Stage 3 - Relevant implications

Read through the relevant implications below then answer the questions that follow

Social	Health and safety	Legal	Ethical
Will it have a positive social impact	How can we maintain safety within the development and ongoing operation?	Much of the code can be reused from internet sources! Does it comply with Copyright laws?	Should we be doing this? Should we be using cheap Chinese Arduino clone hardware?

Intellectual property	Privacy	Accessibility	Usability
Who owns the ideas, the images, the code? Should you protect your ideas via Creative Commons or Copyright?	Are there any privacy issues of the data you are collecting?	Should the outcome be easily accessible to everyone?	Is it easy to operate? Should you include instructions or labels on the enclosure? Is it easy to navigate or control

Functionality	Aesthetics	Maintainability	End-user considerations
Is it important that it works as intended? Correctly sensing input, correctly processing data providing accurate and true output.	Does it look good? What does looking good mean in the context of your outcome?	How will it be maintained? Can you keep it up to date? How will you make it easy to fix or change batteries?	What specific needs do the end-users have? How will the user know its working? Can the user control it, will they understand the output?

Software Standards	Reliability	Robustness	
What are software codes of practice and how can your outcome adhere to these? Variable names, code comments program naming conventions,	What would happen if the system was unreliable? How could we improve reliability? What testing needs to happen to make sure it's reliable	Will your system be used outside? Does it need to be waterproof? Does it need to be stable, portable? How will this be achieved?	

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Rank the implications

There are at least 15 implications that may or may not relate to your outcomes design and development. Rank the implications from most (1) to least (15) important

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____

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Explain how you will address implications

Explain how the most relevant implications (top 3) affect your project, or how you intend to address these within development

Relevant implications 1: Describe it, Explain with an example how you will address it

Relevant implications 2: Describe it, Explain with an example how you will address it

Relevant implications 3: Describe it, Explain with an example how you will address it

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Stage 4 - Develop & Trialling

Developing your outcome means to make, build, develop, construct, code, debug, trial and test … but in an organised manner.

You need to follow a Project management process.

Keep to the plan, Update your plan. Update your Trello.com board, moving tasks from todo to doing to done.

You need to Trial components

Trialling of electronic components, interfaces and software code

Electronic Component Trialling

- What Input interface components - Trial different Temperature Sensors such as 100k NTC or Ds18B20 or LM35
- What Output interface components - Radio Transmission. Trial the Dorji ASK modules and the Dorji DRF1278DM.
- What Software code -C++ code or Arduino Libraries to use
- What Enclosures -A box or PVC pipe that will fit Arduino, battery, sensor radio securely

Web Page Component Trialing

- HTML and CSS for layout of page
- Charting libraries - Trial Chart.js and Plotly.js libraries
- Server Scripts - Trial Connection, Query and echo-ing of data to an HTML page

Development and Testing means

- What Output interface components - Radio. Testing output range and success rate of data packets
- Viewing HTML/CSS layout output on expected OS types and expected Screen resolutions.
- Develop Software code -C++ and HTMLweb pages using meaningful file names, meaningful variable names, code comments.
- HTML/CSS page validation, checks for links, images working and spelling/grammar.

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Trialling components

Trialling the components of the digital technologies outcome.

Below is a list of electronic components available for use.

Input Components

DS18B20 Temp Sensor

100K NTC Thermistor

Component selection - Advantages of Component

DS18B20 RESOURCE | NTC THERMISTOR RESOURCE

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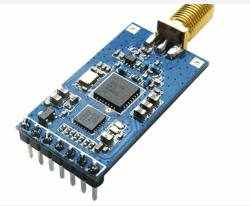
Radio Components

Tact Switch

On/Off Switch



Component selection - Advantages of Component

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Spare Page for more trialling of components or C++ software code

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Develop and Test Input interface

Developing and testing the input interfaces of your outcome

Photo of Input interface (temp sensor) (take a photo and place here)	Sample C++ code for input interface (temp sensor) (show file name) (Take a screenshot and place here)

Complete the testing table for your inputs

Testing Table		
Test	What happened?	Was it expected? What To-do?
Reading in Temperature value	Screenshot of Serial Terminal showing results	
Checking that temperature values are correct using an actual thermometer		

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UPDATE YOUR TRELLO.COM BOARD

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Develop and Test Output interface

Photo of Output interface (Radio) (take a photo and place here)	Sample C++ code for output interface (Radio) (Show file name) (Take a screenshot and place here)

Complete the testing table for your outputs

Testing Table		
Test	What happened?	Was it expected? What To-do?
In Class (short range)		
Outside (long range)		

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Develop and Test Electronic Enclosure

Photo of Enclosure (take a photo and place here)	Photo of Enclosure with components installed (take a photo and place here)
Testing of enclosure in its intended location (Take a photograph of enclosure and components in actual locations)	

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Develop HTML / CSS web page

Develop a framework or layout page for your web page. Including navigation, banner, columns and footer..

Screenshot of HTML page	Sample HTML code

Complete the testing table for your outputs

Testing Table		
Test	What happened?	Was it expected? What To-do?
Browser testing (Safari, Edge, Chrome)		

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Develop PHP - MySQL

Develop sample PHP files that connect, query and echo data to an HTML page.

Screenshot of PHP code	Sample HTML output from echo statement

Complete the testing table for your outputs

Testing Table		
Test	What happened?	Was it expected? What To-do?
Run a basic query SELECT * from $table	You should expect all data to echo to page	
Run a more advanced query SELECT field from $table WHERE created_at = “”	You should expect specific data to echo to page	

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Make improvements and refinements

Bring all the elements together. This means place the sensor in-situ for a few days, collect data and using your webpage to display the data.

- What could be improved?
- Does it meet relevant implications?

Screenshot of PHP code	Sample HTML output from echo statement

Complete the testing table for your outputs

Testing Table		
Test	What happened?	Was it expected? What To-do?

Improvements to make

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Stage 5 - Evaluation, Discussion

Evaluation

How did the information from planning, testing and trialling of components assisted in the development of a high-quality outcome

How does your outcome it meet the base specifications of the project found on page 1

How does your outcome address relevant implications

How did the use of a develop - trial - test process enable refinment of your outcome

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Spare Page for more evaluation

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Student Checklist

Have you completed the following tasks in the assessment

- ❑ Signed up to www.trello.com and created a "board"
- ❑ Decomposed your project into smaller tasks
- ❑ Ranked the relevant implications
- ❑ Selected 3 implications and explained them
- ❑ Trialled components and software code
- ❑ Develop and Test Input interface
- ❑ Develop and Test Output interface
- ❑ Develop and Test Electronic Enclosure
- ❑ Develop HTML / CSS web page
- ❑ Develop PHP - MySQL
- ❑ Make improvements and refinements
- ❑ Evaluation, Discussion

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