SIT210

Embedded Systems Development

Learning Summary Report

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Self-Assessment Details

The following checklists provide an overview of my self-assessment for this unit.

	Pass (D)	Credit (C)	Distinction (B)	High Distinction (A)
Self-Assessment				✓

Self-Assessment Statement

	Included
Learning Summary Report	✓
Pass tasks complete	✓

Minimum Pass Checklist

	Included
All Credit Tasks are Complete on OnTrack	✓

Minimum Credit Checklist (in addition to Pass Checklist)

	Included
Distinction tasks (other than Custom Program) are Complete	✓
Custom program meets Distinction criteria	✓

Minimum Distinction Checklist (in addition to Credit Checklist)

	Included
Something Awesome included	✓
Custom project meets HD requirements	✓

Minimum High Distinction Checklist (in addition to Distinction Checklist)

Declaration

I declare that this portfolio is my individual work. I have not copied from any other student's work or from any other source except where due acknowledgment is made explicitly in the text, nor has any part of this submission been written for me by another person.

Signature: **Don**

Portfolio Overview

This portfolio includes work that demonstrates that I have achieve all Unit Learning Outcomes for SIT210 Unit Title to a **High Distinction** level.
During the study of this unit, I have completed all the tasks including all pass, credit, distinction, and high distinction tasks. I have shown the knowledge I have gained through unit resources and beyond what's taught.

I have shown good understanding of development of software necessary for controlling devices within an embedded system. During the tasks such as PWM, I2C using Particle Argon, and Raspberry Pi, I showed my understanding of C++, Python programming languages to create secure, bug free data communication applications. Furthermore, I demonstrated my expertise in developing an end-to-end embedded system solution for a real-world problem. I have developed fault-tolerant software throughout all the activities of the using thus demonstrating my understanding of development software necessary to create embedded systems.

While attempting the tasks of this unit, I showed my skills of interfacing sensing and computation and communication components to real-world problems. During the development of the final project, I conducted thorough research on feasibility of wireless communication technologies and sensory requirements of the system while formulating the product architecture. During workshops, I collaborated with my peer to iterate on embedded system design concepts while critically evaluating feasibility of different sensors, computation equipment and communication protocols regarding price, power consumption, development complexity and environment constraints. I took similar approach while developing my tasks which have demonstrated HD standard of the unit.

I showed my attention to detail during the workshop classes and OnTrack activities by developing embedded system architectures by considering robustness, fault tolerance, responsiveness, and constraints of the environment. During workshop activities I collaborated with my peers on solving real world problems such as developing a wearable embedded system for elderly care. During such activities we discussed the feasibility of different embedded hardware on the system such that system satisfies considerations such as energy, space requirements. Furthermore, I developed software that utilizes I2C communication for robust and responsive data communication and event driven systems with exponential backoff methods and exception handling for fault tolerance.

I have shown my expertise in all learning outcomes of this unit and have put forward work with good attention to detail that satisfies the HD standard of the unit.

Reflection

The most important things I learnt:

I have learnt several important concepts that has helped me navigate this unit,

Overall Embedded System Design,

This unit has motivated me to learn embedded system development to a deeper level. I was able to gain knowledge about communication protocols, deeper understanding of sense think, act paradigm, and system design knowledge are some of the important theoretical knowledge I have gained from the system.

PCB Design,

The tasks in this unit motivated me to learn more about PCB design for my embedded systems project. Although I was not able to use a PCB design for my final project, I implemented the system using Proto Board and used the schematics I used for the PCB task. I was able to gain a lot of practical knowledge of soldering and wiring.

The things that helped me most were:

Unit resource,

The unit resources helped me a lot when attempting the tasks. It guided me in the right direction and allowed me to gain a great deal of theoretical and practical knowledge.

Documentation,

Although I was bit skeptical of the Particle IO, I quickly understood why it is a great platform for learning and building. The documentation was very thorough and simple. The board is very robust. The tooling available for development is exceptional. I really enjoyed using particle devices towards the end of the unit and utilized some of the cool features in my final project as well.

I found the following topics particularly challenging:

I found the PCB design and digital communication quite challenging,

PCB Design,

I had a bit of challenging experience while learning PCB design. I had a goal to implement a working PCB for final project. However due to my gaps in knowledge and time constraints I was not able to complete the circuitry as a PCB for the final project. I had to refer to multiple online material to grasp concepts of PCB design.

Digital Communication,

Although there are multiple libraries that simplified the process of digital communication via I2C, my attempts on using Wire.h library for digital communication were rather challenging. I believe the knowledge required for I2C communication via Wire library is scattered and the skills to find and utilizes them effectively is necessary.

I found the following topics particularly interesting:

During my search for wireless and power efficient communication method I came across BLE which is an interesting trend in embedded system development. Recently, our house was fitted with a wireless power monitoring system called PowerPal which allowed us to monitor usage of the power usage wirelessly. It used BLE which advertises the power usage and allowed us to view it within the house. I was intrigued by the technology and used it in my final project.

I feel I learnt these topics, concepts, and/or tools really well:

I believe I learnt developing embedded systems software well. I really enjoyed reading through Particle's extended documentation website and implementing software for tasks in this unit. Prototyping circuits using particle devices was fast due to user friendly design and extensive documentation. I learnt the concepts of connecting sensors properly, logic levels, digital communication well as I have demonstrated them in the tasks.

I still need to work on the following areas:

I believe I need to improve a lot in time management. I had difficulty maintaining the required standards in certain tasks due to constraints in time along with 3 other units. Although I have provided necessary requirements for HD grade, I believe I could do better and provide more impressive results had I been managing my time properly.

I am lacking in research skills necessary finding gaps in research literature to find solutions for gaps in research. Although my intentions were to work on a research problem, I still yet to improve my knowledge and skills to proper problem solving.

My progress in this unit was …:

I have maintained a good progression in unit tasks while gaining the required tasks. I have demonstrated my experience align with the unit learning outcomes.
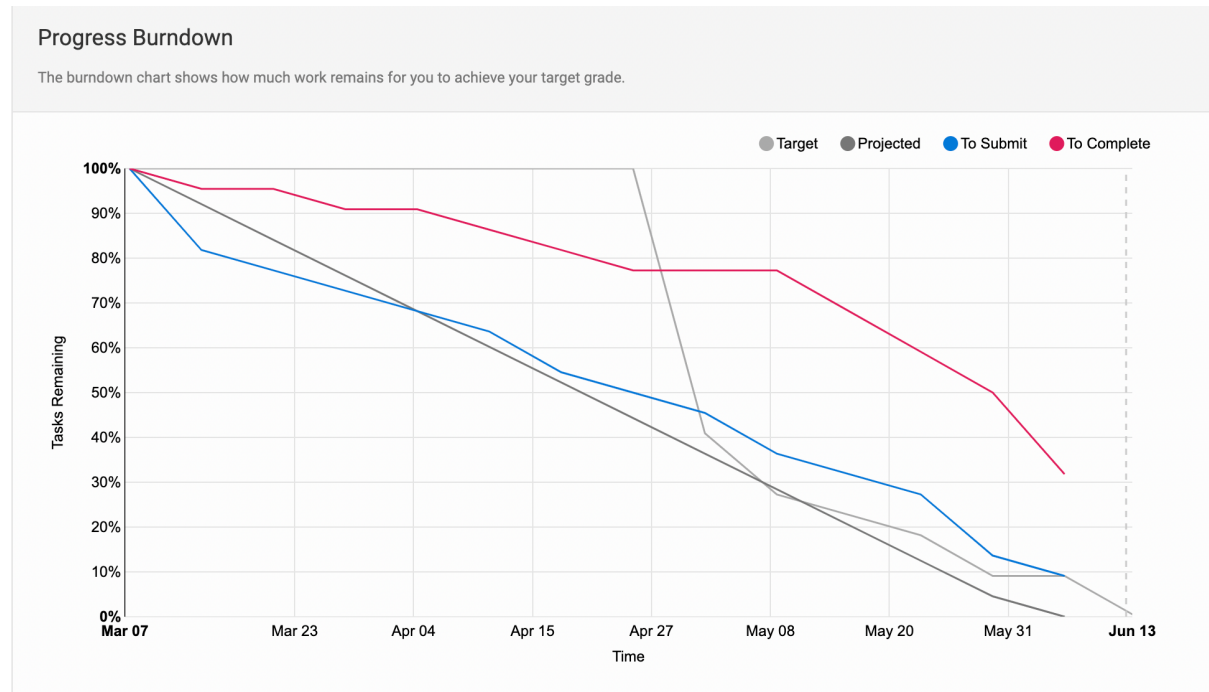
This unit will help me in the future:

This unit will help me immensely to showcase my knowledge in embedded system design while applying for graduate roles. Furthermore, this unit laid a good foundation for me to build up on my experience and improve my knowledge in embedded system design for future project.

If I did this unit again I would do the following things differently:

I would manage my time better to provide a well-designed final project. I believe my final project could be improved greatly by providing more development. I have implemented the basic structure of the prototype, however there is a long way in terms of software development.