EXCEL PROJECT MANAGEMENT DOCUMENTATION

Section 2

NOVEMBER 15, 2017

SO CALLED ENGINEERS

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2. Excel Project Management Documents (ELO 8)

ELO 8 main focus is team work and team dynamics. Therefore this part of the report will look at how the team work together and not really concentrate on the design of the product but instead take a look at which member designed the product and how the members interacted with one another throughout the design process.

2.1 Combined Project Documents (Team)

From the excel documentation the following combined project documents are documented.

2.1.1 Work Breakdown and Allocation

In Table 1 the work breakdown allocation can be seen for each member of the group including the functional responsibilities and the additional task for which they are responsible.

Table 1: Work Breakdown allocation for the group

Member	Function responsible for	Additional Tasks
TE Carter	DCDC Convertor 1 I/F 2.0 Unit 3 DCDC Convertor 2 I/F 2.2 Unit 3 DCDC Convertor 3 I/F 2.4 Unit 3 Phone Charger I/F 5.2 Unit 5 LED Light Driver I/F 3.7 Unit 3	Functional analysis diagram Research for I/F responsible for List and price components needed for I/F responsible for Begin working on ELO 5 and portfolio Compile the budget Buy components
SJ Du Plessis	Arduino control and programming Unit 2 Battery charging with PWM I/F 1.7.1, 3.6, 3.5 Unit 2 LED light control with PWM Unit 3.7 Additional Trigger I/F 3.4 and 3.1 Unit 2 HMI control with LEDs I/F 3.9 Unit 2	Define all interfaces Research for I/F responsible for List and price components needed for I/F responsible for Work further on Functional Analysis Begin working on ELO 5 and portfolio Submit and compile all documents
CF Greyling	Solar Charge Unit and PSU I/F 1.0 Unit 1 Battery I/F 4.1 Unit 1 220 V Mains Input (Optional) (no longer included) Solar Panel I/F 1 Unit 1	Functional architecture Research for I/F responsible for Compile the power budget Begin working on ELO 5 and portfolio List and price components needed for I/F responsible for

These responsibilities were discussed and agreed upon at the beginning of the semester, in some cases some members had much more work than others or were battling with their work load while

other members were more flexible, which lead to members swapping tasks in order to help each other. The group got together and continuously discussed each members work load and as mentioned above if the one member had to great a work load another member would take on some of that work load. All decisions were made unanimously and no member was taken advantage of during this project each member brought their side.

2.1.2 Project schedule

The project schedule can be seen in the timeline tabulated below in Table 2 as well as in Figure 1: Timeline, where the chart of the timeline can be seen.

Table 2: Timeline of project

Timeline	
17-Jul-17	Project initiation
10-Aug-17	Functional Analysis Test
10-Aug-17	Functional Analysis Complete 2 levels
14-Aug-17	Preliminary Design Complete
28-Aug-17	Work done as discussed in class in preparation for 30% demonstration
31-Aug-17	30% Completion Milestone
4-Sep-17	Finalize who is working on which part of the circuit
7-Sep-17	Order Components and finalize wiring diagram
28-Sep-17	Start Assembling Circuit
29-Sep-17	Buy battery and other remaining components
2-Oct-17	Buy other remaining components
3-Oct-17	Start building
4-Oct-17	50% Completion Milestone
4-Oct-17	Portfolio and documentation up to date due for submission
9-Oct-17	Prof Holm 50% Evaluation in class
27-Oct-17	80% Completion Milestone

10-Nov-17	100% Completion Milestone
16-Nov-17	Demonstration

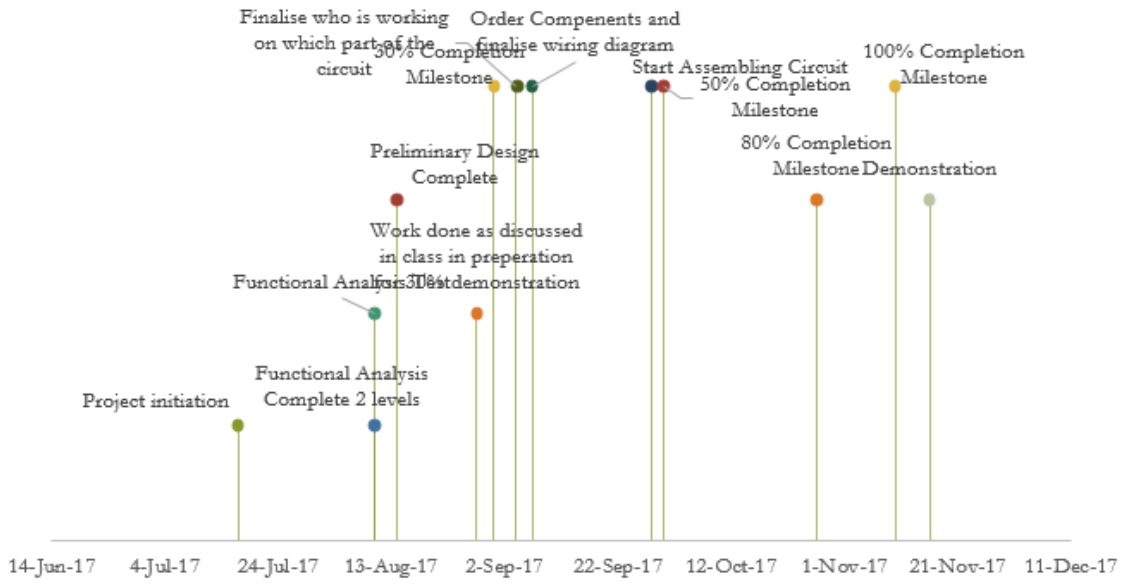

Figure 1: Timeline

2.1.3 Progress tracking

Each week the projects progress was checked with a RAG status and a description of why the project is in risk if it should be an amber or red status. The project progress tracking can be seen in the Table 3 here below.

Table 3: Project progress tracking and status

		Project Status			
	% Complete	**Green**	**Amber**	**Red**	**Description**
Week 1					
Week 2					
Week 3					
Week 4					
Week 5					
Week 6	20%				Some confusion as to what has to be done for the 30% milestone
Week 7	30%				
Week 8					
Week 9					
Week 10	50%				Although all the work is done, the group is a bit late on documenting all the factors in the design

Week 11	Start building				There is still clarity on the USB port and another group member has been put in charge of the USB port as well as the opt coupler
Week 12					Only the LED has been built and tested there seems either to be a problem with the ciruit or the Arduino code.
Week 13	60%				The USB chips have not arrived yet and the correct diodes must be bought for the charger and the correct capacitors for the DCDC convertors
Week 14					The charger and DCDC have been built but don't seem to work.
Week 15					The lecturer has been consulted and it has been discovered that the DCDC chips and USB chips are faulty, these devices are now on track the charger also works it just does not want to switch.
Week 16	80% demo				All the documentation has been corrected and most part have been integrated the charger just does not want to switch and the lecturer will be consulted on this matter.
Week 17	100% demo				Finalizing documentation and the charging circuit now works, just making the circuit more presentable.
Week 18	Project finished				Project finalized and ready for the final demonstration

2.2 Risk / Mitigation Register (Team)

Table 4 shows the risks that were encountered during the timeline the project was designed and built in.

Table 4: Risk/ Mitigation

Risk	Date	Description of Issue / Risk	Issue /	Type	Sever	Impact	Mitigation / Action	Responsible	Mitigat	notes on mitigation

No			Risk*		ity			person	ed	
1	*24-Aug-17*	*Confusion as to what is due for the 30% milestone*	*Issue*	*Project*	3	*Penalization for incomplete work*	Complete work up to where is possible and ask in Monday (28th) class for clarification	All members	-	
2	*31-Aug-17*	*Components not ordered*	*Risk*	*Project*	*3*	*Behind schedule may not finish project*	*Order components ASAP*	All members		
3	*31-Aug-17*	*MOSFET or PSU unsure*	*Issue*	*Technical*	*3*	*PSU does not work*	*Find someone to help*	CF Greylin g		
4	*31-Aug-17*	*The timeline to build project*	*Risk*	*Technical*	*2*	*Do not complete project and get penalized for it*	*Better time management*	All members		time continues to be an obstacle
5	*31-Aug-17*	*Design not finished*	*Risk*	*Technical*	*5*	*Do not finish in time*	*Finish the design within the week, change focus to design*	All members		

6	31-Aug-17	Time components take to order	Risk	Technical	2	Do not have enough time to finish the project	Order components with leniency	All members		First components ordered received
7	31-Aug-17	Don't know what will happen if deadline is not met	Risk	Project	4	Penalty	Unable to finish project	All members		will not be late
8	31-Aug-17	Help with the thermal design of the LED	Issue	Project	3	LED does not work	Determine how the LED works	TE Carter		
9	31-Aug-17	Simulation and wiring not done for components	Issue	Project	5	Deadline not met	Must do within the week	All members		
10	31-Aug-17	Datasheets and application notes must be downloaded and added to the portfolio	Issue	Technical	5	Deadline not met	Must to within the week	All members		
11	31-Aug-17	Not sure how to design a DCDC convertor	Issue	Technical	3	Technical issue	MPS design simulation for DCDC and populate portfolio	TE Carter		

	-17 31-Aug-			*cal Tech nical*						
12	*-17 31-Aug-*	*Not sure how to design an LED driver*	*Issue*	*cal Tech nical*	*3*	*Technical issue*	*Do research*	TE Carter		
13	*-17 31-Aug-*	*Not 100% sure how the circuit looks*	*Risk*	*cal Tech nical*	*5*	*Build the circuit incorrectly*	Do research	All members		
14	*-17 31-Aug-*	*Have nothing to measure against at present*	*Risk*	*cal Tech nical*	*5*	*Become behind schedule*	*Get the solar panel to do testing on*	SJ Du Plessis		Test completed
15	*-17 31-Aug-*	*PC board layout and the thermal design of the LED*	*Risk*	*cal Tech nical*	*3*	*Cannot order components before design*	*Do research*	TE Carter		No PC board layout
16	*-17 4-Sep-*	*The connectors on the solar panel*	*Issue*	*cal Tech nical*	*3*	*Don't know how to use connectors*	*Do research*	SJ Du Plessis		Connectors found but are very expensive
17	*-17 4-Sep-*	*Other connector*	*Risk*	*Pro cal*	3	*The price of new connectors are expensive*	Consult with lecturer	SJ Du		less expensive connectors

	Sep-17	*are expensive*		*Project*				Plessis		found but still costly
18	*Sep-17*	*Switch between power input components*	*Issue*	*Technical*	3	*Technical issue*	Consult with lecturer	All members		Switch with diodes between supplies
19	*Sep-17*	*220 V AC input from mains connection to circuit*	*Issue*	*Technical*	2	*Technical issue*	Consult with lecturer	CF Greyling		Will add if there is extra time and resources left (Optional Extra)
20	*Sep-17*	*Solar charge unit circuit*	*Issue*	*Technical*	3	*Technical issue*	Consult with lecturer	CF Greyling		
21	*Sep-17*	*Unsure about pricing of components MPS*	*Risk*	*Technical*	2	*Over budget*	Make contact with Mr de Klerk from MPS	All members		Consulted with MPS employee and determined the cost of components
22	*Sep-17*	*Arduino connection to charger*	*Risk*	*Technical*	3	*Technical issue*	Consult with lecturer	CF Greyling, SJ Du Plessis		

23	4-Sep-17	Arduino connection to LED light driver	Risk	Technical	3	Technical issue	Consult with lecturer	TE Carter, SJ Du Plessis			
24	5-Sep-17	Courier cost and time for components from MPS	Risk	Project	3	extra cost may cause project to exceed the budget and the extra time courier takes may delay the project dangerously	Consult Mr de Klerk at MPS and the finance at NWU	All members			
25	5-Sep-17	Payment method for components at MPS	Issue	Technical	2	Financial issue	Consult finance for project	All members			
26	6-Sep-17	USB chip	Issue	Technical	2	Technical issue	Do more research on different kinds of usb chips	CF Greyling			Different usb charger
27	23-Sep-17	some components still need to be ordered	Risk	Technical	2	Components not delivered with in time of competition	order all components ASAP	All members			Components ordered
28	23-Sep	Due date for 50% completion moved ahead from 30 to 26 September	Risk	Project	4	50% Completion not on time	Ask for extension of time and complete work	All members			extension received till the end of 27th

29	17-Sep-17	Schottky diode sufficient for power switch?	Risk	Technical	3	Circuit will not work if diode is insufficient	Do more research on properties of different diodes	CF Greylin g		Correct diode used
30	17-Oct-17	50% milestone may not be up to standard	Risk	Project	2	Behind schedule may not finish project	Be a accurate as possible with project	All members		50% milestone assessment was successful
31	16-Oct-17	cannot find the correct ceramic caps	Issue	Technical	3	DC to DC converter will not be able to work with polarized	Find a store that has the correct ceramic cap	TE Carter		Found Ceramic caps of the correct value
32	16-Oct-17	schedule clash between LLAW 221	Risk	Project	2	Might not be able to be at the assessment	Talk to Prof Holm about a time slot	All members		Not needed to go As the group got above 80%
33	26-Oct-17	DC to DC converters are not working because the chips aren't working	Issue	Technical	3	Technical issue	The DCDC chips aren't working	TE Carter		Find new chips and rebuild, which was done the moment it was discovered that the chips don't work.
34	26-Oct-	USB charger does not work because the chips aren't working	Issue	Technic	2	Technical issue	The USB chips don't work either	TE Carter		Buy a USB port circuit

	17		al							
	26		Tech							
	-	the battery								
	Oct-	charge controller works but it	Issue	nical			The charger works but it	CF Greyling		
35	17	does not switch			3	Technical issue	is not switching			charger working

Note all risks where mitigated by the end of the Project.

2.3 Minutes of Meetings

The meetings that were held throughout the designing and building of the project.

Meeting 1

Date	8-Aug-17			
Time	14:00			
Chairman	***TE Carter***			
Attendance list	***TE Carter***			
	SJ Du Plessis			
	CF Greyling			
Agenda				
Progress Tracking	***Progress on schedule***			
Issues / Risks and Mitigations	No risk identified			
Decisions	Functional Flow Diagram			
	Functional Architecture Design			
	Specification of interfaces			
Actions	Allocated work	TE Carter	Functional Flow Diagram	
		SJ Du Plessis	Specification of interfaces	
		CF Greyling	Functional Architecture Design	

Meeting 2

Date	21-Aug-17
Time	13:00
Chairman	***SJ Du Plessis***

Attendance list	***TE Carter***
	SJ Du Plessis
	CF Greyling

Agenda

Progress Tracking	***Progress on schedule***		
Issues / Risks and Mitigations	No risk identified		
Decisions	Members work allocation		
Actions	Allocated work	TE Carter	DC to DC converter LED
		SJ Du Plessis	ARDUINO Programming
		CF Greyling	Solar charge unit Battery USB charger

Meeting 3

Date	24-Aug-17
Time	14:30
Chairman	***CF Greyling***
Attendance list	***TE Carter***
	SJ Du Plessis
	CF Greyling

Agenda

Progress Tracking	20% complete	
Issues / Risks and Mitigations	Uncertainty of work due for 30% deadline	
Decisions	Portfolio	ELO 5
		ELO 8
Actions	Allocate individual and group work between members Agree to ask for clarification (in Monday 28th class) of work due up for 30% milestone	

Meeting 4

Date	28-Aug-17
Time	11:30
Chairman	***SJ Du Plessis***
Attendance list	***TE Carter***
	SJ Du Plessis
	CF Greyling

Take note this meeting was held with Prof Holm in order to clear up some uncertainties about the circuit

Agenda

Progress Tracking	By 07-Sept-17 30% Complete
Issues / Risks and Mitigations	The solar panel connectors
	The price of the solar panel connectors
Decisions	How the circuit will look this can be seen in the Figure in this meeting
Actions	Simulate and finalize the wiring diagram by 05-Sept-17
	Create a list and order components by 07-Sept-17
	The solar panel connectors is a MC4 connector

Meeting 5

Date	4-Sep-17
Time	8:00
Chairman	***CF Greyling***
Attendance list	***TE Carter***
	SJ Du Plessis
	CF Greyling

Agenda

Progress Tracking	***27%***
Issues / Risks and Mitigations	*The connectors on the solar panel*
	Other connector are expensive
	Switch between power input components
	220 V AC input from mains connection to circuit
	Solar charge unit circuit
	Unsure about pricing of components MPS
	Arduino connection to charger
	Arduino connection to LED light driver
Decisions	*determine the price o components*
Actions	*Make contact with MPS about component pricing*

Meeting 6

Date	11-Sep-17
Time	8:00
Chairman	***TE Carter***
Attendance list	***TE Carter***
	SJ Du Plessis
	CF Greyling

Agenda		
Progress Tracking	***30%***	
Issues / Risks and Mitigations	progress of project	
Decisions	EMC of project	
	PCB Layout	
	Design for DC to DC converters	
Actions	design for the DC to DC converter finalized	
	will use other way to lay out circuit than PCB	

Meeting 7

Date	18-Sep-17	
Time	8:00	
Chairman	***SJ Du Plessis***	
Attendance list	***TE Carter***	
	SJ Du Plessis	
	CF Greyling	

Agenda			
Progress Tracking	***40%***		
Issues / Risks and Mitigations	***Risks***	50% deadline	Paperwork
			Show of progress
	Mitigation	informed on what is due fir 50%	
Decisions		50% deadline requirements	
		State base diagram	
	Characterization		
Actions	stock taken of progress		
	begin work for deadline		

Meeting 8

Date	23-Sep-17	
Time	8:00	
Chairman	***CF Greyling***	
Attendance list	***TE Carter***	
	SJ Du Plessis	
	CF Greyling	

Agenda		
Progress Tracking	***45%***	
Issues / Risks and Mitigations	50% deadline may not be complete	
Decisions	Work allocation for 50% deadline	

	decided that we will complete work up until where we are giving an honest representation of work progress Will work in vacation starting Tuesday 12 pm
Actions	Design module is set as priority

Meeting 9

Date	9-Oct-17
Time	8:00
Chairman	***CF Greyling***
Attendance list	***TE Carter***
	SJ Du Plessis
	CF Greyling

Agenda

Progress Tracking	***50%***
Issues / Risks and Mitigations	DC to DC converter not finding the correct ceramic caps
Decisions	Continue building
	Continue documenting
	try to finish work before the exam
Actions	general 50% assessment

Meeting 10

Date	16-Oct-17
Time	8:00
Chairman	***TE Carter***
Attendance list	***TE Carter***
	SJ Du Plessis
	CF Greyling

Agenda

Progress Tracking	***60%***
Issues / Risks and Mitigations	50-60% assessment and feedback Monday 13:00 clash with LLAW class
Decisions	Testability
	safety
	try to finish work before the exam
Actions	mitigation of risk of assessment

Meeting 11

Date	19-Oct-17
Time	16:00
Chairman	***SJ Du Plessis***

Attendance list	***TE Carter***
	SJ Du Plessis
	CF Greyling

Agenda

Progress Tracking	***60%***
Issues / Risks and Mitigations	Time for combined building limited
Decisions	safety
	HIRA
	formal lessons at an end
	Monday resubmission for documentations
Actions	Discuss safety in the project
	single point of failure

Meeting 12

Date	26-Oct-17
Time	10:00
Chairman	***CF Greyling***
Attendance list	***TE Carter***
	SJ Du Plessis
	CF Greyling

Agenda

Progress Tracking	***65%***
Issues / Risks and Mitigations	DC to DC converter chips blown, new circuit designed
	charge controller circuit not working must rebuild
	USB chips not functioning
Decisions	new DC to DC converter circuit designed
	must re-solder charge controller circuit
	date set for 27th to continue building
	new design of USB charger decided on
Actions	work on 27th
	portfolio on design updates

Meeting 13

Date	27-Oct-17
Time	8:00
Chairman	***TE Carter***
Attendance list	***TE Carter***
	SJ Du Plessis
	CF Greyling

Agenda

Progress Tracking	***70%***
Issues / Risks and Mitigations	80% milestone on the way Charger does not want to switch
Decisions	Work at home in the weekend do more testing on the charge controller assemble most of the components in the control panel
Actions	do risk mitigation of the charge controller update design portfolio and project management file

Meeting 14

Date	09-Nov-17
Time	12:30
Chairman	***SJ Du Plessis***
Attendance list	***TE Carter*** ***SJ Du Plessis*** ***CF Greyling***

Agenda

Progress Tracking	***90%***
Issues / Risks and Mitigations	100% demo on the way and final demo The coding is not yet complete and a lot of documentation still needs to be done.
Decisions	Work on the portfolio 11-Nov-2017 Submit portfolio to demi on 13-Nov-2017 Improve portfolio 14-Nov to 16-Nov-2017 Do final tests on 11-Nov-2017
Actions	Do final documentation and testing 11-Nov-2017 Send portfolio to demi 13-Nov-2017 Correct and prepare portfolio for submission.

2.4 TE Carter: Excel Project Management Documents (Member – Refer to Excel Spreadsheet in Appendix B)

Take note that the whole ELO 8 Project management spreadsheet can be seen on the CD.

2.4.1 Expertise

- Documentation
- Hardware

2.4.2 Parts of the circuit the member is responsible for:

- DCDC Convertor 1 I/F 2.0 Unit 3
- DCDC Convertor 2 I/F 2.2 Unit 3
- DCDC Convertor 3 I/F 2.4 Unit 3
- Phone Charger I/F 5.2 Unit 5
- LED Light Driver I/F 3.7 Unit 3

2.4.3 Unit Breakdown (Functional Architecture of Circuits)

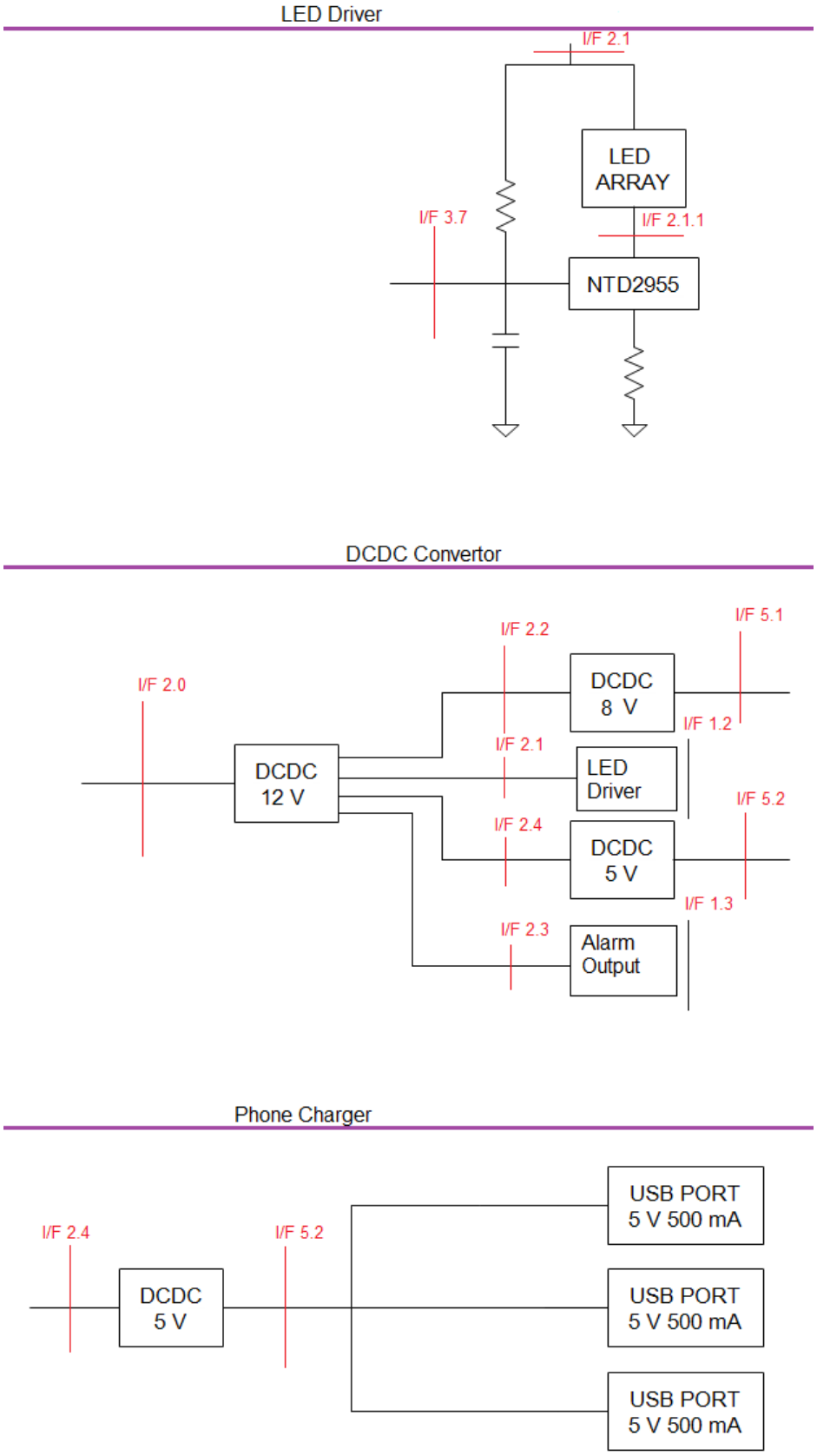

Figure 2: The Unit Breakdown for Member A.

2.4.4 Work Breakdown

Table 5: Work breakdown for Member A

Function responsible for	Additional Tasks
DCDC Convertor 1 I/F 2.0 Unit 3	Functional analysis diagram
DCDC Convertor 2 I/F 2.2 Unit 3	Research for I/F responsible for
DCDC Convertor 3 I/F 2.4 Unit 3	List and price components needed for I/F responsible for
Phone Charger I/F 5.2 Unit 5	Begin working on ELO 5 and portfolio
LED Light Driver I/F 3.7 Unit 3	Compile the budget
	Buy components

2.4.5 Timeline

Table 6: Timeline for Member A

Date	Description
17-Jul-17	Project initiation
08-Aug-17	Design Functional Analysis
10-Aug-17	Functional Analysis Test
14-Aug-17	Preliminary Design Complete
28-Aug-17	Work done as discussed in class in preparation for 30% demonstration
31-Aug-17	20% Completion Milestone
04-Sep-17	Research and design wiring diagram for components
06-Sep-17	Finalise wiring diagram and make list of components
07-Sep-17	Order components
08-Sep-17	30% Completion Milestone
28-Sep-17	Begin Assembling Components

30-Sep-17	50% Completion Milestone
27-Oct-17	80% Completion Milestone
10-Nov-17	100% Completion Milestone
16-Nov-17	Demonstration

2.4.6 Progress Tracking

Table 7: A progress tracking of Member A

Week	% of work allocated to member completed	Individual progress statement		
		Green	Amber	Red
Week 1	100%			
Week 2	100%			
Week 3	100%			
Week 4	100%			
Week 5	100%			
Week 6	100%			
Week 7	100%			
Week 8	100%			
Week 9	100%			
Week 10	Fallen behind on documentation for 50% demo			
Week 11	Components have arrived, behind on building			
Week 12	The LED has been built and tested with the signal generator and with another person's code.			

Week 13	The LED has been soldered onto the Vero board and does not work with the Arduino code		
Week 14	No other components have been built still waiting for USB chips and finding the correct capacitors for the DCDC.		
Week 15	The DCDC has been built but does not work, consulted with lecturer and found the chips were blown, the same is now true for the USB chips could be due to soldering them on. New DCDC chips have been used by classmates and USB ports have been bought because to reorder will take too long		
Week 16	All sub circuits work for this member the interface document has been updated but the lecturer will be asked if it is correct and the functional flow diagram will also be redone and the lecturer will be asked if the new one is correct. (80% demo)		
Week 17	Need to update all documentation and conduct tests on the whole system and record and document the information (100% demo).		
Week 18	Ensure all documents are up to date (Project ends).		

2.4.7 Experience Report

For the year 2017 it was required of my group and myself to design a solar system and battery system to power an alarm. In this system there would be a USB cell-phone charging port and an LED driver. It was not compulsory to add sensors and a 220 V AC source to our system, therefore the team decided to see how well time was managed before deciding on a 220 V AC source and sensor. As a member of the "So called engineers" group it was my job to research and build DCDC Buck convertors, the USB port and the LED driver circuit. At this present moment the only experience I have is in simulating these components (as the components have only arrived recently as can be seen in the progress report above), documenting ideas and choices and drawing up a functional flow diagram. Once I have completed this module I will have experience in connecting

a DCDC convertor circuit, LED driver circuit and USB port circuit, as well as using a heat-sink to reduce the LED temperature when operating and using other devices to bring down the temperature of components. The experience part of this module will only really begin once building of the circuits begins.

The rest of the team will be doing other parts of the circuit, which can be seen above in Table 3 it shows what each member is involved with for this project and the additional tasks they have to do for this module.

2.5 SJ du Plessis: Excel Project Management Documents (Member – Refer to Excel Spreadsheet in Appendix B)

2.5.1 Expertise

- Documentation and characterization
- Software
- Hardware

2.5.2 Parts of the circuit the member is responsible for

- Arduino (programing) Unit 2.0
- Human Interface Machine Unit I/F 3.9
- Solar Panel sectional test I/F 1

2.5.3 Unit Breakdown (Functional Architecture of Circuits)

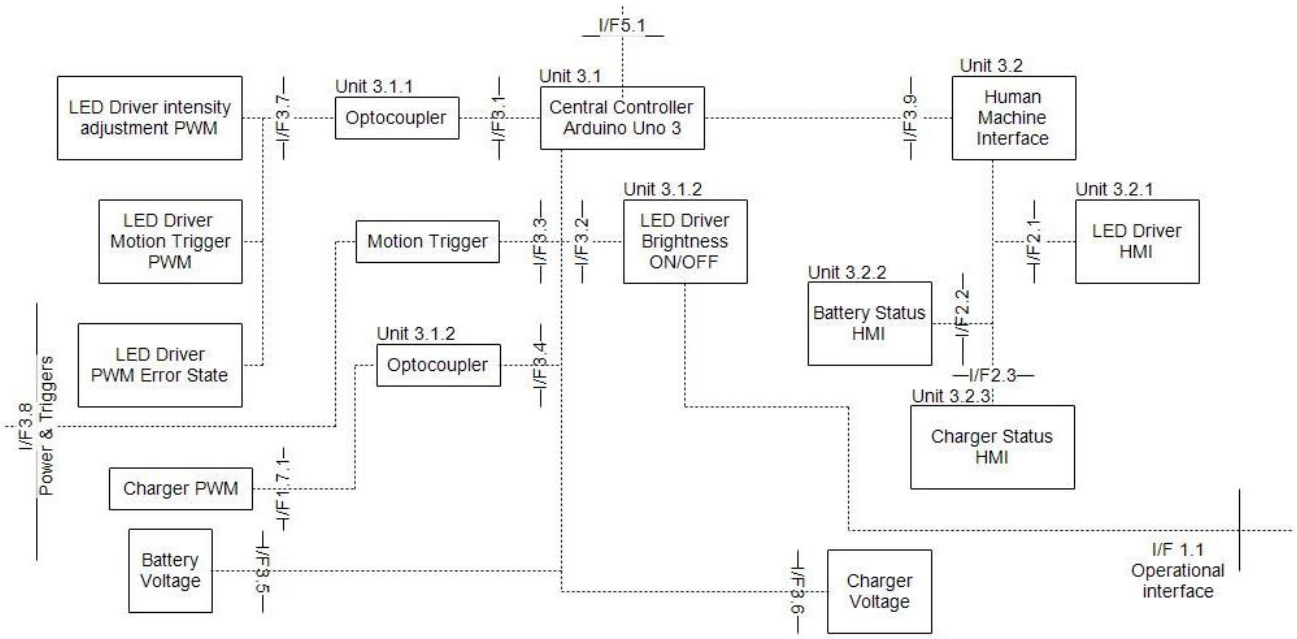

Figure 3: Unit Breakdown for Member B

2.5.4 Work Breakdown

Table 8: Work breakdown for Member B

Function responsible for	Additional Tasks
Arduino control and programming Unit 2	Specification of Interfaces
Battery charging with PWM I/F 1.7.1, 3.6, 3.5 Unit 2	RF Flow combined block diagram
LED light control with PWM Unit 3.7	PV panel characterization

Additional Trigger I/F 3.4 and 3.1 Unit 2 HMI control with LEDs I/F 3.9 Unit 2	Work further on Functional Analysis Battery charging (PWM) Begin working on ELO 5 and portfolio Submit and compile all documents

2.5.5 Timeline

Table 9: Timeline for Member B

Date	Description
17-Jul-17	Project initiation
10-Aug-17	Functional Analysis Test
12-Aug-17	Specification of Interfaces
14-Aug-17	Preliminary Design Complete
28-Aug-17	Work done as discussed in class in preparation for 30% demonstration
31-Aug-17	30% Completion Milestone
4-Sep-17	PV panel characterized
30-Sep-17	50% Completion Milestone
27-Oct-17	80% Completion Milestone
10-Nov-17	100% Completion Milestone
16-Nov-17	Demonstration

2.5.6 Progress Tracking

Table 10: A progress tracker for Member B

	% of work allocated to member completed	Green	Amber	Red	Description
Week 1	100%				
Week 2	100%				
Week 3	100%				
Week 4	100%				
Week 5	100%				
Week 6	100%				
Week 7	100%				
Week 8	100%				
Week 9	100%				
Week 10	50% demonstration				Fallen behind on documentation for 50% demo
Week 11	Need to start building				Components have arrived behind on building

Week 12	60%				Test week
Week 13					Helped with LED layout and soldered to Vero board. Small amount of diming with Arduino. Arduino switching correctly on oscilloscope.
Week 14					Still not sure what was wrong with the LED circuit. Characterized the Solar panel in the sun and compared results against datasheet
Week 15					Coded on main program, still wanting on other circuits to test them for functionality and to finalize the code. Focused on other subjects practical's and tests.
Week 16	80% demo				LED circuit fault found. LED current limited with to high resistance. Replaced 1k ohm resistor with two 1.2 ohm 5W resistors. Code dimes the LED. Helped with the DCDC convertors as well as the charge circuit. The charge circuits had an fault and the layout on the Vero board made it hard to connect loads. Redesign the layout and made the load connects easier.
Week 17	100% demo				Document the new designs and finalize the programming of the Charger and LED.
Week 18	Project ends				Finalize final errors and final test on designs

2.5.7 Experience Report

It was required from our group to design a power system for an alarm system with solar - and AC power from the grid. The solar panel and AC power supply deliver power to the alarm system, highest priority, but also to an LED driver, Arduino and mobile phone charging. The solar panel and power supply also charge a lead acid battery with a p-MOSFET and PWM from the Arduino. The Arduino controls the charge state in which the battery operates. When the solar and AC power fails away the battery is the power source to the alarm system. The LED driver is controlled by a n-MOSFET and PWM from the Arduino. The Arduino controls the power output of the LED to minimize power usage. It is my job to code the Arduino and control the battery charging and LED driver with PWM. When only the battery is supplying power to the system the mobile phone charging is disabled with the Arduino. The battery has three modes namely normal -, trickle - and discharge. Between a certain voltage range, the battery is charge normally with 100% duty cycle but when the voltage is above the range the battery is charge just to keep it from discharging, thus with a lower duty cycle. If the battery delivers power it is in the discharge mode. The Arduino

controls the HMI which is kept basic with LEDs. The inputs values are uses to change the LEDs colours for different representations.

I have software experience from high school and was asked by fellow members if it is possible for me to do the program because they do not feel comfortable to do it. After the module I will have gained experience in group work and programming of an Arduino and how to protect the Arduino as well as better understand on how to manage a project from the beginning to the end with the help of a great mentor.

The true experience will be gained when the manufacture of the system starts. The work allocation of the other members can be seen in Table 3.

2.6 CF Greyling: Excel Project Management Documents (Member – Refer to Excel Spreadsheet in Appendix B)

2.6.1 . Expertise

- Hardware
- Documentation
- Taking notes
- Software such as
    - Excel
    - word
    - RF Flow

2.6.2 Parts of the circuit the member is responsible for:

- Solar panel – Interface 1.0
- Mains (If applicable) – Interface 6.0 and 6.1
- Diode circuit power switching – Interface 1.0.0
    - Interface 1.0.1
    - Interface 1.0.2
    - Interface 1.0.3
- Charge controller – Interface 4.0 (to Arduino - Interface 1.7 – with SJ du Plessis)
    - Voltage sensor – Interface 4.1.1 (to Arduino - Interface 1.7.1– with SJ du Plessis)
    - Current sensor - Interface 4.1.2 (to Arduino - Interface 1.7.2– with SJ du Plessis)
- Battery – Interface 4.1

2.6.3 Unit Breakdown (Functional Architecture of Circuits)

The individual unit breakdown can be seen in the Figure 4 below.

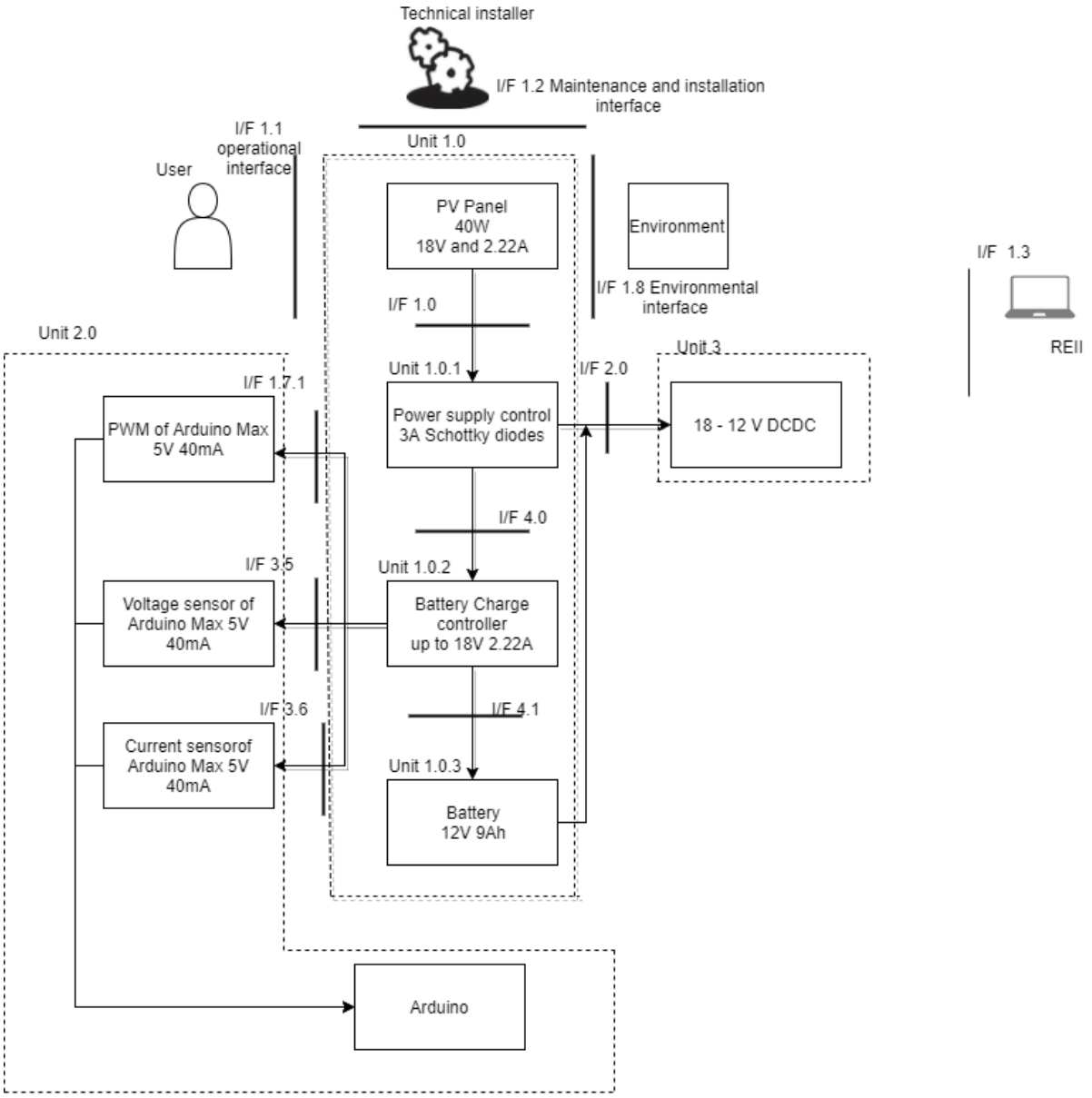

Figure 4: Unit breakdown for Member C

The diode interface numbering revers to Figure 5 below.

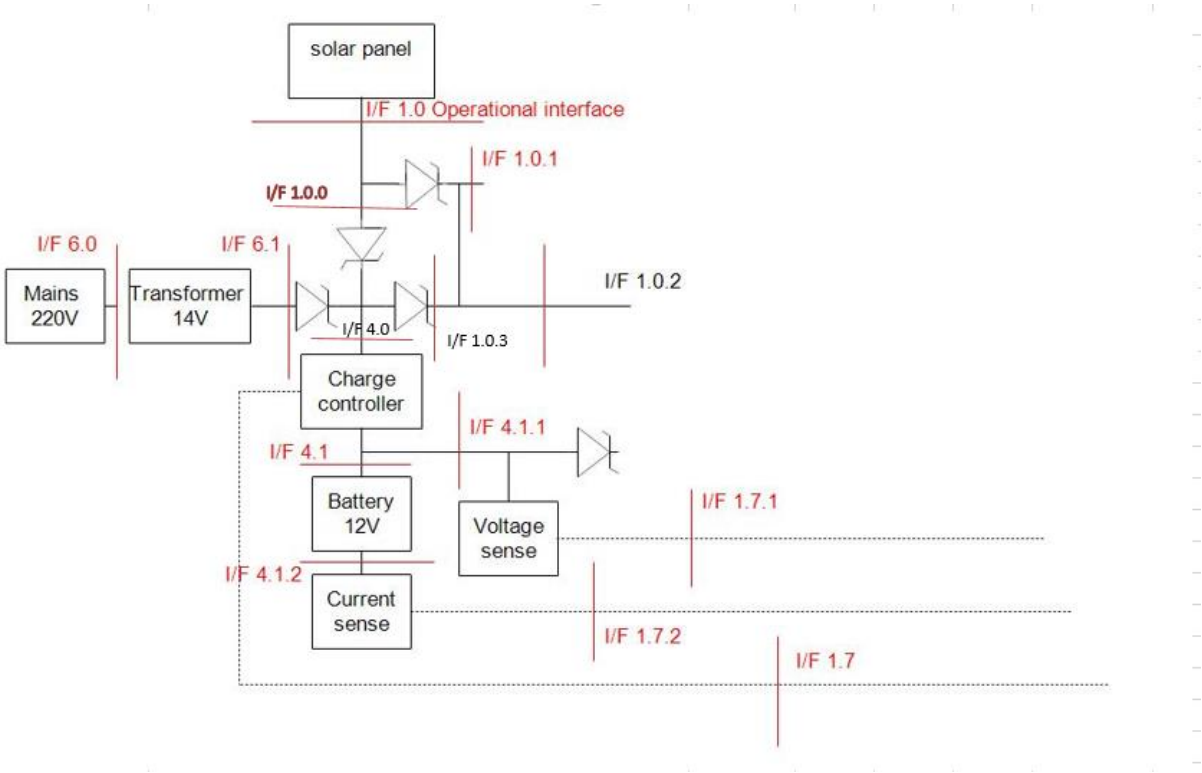

Figure 5: Diode referencing Interface architecture breakdown

2.6.4 Work Breakdown

Table 11: Work Breakdown for Member C

Function responsible for	Additional Tasks
Solar Charge Unit and PSU I/F 4.1 Battery I/F 2 220 V Mains Input (Optional) I/F 6 Solar Panel I/F 1	Functional architecture Research for I/F responsible for List and price components needed for I/F responsible for Compile the power budget Work on ELO 5 and portfolio Document team work Document meetings Document requirements Simulations and Circuit diagrams of I/F responsible for

2.6.5 Timeline

Table 12: Timeline for Member C

Timeline	
17-Jul-17	Project initiation
10-Aug-17	Functional Analysis Test
10-Aug-17	Functional Analysis Complete 2 levels

14-Aug-17	Preliminary Design Complete
28-Aug-17	Work done as discussed in class in preparation for 30% demonstration
29-Aug-17	Complete research aspect
30-Aug-17	Finalize first component list
31-Aug-17	30% Completion Milestone
4-Sep-17	Finalize who is working on which part of the circuit
7-Sep-17	Order Components and finalize wiring diagram
28-Sep-17	Start Assembling Circuit
29-Sep-17	Buy battery and other remaining components
2-Oct-17	Buy other remaining components including diodes
3-Oct-17	Start building
4-Oct-17	Compile portfolio documentation
4-Oct-17	50% Completion Milestone
4-Oct-17	Portfolio and documentation up to date due for submission
9-Oct-17	Prof Holm 50% Evaluation in class
16-Oct-17	Feedback on 50% evaluation
16-Oct-17	60% Completion milestone
17-Oct-17	Solder charge controller
21-Oct-17	Solder final circuit
23-Oct-17	Test diode circuit
27-Oct-17	80% Completion Milestone
3-Nov-17	Test charge controller circuit
8-Nov-17	Integrate circuit
8-Nov-17	Trouble shoot circuit
9-Nov-17	Re-solder circuit after mistake was discovered
9-Nov-17	Integrated circuit test
10-Nov-17	100% Completion Milestone
15-Nov-17	Complete documentation
16-Nov-17	Demonstration

17-Nov-17	Hand in Portfolio and ELO5 documentation

2.6.6 Progress Tracking

From the documentation in excel the following work progress tracking is done using the RAG status.

Table 13: A progress tracker for Member C

		Individual progress Status			
	% of work allocated to member completed	**Green**	**Amber**	**Red**	**Notes**
Week 1	100%				
Week 2	100%				
Week 3	100%				
Week 4	100%				
Week 5	100%				
Week 6	100%				
Week 7	100%				
Week 8	100%				
Week 9	100%				93% on evaluation from lecturer
Week 10	Fallen behind on documentation for 50% demo				components have arrived but behind on building schedule
Week 11	Components have arrived behind on building				redesign circuit without mains 220V power supply
Week 12					redesign circuit without mains 220V power supply
Week 13	60%				Correct Schottky diodes must be bought for the power supply management
Week 14					Learn how to solder. Built the charge controller circuit and the diode circuit. Ready for testing next week.
Week 15					Discovered mistake in diode circuit, unsolder main components from board, re-solder correct circuit, use node checking. Diode circuit fixed and working, solar panel tested and working, battery tested and working. Test Arduino with charging switch.

Week 16	80% demo				Documentation on track. Diode is switching the circuit. Battery working. Solar Panel working. Charge controller functional but will not switch correctly. Ask Prof if the ground is where the mistake is. Therefore not all individual components working and not on track for 80% milestone. Would rate work at 80% of the 80% milestone.
Week 17	100% demo				Test integrated system. Document the testing. Complete documentation.
Week 18	Project ends				Ensure all documentation is complete

2.6.7 Experience Report

Our team consisting of TE Carter, SJ du Plessis and CF Greyling are required to design and build a solar powered alarm system for the module INEM 327 in the second semester 2017. The alarm panel and motion sensors is the responsibility of the REII 327 student, however it is expected of our team to provide the REII students RaspberryPi with 12 V and 6 Watt as agreed upon in the interface 3.5. For the system there will be either three or four power sources, firstly the 40W solar panel that will be the primary power source and will load the battery. The second source is the battery that will act as power source at night or when the solar panel does not have sun. The last and optional power sources is the mains power which is a 220 V AC power source therefore it will need a transformer to convert the power to DC 12 V source this is very expensive. This will only be added on if there is still finance and time left at the final stages of the project, as the mains would not be used as primary source at any stage it is a backup for the system if both the solar panel and the battery is incapable of acting as power source.

For the system the charge of the battery will be controlled with pulse width modulation (PWM), the PWM is controlled with Arduino for which SJ Du Plessis is responsible, while I am responsible for the Charge controller and the Voltage and Current sensors that will be used to do the calculations with for the PWM with the Arduino this interface between the Charge controller and the Arduino is interface 1.7, the voltage sensor interface with the Arduino input is interface 1.7.1 and the current sensor interface with the Arduino input pin is interface 1.7.2. For the PWM charging algorithm the set point is changes automatically according to the battery voltage. During the charge the amount of charge current is determined by the difference between the battery voltage and the charge set voltage. The Arduino will then give a high or low output the p channel

MOSFET that form part of the charge controller depending on the status. Therefore the battery will be charged with treacle charge.

For the system lightning protection is added in the form of a Transorb and fuses for thither circuit protection from spikes are added at the battery and the solar panel which is part of my responsibility for the project. Thither more I am responsible for the switching between power sources, this is done by adding Schottky diodes throughout the circuit so that the power is firstly pulled from the solar panel and if that should drop below 14 V it will start tapping power from the battery if the voltage drops below 12V then it will start getting power from the mains (in the case that we should add the mains power source). Thither more I am responsible for the documentation of team work and the taking of notes during class for the subject. In the system there is also a USB cell-phone, DC-DC buck converter charger and LED driver this is the responsibility of TE Carter. While the other responsibility of SJ du Plessis is to build and research the Optocoupler for the circuit.