ECE 212: Sprint Review, Retrospective & Planning report for Team 15

SPRINT 1

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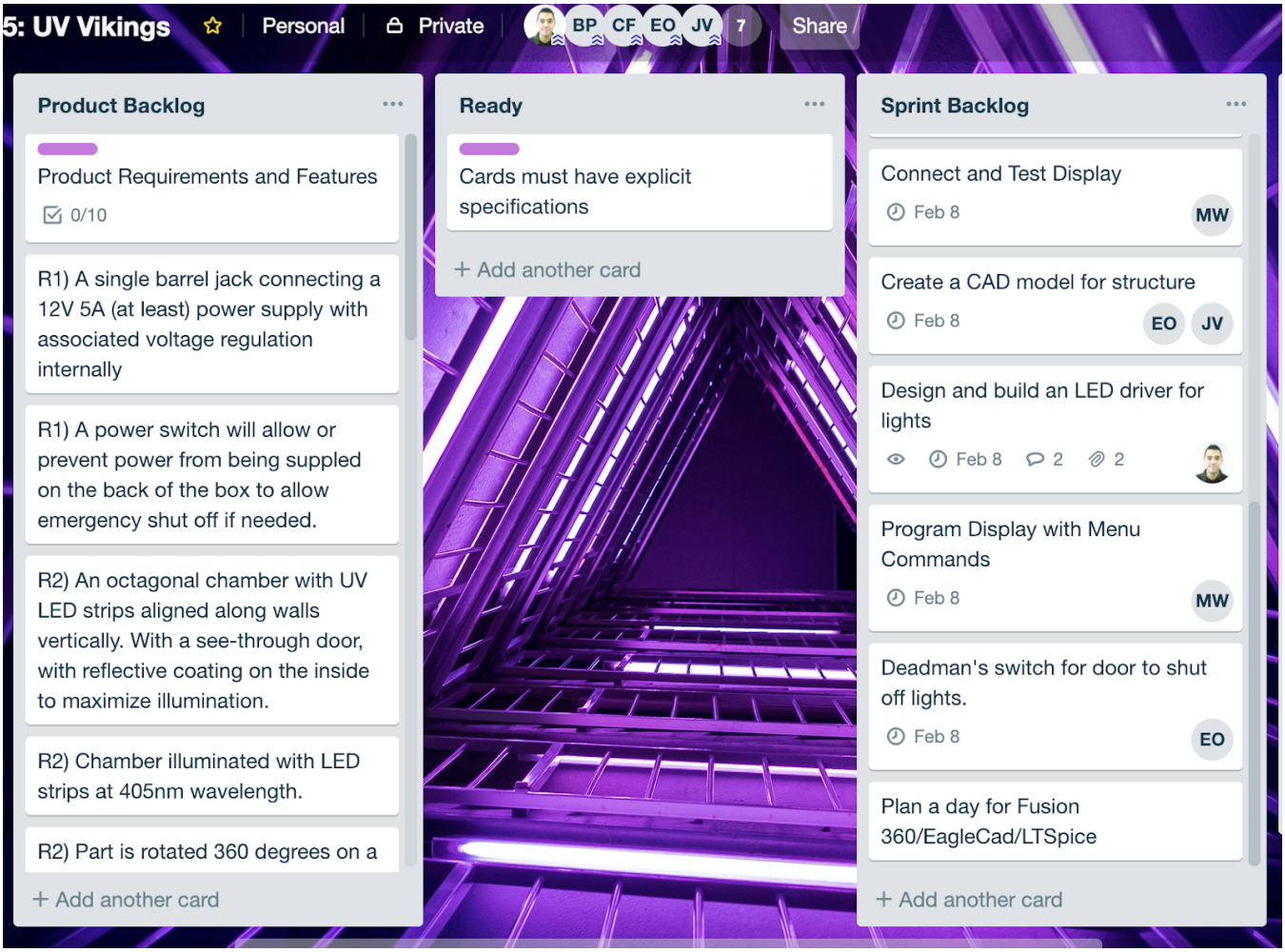
I. Sprint Review

The goal of the completed sprint was to have purchased all needed parts, completed research on sizing, have a prototype power regulation and heating circuit that has been tested with sample code, have a preliminary design and prototype of the curing chamber structure with a detailed CAD model, and have a working LCD screen.

Sprint Backlog Status

Sprint Backlog items DONE (bulleted list)	• Purchased all required components • Completed research on curing settings and chamber size requirements • Completed prototype power regulation circuit • Completed prototype heating circuit • Completed sample code for heating feedback loop • Completed preliminary chamber design and prototype

Sprint Backlog items NOT DONE	Reason for NOT DONE	Keep in backlog (Y/N); why?
Get LCD screen working	*Can't map over pins from Arduino to ESP32 for this particular screen*	*Yes, the LCD screen is a requirement for this project. We may switch to a different LCD screen we know works.*
Test out actual heating element with chamber	*Need to do final safety checks and make circuit more robust*	*Yes, the heating element is a requirement for this project and should be tested well before final implementation.*
Circuits drawn in LTSpice	*Can't figure out how to add custom elements to LTSpice*	*Yes, but maybe will use another program (iCircuit) which is easier to add custom elements into.*
Detailed CAD model	*Still learning how to use Fusion 360.*	*Yes. The CAD model will be good reference for making future design decisions and for communicating proposal to Chris at the EPL.*



Full Product Backlog Pruning

Our full product backlog has been fleshed out to include safety requirements, including the addition of a dead-man's switch to turn off the lights in case the door is opened during curing time. The items for our next sprint will include getting the LED lights functioning safely by implementing an LED driver, getting the LCD screen working and designing and programming the menu options, getting the rotary encoder functioning, and the design of a dead man's switch for the switching off of the lights when the door is opened. We will also build a chamber prototype that includes the screen holder which will be 3D printed.

It is too early to start removing features from our overall backlog. However, we have made some changes in our original ideas in the interest of time, including switching from a larger touchscreen LCD screen which we haven't been able to get functioning to a smaller one which we know functions from our previous project. We are also reconsidering the usage of an acrylic door but we haven't made a decision on this quite yet. We may drop the functionality of notifying users via the internet when the part is complete as this functionality seems superfluous both to our team and to Chris from the EPL. Instead, we are considering using the WIFI capability of the ESP32 to log data on usage and function to allow us to track its ability to function properly and provide data for users to track the results from various curing settings.

- A power switch will allow the shutting off of the power supply to the entire product.

- Octagonal chamber with an acrylic see through door with reflective film on the inside.
- Chamber illuminated with 405nm lights.
- Part rotated 360 degrees with a DC motor.
- Resistive heating pad placed in the chamber with a feedback loop to maintain temperature.
- Chamber will be completely enclosed to prevent UV light leakage.
- Dead man's switch will shut off lights in the event that door is opened before curing is complete
- Will include diagnostic functions to test lights and temperature controls.
- Will log usage data on a web feed.
- Will include simple to use menu.
- Custom settings can be saved into presets.
- LCD screen will be mounted onto 3D module that fits within larger chamber.

Technical and other difficulties

During this sprint, Matt discovered that the LCD screen that we intended to use did not have any readily available libraries that would allow us to interface with any devices besides Arduino. Matt noticed that it was not like the other I^2C interface that he had dealt with because of its additional 8 data input pins that were vital to its functionality. From this roadblock, he had to decide whether an LCD shield was the best fit for the project or if he should acquire a simpler screen with a more traditional I^2C interface. After reverting back to the 1.8" TFT LCD screen that he's been using with the HUZZAH32 board, he was able to get the screen to work with some simple graphics libraries. There is still an issue with this new screen as well. Even though it is compatible and functional with the HUZZAH32 featherboard, the ESP32 DEV Module featherboard is still unresponsive to the I^2C interface. Matt had to verify that the board is being written to by creating LED blink programs on the pins as well as verify that the code works for the HUZZAH32 board which uses the same ESP WROOM 32 processor. These bugs challenged Matt to look closer and harder at the software and hardware of these boards and to try new debugging methods.

(Briefly discuss what new skills you learned during this sprint. Give this information for each team member. One paragraph.)

Chuck: During this sprint I learned a lot about how to use voltage regulators, in particular the LM7805 to convert a 12V power supply to a 5V power supply to be able to power the ESP32. I also learned a lot about using transistors as electrically controlled switches to control the switching on and off of a fan using the microcontroller. I also became familiar with relays which are another form of electrically controlled switch, which completely isolates the circuit being controlled from the microcontroller using inductive coils internal to the relay to control mechanical switches.

Matt: Some of the most substantial lessons I learned on this sprint is that even if I am programming a board with a familiar processor chip on it, I should not expect the same outcomes as my previous experience with the chip. I cannot be certain that an idea that sounds pretty solid will actually work. What helped me learn this was the practice of rapid prototyping different LCD screen configurations. Although it didn't help me find a final solution to my problem, it did help me flesh out some some issues in my design.

Edgar: Reflecting back on this past sprint something that I started to learn was using the program Fusion 360 by playing around with the different settings and commands the program allows you to do to try and build a 3D design that will help with further design implementations. A different skill that is not so much technical but

practical is being more organized in the Trello board by remembering to add to it and writing down notes to help with further task and Trello management.

Jesse: During this sprint I was introduced to CAD design. I have had the chance to use Fusion 360 to produce a 3D design which will help us with the final building process. We still have not decided on a material for the final build, but having a 3D model will shorten the build time, as the vector images produced will give us the ability to have the enclosure laser cut. I have also had the opportunity to work with voltage regulators. Following Chuck's design, I am assisting in completing the final circuit board build by soldering the components (i.e. barrel connector, LM7805 ect.) to the logic board.

II. Sprint Retrospective

(Describe the process of how you went about sprint planning and your use of planning tools (Gantt chart, Trello). One paragraph)

We started by identifying the requirements for this project, and the desired specifications we wanted our product to have. We then developed a functional decomposition of our project and broke the project into mechanical, electrical, and programming tasks. We made a list of the tasks we wished to complete this sprint on Trello, and assigned each task to a member and set the deadline to the end of the two week sprint. It was then up to each team member to review their tasks and make a checklist of what they needed to complete in their tasks.

Things that went well

- Group meetings were productive and our stand-up meetings became a habit.
- Having dedicated members for meeting notes really helped us keep track of what went down at each meeting!

Things that could be improved

- We need people to review the cards in the "Review" stack on Trello to make any notes if needed and approvals or disapprovals.
- Cards aren't being moved from "In Progress" to "Review" when they are being completed.
- Because of the way the project was broken down some members didn't have a particular task to complete in terms of product development and so didn't have too much to share during stand-ups.

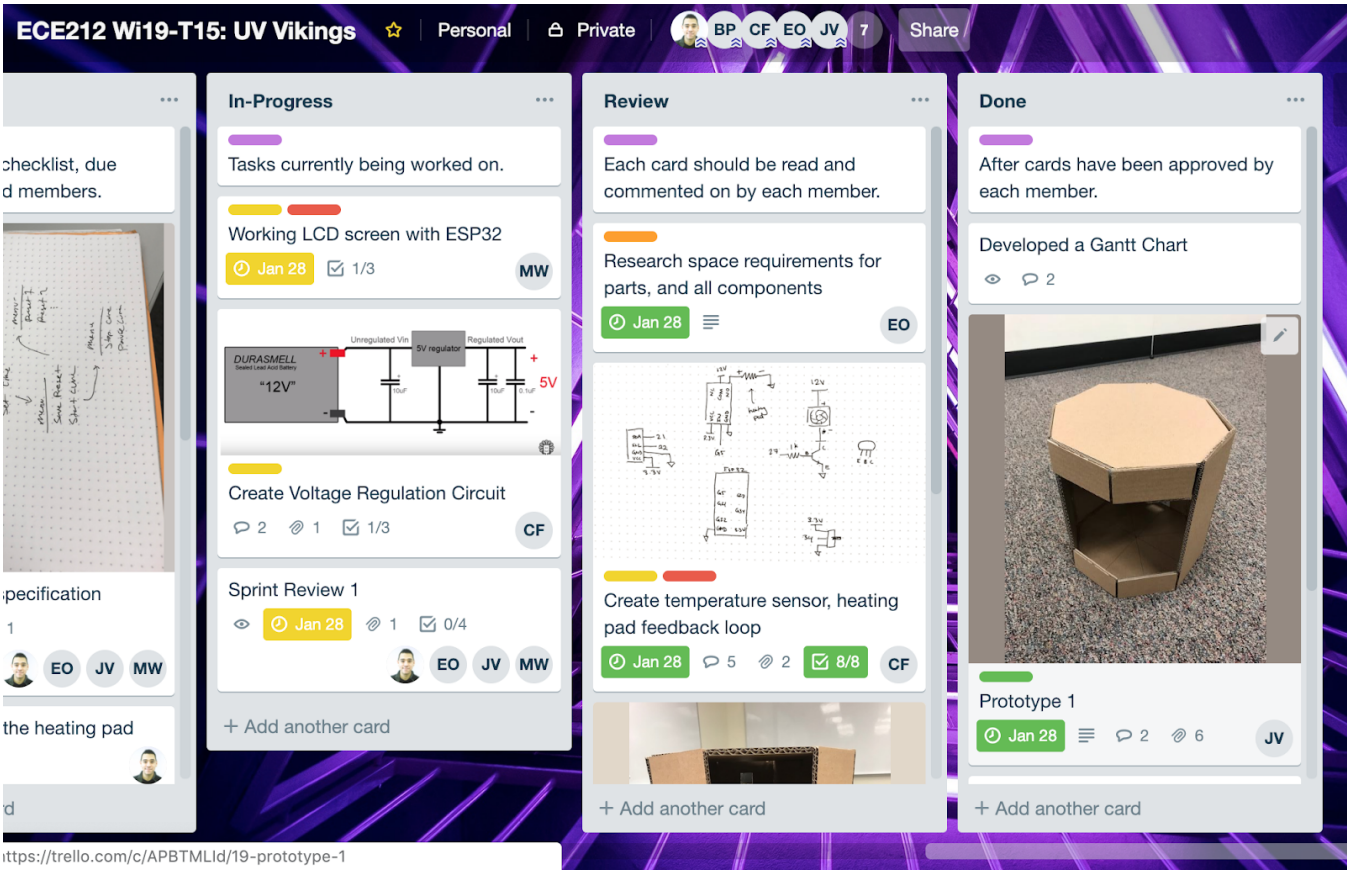
Suggested improvements

- Maybe setting aside some time after stand up meetings going through the "Review" stack and reviewing completed tasks and moving cards as necessary.

- We need to look again at the functional decomposition to see if we can break down the project into logical chunks so that all members have tasks to complete both technical and managerial.

Trello

We are now putting the project ‘requirements’ onto its own card in the Product Backlog, and then created cards with specifications that directly reference each of the requirements within the Product Backlog. These can be changed as needed, but will help us guide our task creation and assignment to various members.



Overall, we would give ourselves a score of **3.5/5** for how well this sprint went.

III. Next Sprint Planning

Overall project plan

In this sprint, we plan to program the LCD screen to have a selectable menu, integrate the UV LED strips into our current circuit design, complete the CAD model of our structure, and have a more finalized container.

SLA RESIN CURING STATION GANTT CHART

PROJECT TITLE		SLA Resin Curing Station				Team Name	UV Vikings	
PROJECT MANAGER		Chuck Faber				TODAY'S DATE	1/27	
WBS NUMBER	TASK TITLE	TASK OWNER	START DATE	DUE DATE	DURATION	% COMPLETE	R&D	Prototype #1
							Fall W10: 11/19-11/23 Fall W11: 11/26-11/30 FALL W12: 12/3-12/7	WIN W1: 1/7-1/11 WIN W2: 1/14-1/18 WIN W3: 1/21-1/25 WIN W4: 1/28-2/1
							M T W R F M T W R F M T W R F	M T W R F M T W R F M T W R F M T W R F
1	Research and Developement - FALL W10-W12	☺	11/19	12/7	20	100%		
2	Prototype #1: Functional Design – WIN W1-W4	☺	1/7	2/1	24	59%		
2.1	Create Rough Design from Low Level	Elec/Mech	1/7	1/18	11	100%		
2.1.1	► Create Specifications for Design	Whole Team	1/7	1/12	5	100%		
2.1.2	► Research Components to Meet Specs	Whole Team	1/12	1/18	6	100%		
2.2	Order Components and Record Receipts	Elec/Mech	1/18	1/19	1	100%		
2.3	Create an Algorithm	Comp/Softw	1/7	1/18	11	75%		
2.3.1	► Decompose Algorithm into Functions	Matt/Chuck	1/7	1/10	3	75%		
2.3.2	► Research Peripheral Components for Functions	Matt/Chuck	1/10	1/14	4	100%		
2.3.3	► Write Functions and Main Program	Matt/Chuck	1/14	1/18	4	50%		
2.4	Order Peripherals and Record Receipts	Comp/Softw	1/18	1/19	1	100%		
2.5	Design and Print Prototype PCB Board	Matt	1/21	1/22	1	25%		
2.6	Solder Wires and Connections onto PCB Board	Jesse/Edgar	1/22	1/25	3	0%		
2.7	Laser Cut + 3D Print Any and All Additional Parts	Jesse	1/25	1/28	3	0%		
2.8	SPRINT #2: Assemble Components Together	Whole Team	1/28	1/30	2	0%		
2.9	Test Design and Code Against the Specs	Whole Team	1/30	2/1	2	0%		
3	Prototype #2: Refining Design - WIN W5-W7	☺	2/4	2/22	18	0%		
4	Final Product: Finishing Design - WIN W8-W10	☺	2/25	3/15	20	0%		

Percentages complete were added for each task, and we updated the timelines.

Requirements

Requirements:

R1) One power supply shall power the entire product.

R2) Product shall provide 360 degrees of part illumination at the appropriate wavelength.

R3) Chamber shall be kept at optimal curing temperature for the duration of the curing process.

R4) Product shall safe to use.

R5) Product shall fit printed objects of the maximum size from the Form 2 SLA printers.

R6) Product should operate reliably for at least 1 year.

Features:

F1) Product should be simple and easy to use.

F2) Temperature and time settings should be able to be customized for advanced users.

F3) Users should have the option to be notified via cloud once curing is complete.

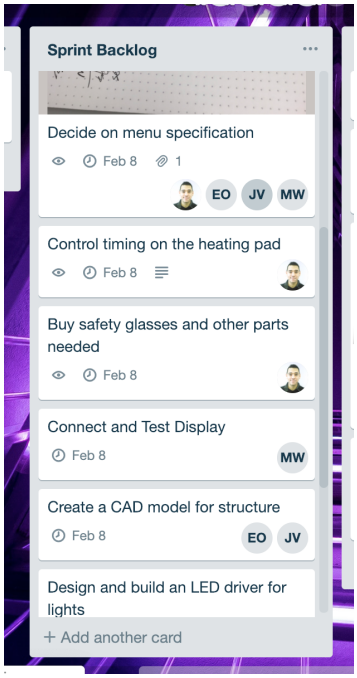
F4) Product should be attractive and fit on a desktop.

Functional decomposition

No changes to L0 or L1 are required at this time.

Sprint details

The goal for this sprint is to finish the tasks from the last sprint that didn't get done like the LCD screen to work in order to start working on the menu and its functions, have 3D model in fusion 360 and continue to work on the heating regulation.



- Decide on menu specifications
- Control timing on heating pad
- Connect and test display screen
- Create cad model
- Program display with menu commands
- Deadman's switch for door to shut off lights.

The highest priority for this sprint is getting the LCD screen to work and the heating timing to work as well since they are key points in getting the rest done because that will allow us work on the menu command specifications, the menu specification will allow for the heating to work because the heating temperature and time is based on the users input from the menu. Matt is in charge of getting the screen to work and testing, chuck is working on getting the timing of the heating pad right, Jesse and Edgar are in charge of creating a cad model for further prototype reference, Edgar is charge of implementing a switch that will shut off the UV lights for safety reasons. And as a unit we are all in charge of deciding what menu functionality we want the user to have.

The testing that will be done for this sprint is on the LCD screen to make sure it's working, the heating pad timing to make sure it regulates and stops when the timer hits zero and figuring out the menu commands and functions in the code, specifically when a user enters a certain resin type that the other components will correspond to such menu specification.

Our team T15 met with our Scrum Master Shahad on 1/25/2019. We discussed Sprint Planning. All team members have read this report and agree that it accurately describes our discussion.