Dwight Look College of ENGINEERING
TEXAS A&M UNIVERSITY

Team 21: 3D Printer and Application Interface
Bi-Weekly Update 4

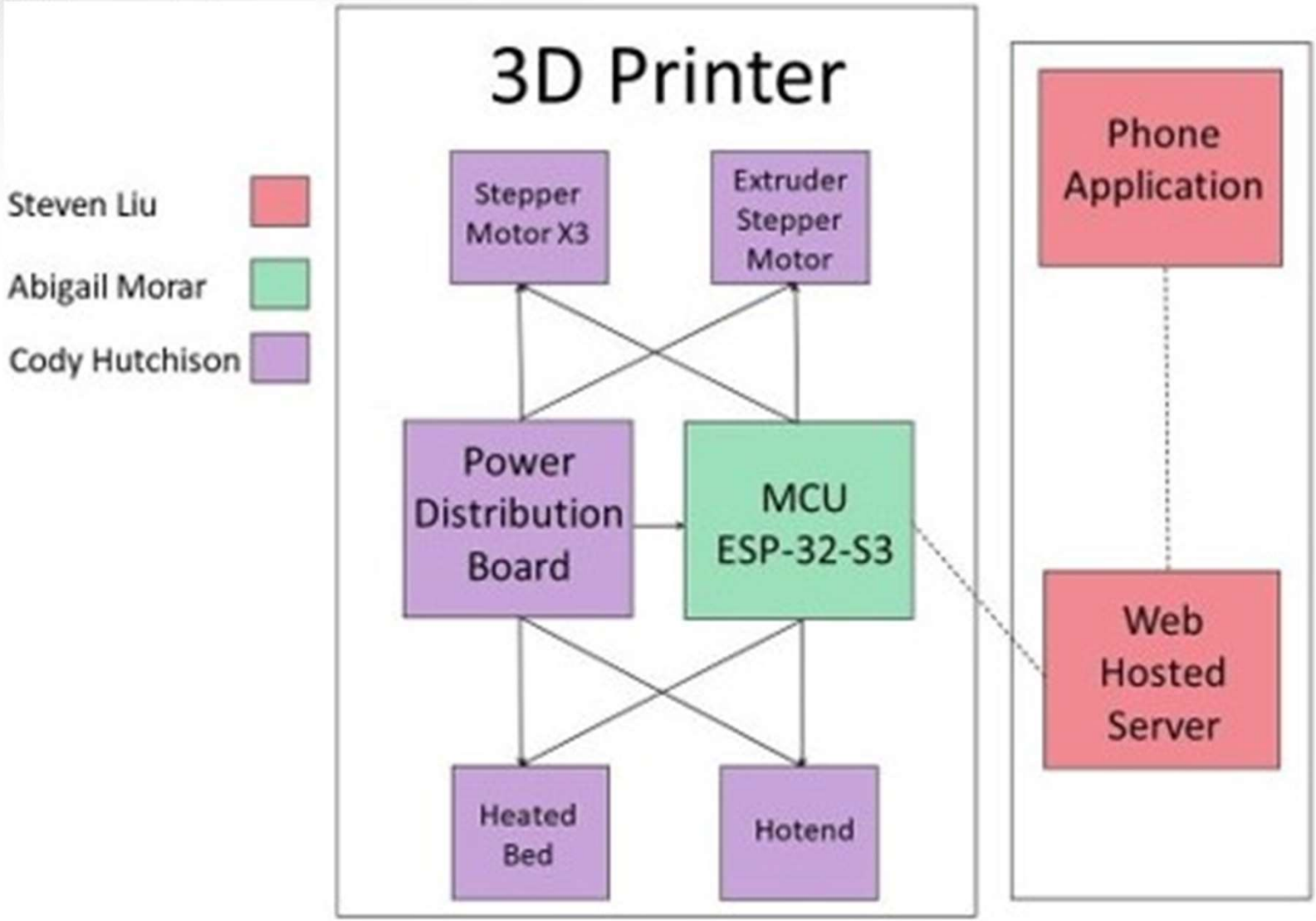
Cody Hutchison
Steven Liu
Abigail Morar
Sponsor: Dalton Cyr
TA: Milenka Gamero

Project Summary

- Current 3D printers require the user to manually upload a G-code file by an external storage device and initiate the printing process via controls on the printer

- The new 3D printer and Application will allow the uploading, controlling, and initiation of printing from anywhere with internet access. The print time will also be within 10% of the Ender 3 printing time while also attempting to speed up the Z-axis movement speed.

Project/Subsystem Overview

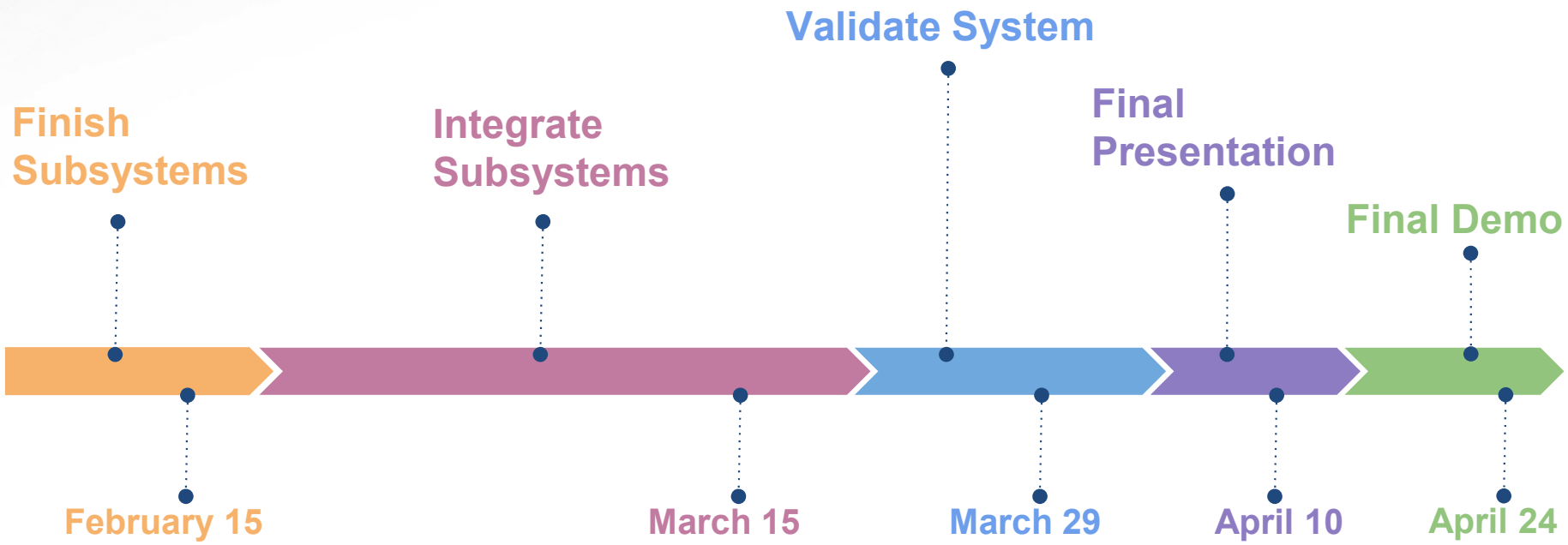


Project Changes for 404

Everything is still **on track** from what was planned in 403.

As of now, changes are mostly geared towards fixing bugs in the current subsystems, preparing for full integration, and dealing with whatever problems may arise from that.

Project Timeline



Electrical Subsystem

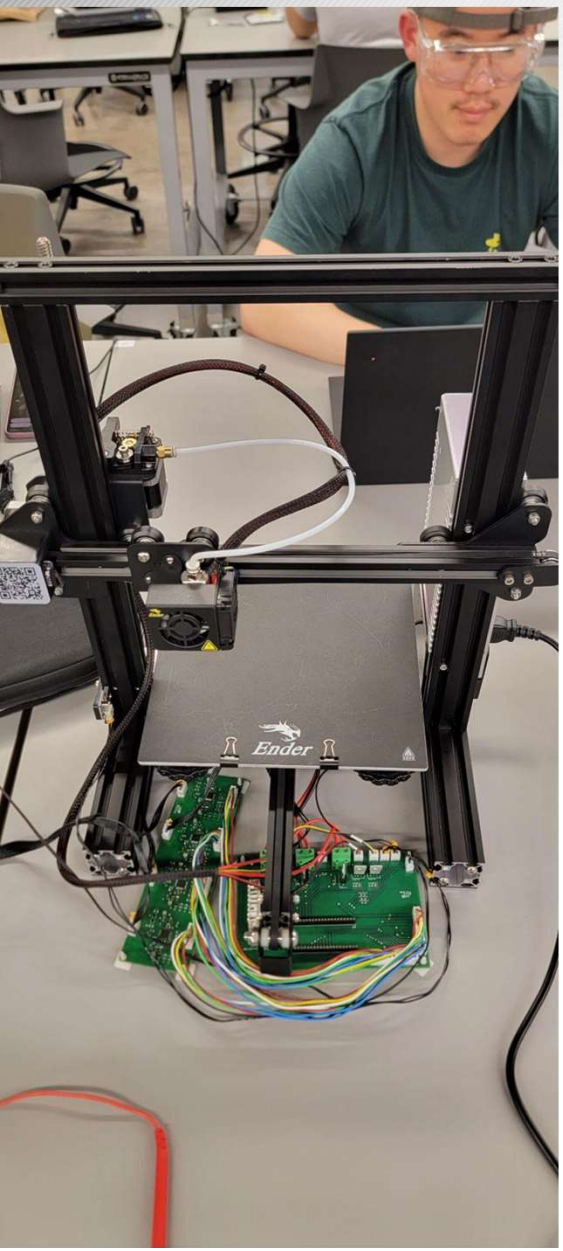
Cody Hutchison

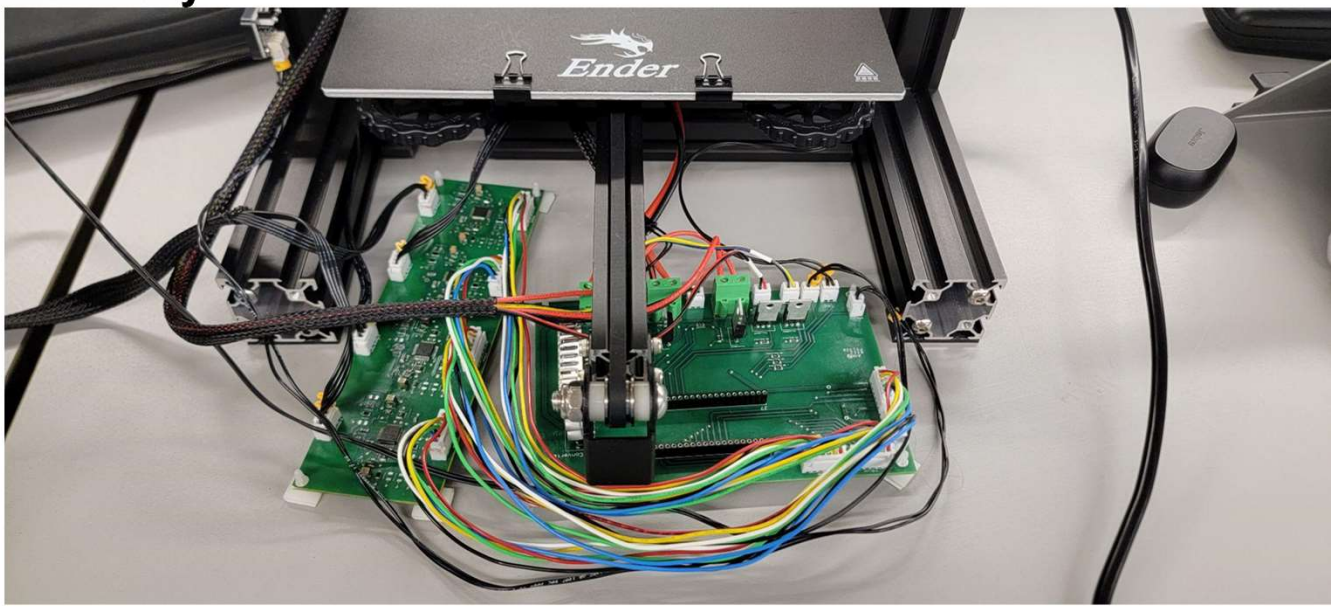
Accomplishments since last update 16 hrs of effort	Ongoing progress/problems and plans until the next presentation
	- Integrate PCB with MCU - Design printer case for PCBs

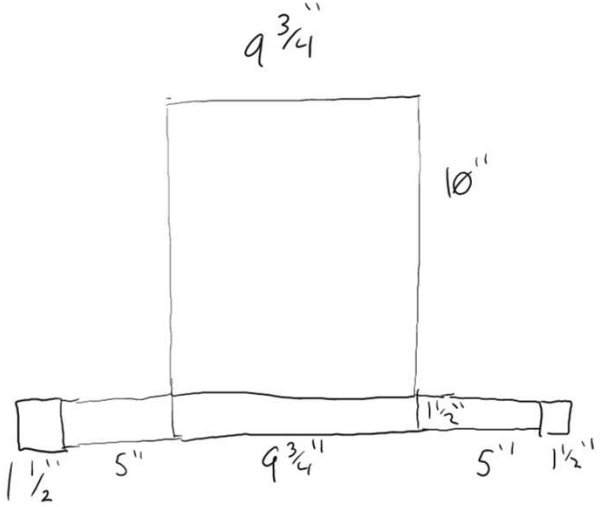
Dwight Look College of ENGINEERING
TEXAS A&M UNIVERSITY

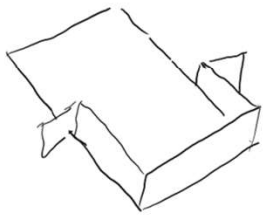
Electrical Subsystem

Cody Hutchison









Application and Server Subsystem

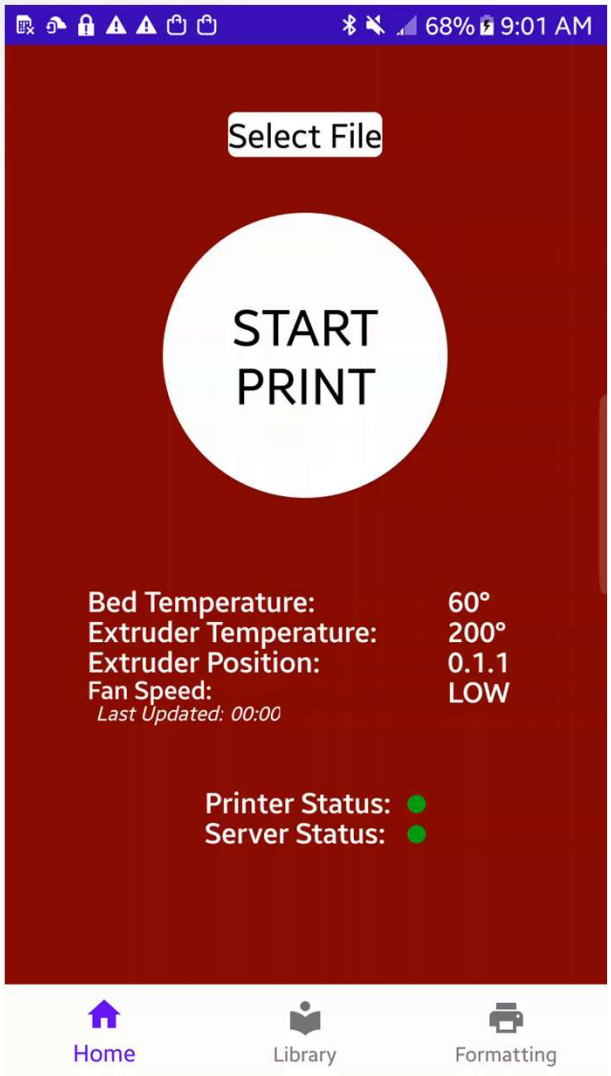
Steven Liu

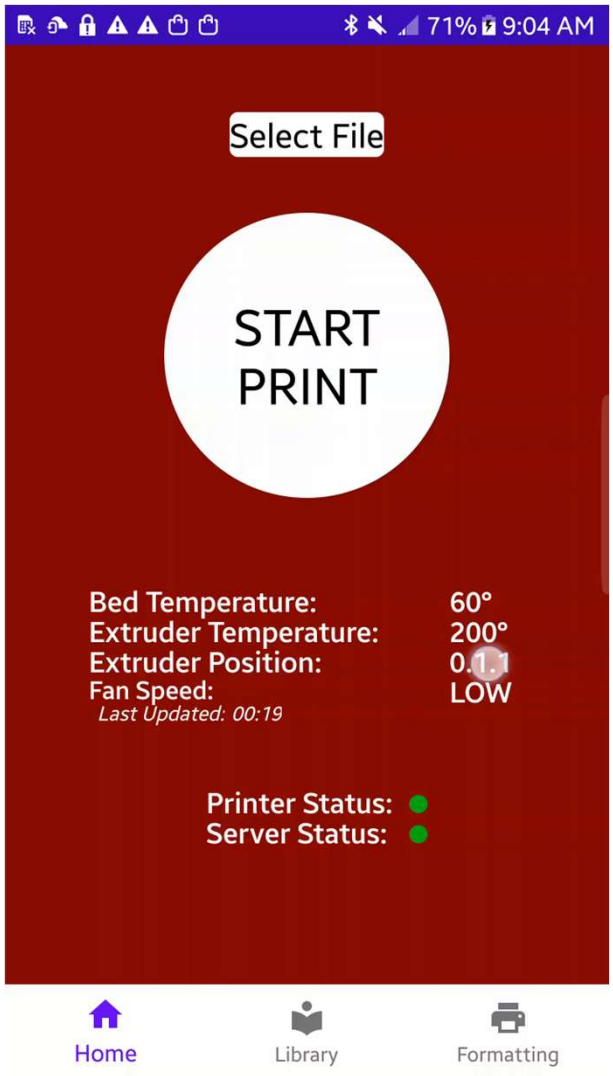
Accomplishments since last update 10 hrs of effort	Ongoing progress/problems and plans until the next presentation
- Application tuning - Added print completion notification	- Look for possible improvements

Dwight Look College of ENGINEERING
TEXAS A&M UNIVERSITY

Application and Server Subsystem

Steven Liu





Dwight Look College of ENGINEERING
TEXAS A&M UNIVERSITY

Microcontroller Programming Subsystem

Abigail Morar

Accomplishments since last update 53 hrs of effort	Ongoing progress/problems and plans until the next presentation
- Began integration with Electrical Subsystem - Full communication to fans, heated components, and stepper motors - Full control of fans and heated bed	- Value constants for hotend - steps/mm, and steps/rev, speed - ensure all parts are functioning as designed before validation across all subsystems

Integration

Accomplishments since last update	Ongoing progress/problems and plans until the next presentation
- Began integration between MCU and Electrical Subsystem	- Validate App/Server and MCU integration - Validate MCU and Electrical Subsystem integration

Parts Ordering Status

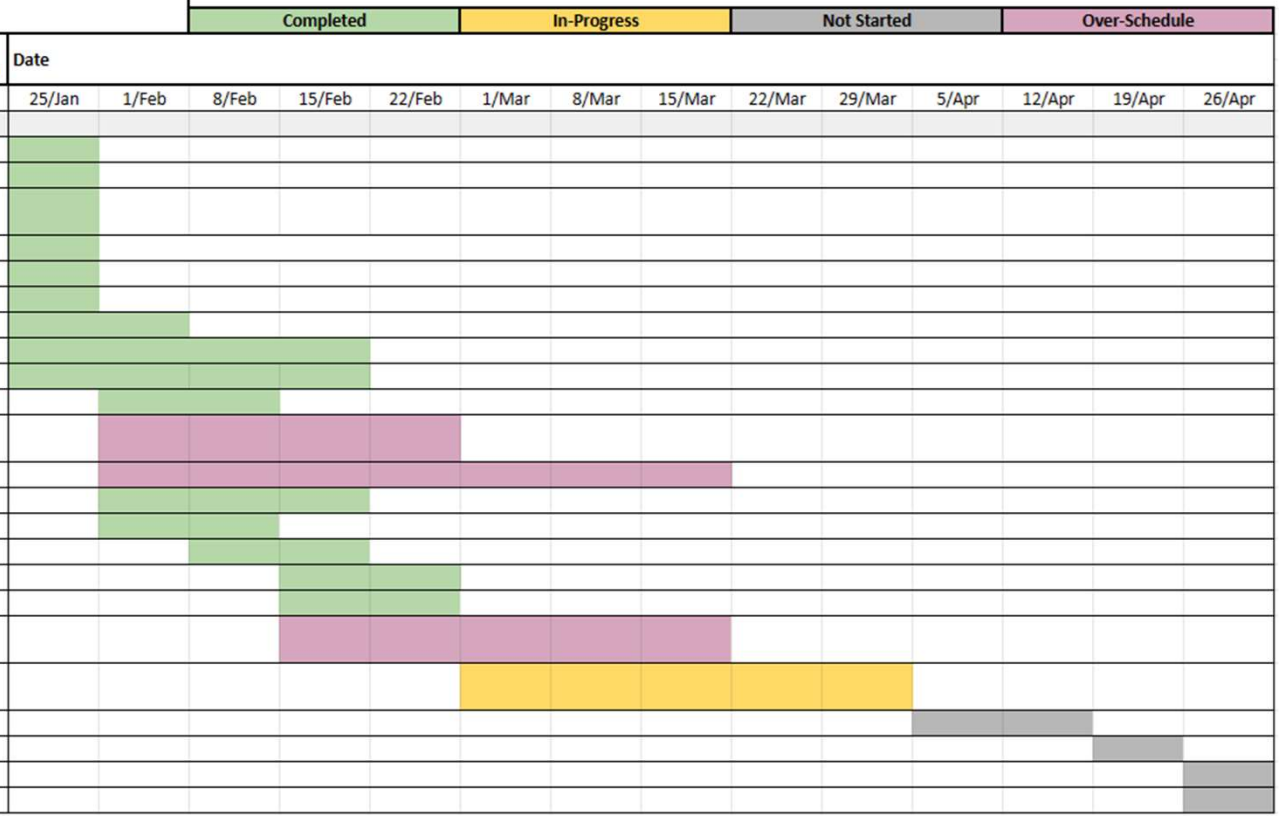
- No Parts on Order

Execution Plan

3D Printer and Application

Completed | In-Progress | Not Started | Over-Schedule

Activity	Plan Start	Plan Duration	Actual Start	Actual Duration	Percent Complete
Status Updates					
Redesign Stepper Motor Driver PCB	25/Jan	1	14/Dec	6	100%
Redesign Controller PCB	25/Jan	1	14/Dec	6	100%
Validate Application and Server Communication	25/Jan	1	14/Dec	6	100%
Order Stepper Motor PCB	25/Jan	1	25/Jan	1	100%
Order Controller PCB	25/Jan	1	25/Jan	1	100%
Order Controller PCB	25/Jan	1	25/Jan	1	100%
Add Server Security Rules	25/Jan	2	25/Jan		100%
Fix Application Bugs	25/Jan	2	25/Jan	4	100%
Add to Firebase Code	25/Jan	2	25/Jan	4	100%
Improve UI Handling	1/Feb	1	3/Feb	2	100%
Application/Server and MCU Integration	1/Feb	2	1/Feb	4	90%
Fix Combined Code	1/Feb	2	1/Feb	7	75%
Solder Stepper Motor Driver PCB	1/Feb	2	1/Feb	3	100%
Solder Controller PCB	1/Feb	2	1/Feb	2	100%
Validate Application and Server	8/Feb	1	8/Feb	2	100%
Validate Stepper Motor PCB	15/Feb	1	15/Feb	3	100%
Validate Controller PCB	15/Feb	1	15/Feb	2	100%
MCU and Motor/Controller PCB Integration	15/Feb	3	1/Mar	3	15%
Assembling the 3D Printer and Troubleshooting	8/Mar	4			10%
System Validation	5/Apr	2			0%
Final Design Presentation	17/Apr	1			0%
Final Project Demonstration	26/Apr	1			0%
Final Report Due	29/Apr	1			0%



Validation Plan

FSR ref.	Validation	Success Criteria	Test Bench	Status	Responsible
3.2.1.2.	Stepper Motor Circuit	Output of 5V 0.84A on three specific outputs, 5V 1A on another output with specific controller inputs	Use Function Generator, DC power generator, controller board, and multimeter to validate output requirements.	Passed	Cody Hutchison
3.2.1.3.	Heated Bed Circuit	Output of 24V 9.167A when controller input is made	Use Function Generator, DC power generator, controller board, and multimeter to validate output requirements.	Passed	Cody Hutchison
3.2.1.3.	Hotend Circuit	Output of 24V 1.67A when controller input is made	Use Function Generator, DC power generator, controller board, and multimeter to validate output requirements.	Passed	Cody Hutchison
3.2.1.3.	Fan 1 and 2 Circuit	Output of 24V 100mA when controller input is made	Use Function Generator, DC power generator, controller board, and multimeter to validate output requirements.	Passed	Cody Hutchison
3.2.4.1.	Power Distribution Circuit	Ensure DC-DC convertor takes 24V input and outputs 5V	Use multimeter to validate all output possiblilites and connections.	Passed	Cody Hutchison
3.2.3.1.	Full Printer Control Features	User choosen printer formatting, file selection, and print initiation	Input printer formatting, select print file, select print initiation and check server for verification	Passed	Steven Liu
3.2.3.2.	Application File Chooser	Application succussfully selects device files	Perform file upload to server and check firebase storage for verification	Passed	Steven Liu
3.2.3.3.	Interactive Library View	Library displays print files that users can select	Attempt print initiation and check server and home tab for verfication	Passed	Steven Liu
3.2.3.4.	Server Storage	Stores print files	Upload print file and retrieve download url	Passed	Steven Liu
3.2.3.5.	Server Realtime Database	Saves print data and accessible print data	attempt printer formatting change and file upload, verify data in server and library tab	Passed	Steven Liu
3.2.3.6.	Application and Server Connection	Successful communication between application and server	Attempt all application printer features and verify communication to server	Passed	Steven Liu
3.2.4.2.	Communication of ESP32	Check incoming transmission from server	Connect MCU to network and send pings to server.	Passed	Abigail Morar
3.2.1.4.	Extruder	Ensure printer is extruding and retracting the proper amount of filament	Feed filament through opening and send code to force filament through nozzle by specified amounts.	Untested	Abigail Morar
3.2.1.	Microcontroller	Can communicate correctly with motors and heated components	Sending inputs through every channel to show everything is connected and operating correctly.	Untested	Abigail Morar
3.2.1.1.	Stepper Motors	Function smoothly and rotate accordingly by required distance	Various input cases will be used to track movement of the motors. This will be tested to ensure correct communication between board and device.	Untested	All
3.2.1.3.	Heated Bed Temperature	Can reach 220°C	Use infrared thermometer to check surface temperature.	Untested	All
3.2.1.3.	Hotend Temperature	Can reach 80°C	Use infrared thermometer to check surface temperature.	Untested	All
3.2.2.1.	Extruder Location	Can reach the full printing area of 220x220x250 (mm)	Set extrusion nozzle head to every possible coordinate.	Untested	All

Questions? Comments?
Thank You