CALIFORNIA STATE UNIVERSITY, SACRAMENTO
College of Engineering and Computer Science
Department of Electrical & Electronic Engineering

Assignment 4 – Design Idea Contract

DMEA Project: Accelerometer Inclination Test Platform (February 2024)

March 3, 2024

Team Number 2

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Neal Levine

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ELEVATOR PITCH

To develop a test fixture, including the accompanying firmware and software, that would enable the automation of accelerometer testing for the DMEA.

EXECUTIVE SUMMARY

A. DMEA High level functional requirements

Design requirements for DMEA sponsored accelerometer test fixture project.

B. Design Idea

Design proposal for DMEA sponsored accelerometer test fixture project.

C. Work Breakdown Structure

A list which tabulates the design features and each task needed to accomplish each feature. Team members are each assigned several tasks

D. Project Milestones and Timeline

A visual timeline of the project detailed by task families.

ABSTRACT

A. DMEA High level functional requirements

This project aims to develop a test fixture as well as accompanying firmware and software to enable the automation of accelerometer testing for the DMEA (Defense Microelectronics Activity) To add, the test fixture shall manipulate the DUT along the x-and y-axis, and firmware/software shall allow the serially connected host to request general data and status information.

B. Design Idea

Our proposed design accelerates the DUT by tilting a platform underneath it.

C. Work Breakdown Structure.

A detailed list of features needed to satisfy specifications laid out by the project scope. Each feature of the design idea is assigned several tasks and might have several preceding tasks. The WBS works to assign team members to each task and gives an estimated duration for the project.

D. Project Milestones and Timeline

A timeline of tasks and features grouped by task families displayed by date. This timeline includes all tasks within a resolution of days. Milestones are defined which underline critical dates for the project. The timeline will be updated when tasks are completed

Keyword Index—Accelerometers, Automatic Test Equipment, Fixtures

I. INTRODUCTION

Accelerometers are a crucial piece of technology, from smartphones to aerial vehicles, by measuring vibration, or acceleration of motion. With this, creating a test fixture for the automation of accelerometers will ensure accuracy and reliability. This paper will detail the development of said test fixture along with the accompanying firmware and software designed with the DMEA's specifications/requirements.

A. DMEA High level functional requirements

1) Configurable movement in both x and y axis

a. The firmware and command set shall allow the user to define up to 10 profiles that each define a sequence of up to 10 x-and-y positions with both angel and speed as inputs.

b. The firmware and command set shall allow the user to select and run profiles 1-10.

c. The firmware and command set shall allow the selection of repeating to continuously or a set number of times.

2) Fixture movement range of -90° to 90° for each axis.

3) Test fixture feedback.

a. The fixture shall provide the user with:

i. Acknowledgement command received.

j. Status if the action was completed.

k. Speed of the movement in each axis

4) Support for UART (TTL) communication.

a. The fixture shall use the USB to Serial cable TTL 234x3V3 or similar.

5) Fixture maximum dimensions 10 x 8.5 x 15 (HxWxD)

6) The fixture logic and control electronics shall be developed using an STM Nucleo board.

B. Design Approach

Our solution to the test fixture consists of a multi jointed gimble arm with a platform mounted to the end as shown in Fig. 1. Testing in every direction will be achieved by tilting the platform on the end of the gimble arm. The fixture will be controlled by a serially connected through an instruction set. The instruction set will allow the user to define, store, and run test profiles.

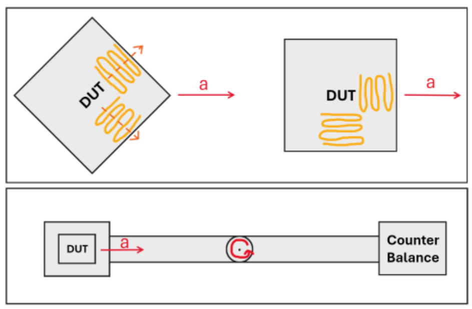


Fig. 1 Rotating Armature Design

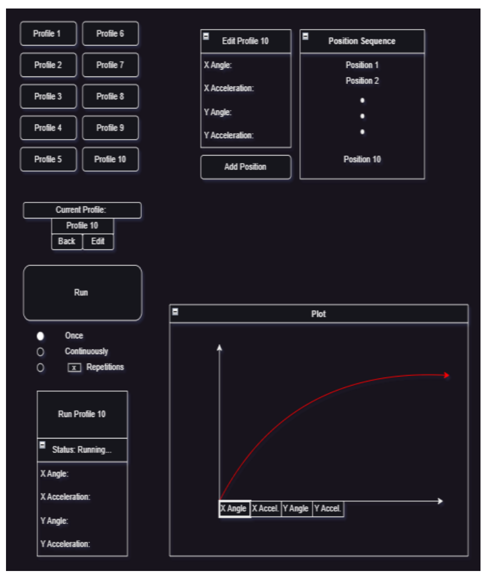


Fig. 2 GUI Design

II. DESIGN IDEA

A. Design Philosophy

Our design philosophy for the test fixture stems from the critical need for accuracy, and reliability when automating accelerometer testing. Per DMEA requirements, the movement of this fixture shall move in the range of -90° to 90° for each axis. The gimble armature satisfies this requirement and allows for speed control as well.

TABLE. 1
Punch List

Feature	Measurable Metric
Configurable movement in both x and y axis	Fixture movement range of -90° to 90° for each axis.
Firmware Command Set	The firmware and command set shall allow the user to: a. define up to 10 profiles that each define a sequence of up to 10 x-and-y positions with both angle and speed as inputs. b. select and run profiles 1-10. c. Run a profile continuously or a set number of times.
Test Fixture Feedback	The fixture shall provide the user with: a. Acknowledgement of command received. b. Status if the action was completed. Speed and angle of the movement in each
Support for UART (TTL) communication.	The fixture shall use the USB to Serial cable TTL 234x3V3 or similar for communication.
Fixture must fit within a given amount of space on a work bench.	Fixture maximum dimensions: 10 x 8.5 x 15 (HxWxD)
The fixture logic and control electronics shall be developed using an STM Nucleo board.	The fixture will be powered and controlled entirely by an STM Nucleo Board
Fixture is self-powered	Fixture is powered via wall outlet plug.
Fixture is stable	Fixture only moves when it is supposed to. There are no unwanted movements during testing.

B. Specific Design Components

1) Gimble Arm

The gimble arm is a servo actuated arm with two joints that allow the platform attached to the end of the arm to tilt 90 degrees in the x and y axis.

2) Tilt Platform

The tilt platform is a square plate mounted at the end of the gimble arm which will serve as an attachment point for the DUT. The platform will be made of a rigid, lightweight material that the client can modify with mounting hardware as they require.

3) Accelerometer

An accelerometer mounted to the tilt platform provides the fixture with sensor feedback that allows it to confirm that the movement of the tilt platform matches the test profile.

4) Enclosure

The enclosure for the gimble arm and the device’s electronics will be made from 3d printed parts.

5) Nucleo STM Board

The entire fixture is controlled by a Nucleo STM development board. The Nucleo board receives commands from a serially connected host device. The board controls the gimble arm’s 2 motors to achieve the desired angle and magnitude of acceleration.

6) Instruction Set

The user controls the fixture through an instruction set that allows them to define, store, and run test profiles.

III. FUNDING

TABLE. 2
Funding

	Funding	Cost	Remaining Budget
DMEA	$2000		$2000
Main Arm Motor		$90	$1910
DUT Vehicle Motor		$14	$1896
Frame Material		$47.35	$1848.65
Nucleo Board		$24.47	$1824.18

IV. WORK BREAKDOWN STRUCTURE

Estimated Hours per Task/Feature

	Task Mode	Task Name	Duration	Start	Finish	Predecessors	Resource Names
1		**Accelerometer Inclination Test Platform**	**233 days?**	**Wed 1/24/24**	**Sun 12/8/24**		
2		**Semester 1**	**81 days?**	**Wed 1/24/24**	**Fri 5/10/24**		
3		**Initiation Phase**	**28 days**	**Wed 1/24/24**	**Wed 2/28/24**		
4		Propose DMEA Project to Professor Levine	11 days	Wed 1/24/24	Tue 2/6/24		Team,Khan,Luca
5		Submit Levine-Approved Proposal to DMEA	1 day	Wed 2/7/24	Wed 2/7/24		Xavior
6		**Review and Commit to Parts List**	**4 days**	**Fri 2/23/24**	**Wed 2/28/24**		**Team**
7		Material Request Form	4 days	Fri 2/23/24	Wed 2/28/24		Xavior
8		**Semester 1 Research Phase**	**29 days?**	**Sun 2/11/24**	**Tue 3/19/24**		
9		Design Idea Contract	5 days	Sun 2/11/24	Thu 2/15/24		Team
10		Revised Design Idea Contract	6 days	Sun 3/3/24	Fri 3/8/24		Warren
11		Work Breakdown Structure	1 day?	Mon 2/26/24	Mon 2/26/24		Lucas
12		Review Github / Version Control	3 days?	Mon 3/4/24	Wed 3/6/24		Team
13		Review and Determine STM Communication Protocol	8 days?	Tue 3/5/24	Thu 3/14/24		Lucas
14		Research TTL Serial Communication Protocol	6 days?	Tue 3/12/24	Tue 3/19/24		Khan
15		Research/Locate Hardware Footprint Measurements for CAD	6 days	Tue 3/12/24	Tue 3/19/24		Xavior
16		**Semester 1 Design Phase**	**40 days?**	**Tue 3/12/24**	**Sun 5/5/24**		
17		Assemble Prototype	0 days	Sun 4/7/24	Sun 4/7/24		
18		**Hardware**	**40 days?**	**Tue 3/12/24**	**Sun 5/5/24**		
19		**Power Supply**	**4 days**	**Tue 4/2/24**	**Sun 4/7/24**		
20		Wire Power Supply to Board	4 days	Tue 4/2/24	Sun 4/7/24	6	Lucas
21		**Accelerometer**	**16 days**	**Mon 3/18/24**	**Sun 4/7/24**		
22		Pin Assignment	5 days	Tue 3/19/24	Mon 3/25/24	13	Warren
23		Wire Pins	4 days	Tue 4/2/24	Sun 4/7/24	22	Warren
24		**Servo Motors**	**2 days**	**Fri 3/15/24**	**Mon 3/18/24**		
25		Pin Assignment	1 day	Fri 3/15/24	Fri 3/15/24	13	Warren
26		Wire Pins	1 day	Mon 3/18/24	Mon 3/18/24	25	Warren
27		**Fixture**	**40 days?**	**Tue 3/12/24**	**Sun 5/5/24**		
28		**Tune Printer**	**6 days?**	**Tue 3/12/24**	**Tue 3/19/24**		
31		**Tilt Platform**	**34 days**	**Wed 3/20/24**	**Sun 5/5/24**		
36		**Firmware**	**15 days**	**Tue 3/19/24**	**Mon 4/8/24**		
37		**Servo Control**	**15 days**	**Tue 3/19/24**	**Mon 4/8/24**		
38		Movement Signaling	5 days	Tue 3/19/24	Sun 3/24/24		Khan,Warren
39		Confirm Servo Movement	11 days	Mon 3/25/24	Mon 4/8/24		Khan,Warren
40		**Accelerometer Control**	**10 days**	**Tue 3/19/24**	**Mon 4/1/24**		
41		Receive Data	4 days	Tue 3/19/24	Sun 3/24/24		Lucas
42		Display Data Received	5 days	Tue 3/26/24	Mon 4/1/24	41	Lucas
43		**Instruction Set**	**10 days**	**Tue 3/19/24**	**Tue 4/2/24**		
44		Create Movement Profiles	8 days	Tue 3/19/24	Thu 3/28/24		Khan,Lucas
45		Recall and Execute Movement Profiles	2 days	Fri 3/29/24	Mon 4/1/24	44	Khan,Lucas
46		Instruction Set Prototype Finished	0 days	Tue 4/2/24	Tue 4/2/24		
47		**Semester 1 Final Phase**	**10 days**	**Mon 4/29/24**	**Fri 5/10/24**		
48		Report	9 days	Mon 4/29/24	Wed 5/8/24		Lucas
49		Poster	10 days	Mon 4/29/24	Thu 5/9/24		Team
50		Present Semester 1 Prototype	0 days	Fri 5/10/24	Fri 5/10/24		
51		**Semester 2**	**72 days**	**Sun 9/1/24**	**Sun 12/8/24**		
52		**Semester 2 Research Phase**	**18 days**	**Sun 9/1/24**	**Tue 9/24/24**		
53		Critique Semester 1 Prototype	6 days	Sun 9/1/24	Fri 9/6/24		
54		Research Design Revisions	6 days	Mon 9/9/24	Mon 9/16/24	53	
55		Research and Order New Parts	6 days	Tue 9/17/24	Tue 9/24/24	54	
56		**Semester 2 Design Phase**	**53 days**	**Wed 9/25/24**	**Fri 12/6/24**		
57		**Implement Design Revisions**	**21 days**	**Wed 9/25/24**	**Wed 10/23/24**		**Team**
58		**Hardware**	**21 days**	**Wed 9/25/24**	**Wed 10/23/24**		
59		**Fixture**	**19 days**	**Wed 9/25/24**	**Mon 10/21/24**		
60		Tune Printer	6 days	Wed 9/25/24	Wed 10/2/24	55	
61		Tilt Platform	13 days	Thu 10/3/24	Mon 10/21/24	60	
62		Power Supply	6 days	Wed 9/25/24	Wed 10/2/24	55	
63		Servo Motors	13 days	Wed 9/25/24	Fri 10/11/24	55	
64		Accelerometer	21 days	Wed 9/25/24	Wed 10/23/24	55	
65		**Firmware**	**13 days**	**Wed 9/25/24**	**Fri 10/11/24**		
66		Instruction Set	13 days	Wed 9/25/24	Fri 10/11/24	55	
67		Accelerometer Control	6 days	Wed 9/25/24	Wed 10/2/24	55	
68		Servo Motor Control	6 days	Wed 9/25/24	Wed 10/2/24	55	
69		**Electronic Housing**	**20 days**	**Thu 10/24/24**	**Wed 11/20/24**	**57**	
70		Design Electronic Housing Model in CAD	6 days	Thu 10/24/24	Thu 10/31/24	57	Xavior
71		Print Electronic Housing Prototype	2 days	Fri 11/1/24	Mon 11/4/24	70	Xavior
72		Review and Iterate Electronic Housing Design	6 days	Tue 11/5/24	Wed 11/20/24	71	Xavior
73		Finish Electronic Housing	0 days	Wed 11/20/24	Wed 11/20/24		
74		**Final Build**	**12 days**	**Thu 11/21/24**	**Fri 12/6/24**	**72**	
75		Assemble Upgrades and Electronic Housing	6 days	Thu 11/21/24	Thu 11/28/24	72	
76		Test to spec	6 days	Fri 11/29/24	Fri 12/6/24	75	
77		Build Final Product	0 days	Fri 11/29/24	Fri 11/29/24		
78		**Semester 2 Final Phase**	**10 days**	**Mon 11/25/24**	**Sun 12/8/24**		
79		Report	11 days	Mon 11/25/24	Sun 12/8/24		
80		Other Final Presentation Preperations	11 days	Mon 11/25/24	Sun 12/8/24		

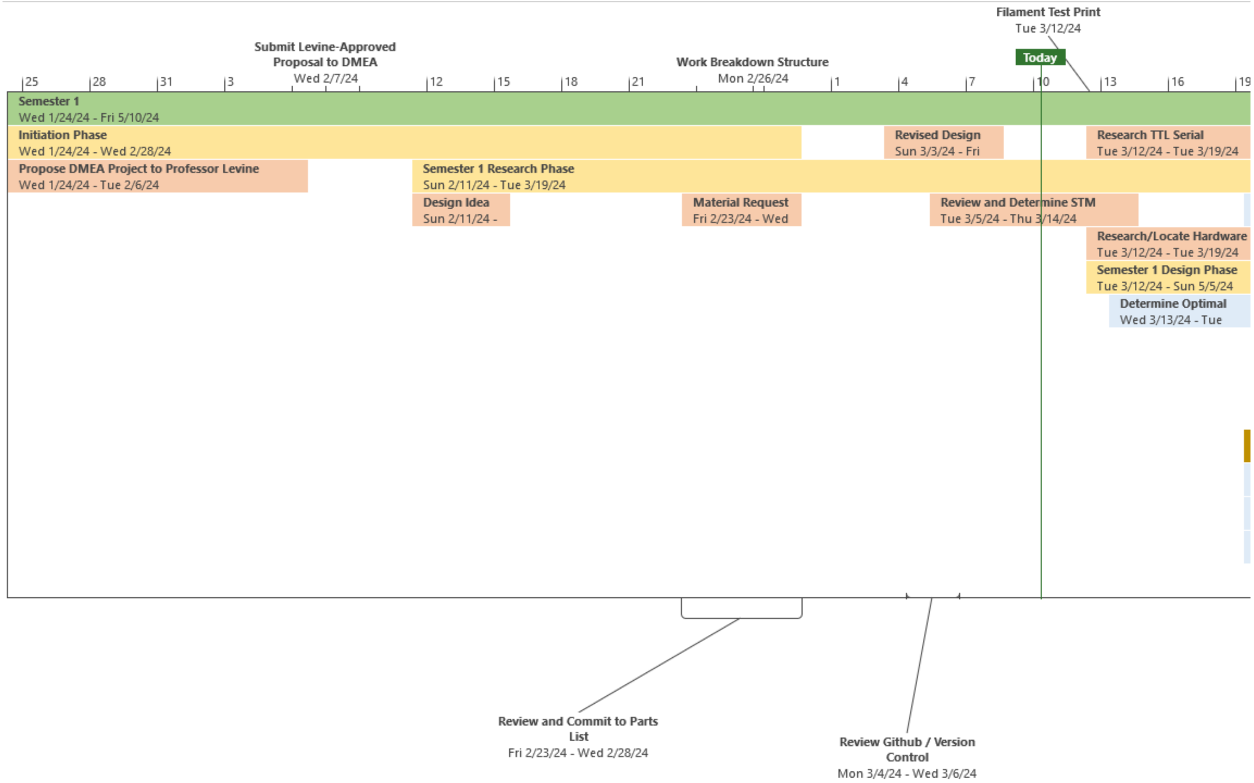
Estimated Hours Per Team Member

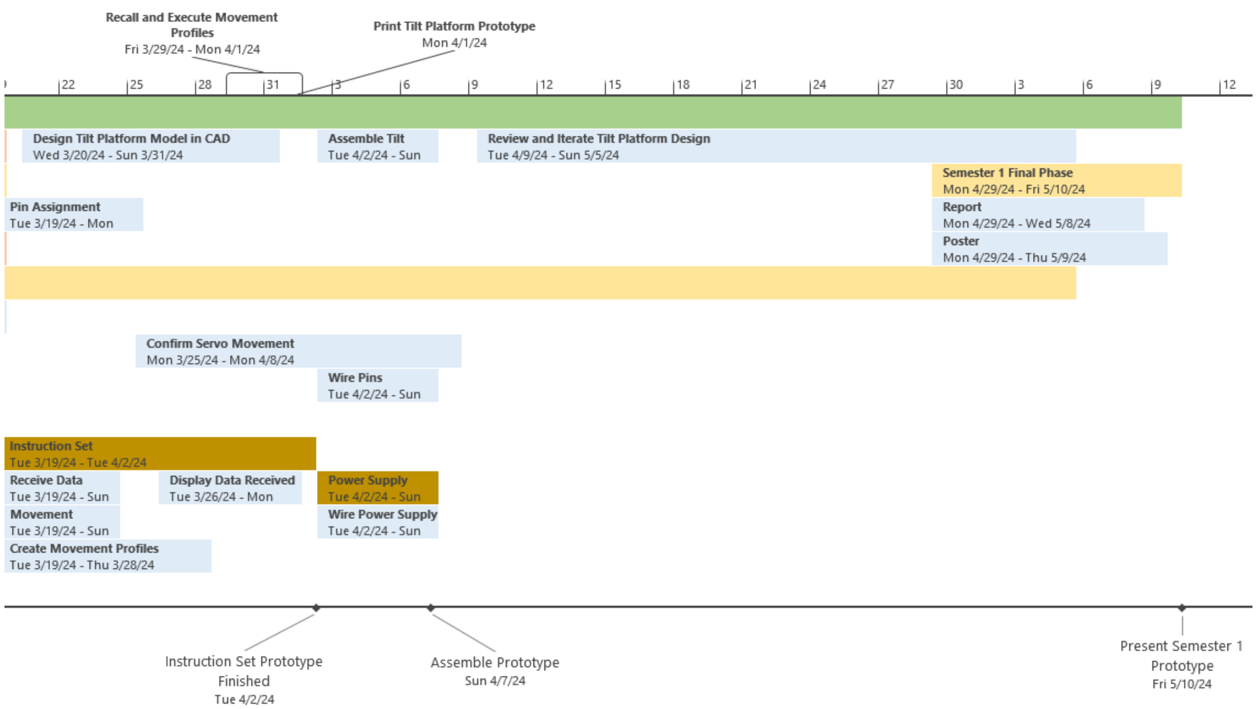
Khan	24 hrs	
Rudimentary Servo Control	*8 hrs*	
Create and Execute Movement Profiles	*8 hrs*	
Save and Recall Movement Profiles	*8 hrs*	
Xavior	**104 hrs**	
Submit Levine-Approved Proposal to DMEA	*8 hrs*	
Material Request Form	*8 hrs*	
Research/Locate Hardware Footprint Measurements for CAD	*8 hrs*	
Filament Test Print	*8 hrs*	
Determine Optimal Print Settings	*8 hrs*	
Design Tilt Platform Model in CAD	*8 hrs*	
Print Tilt Platform Prototype	*8 hrs*	
Assemble Tilt Platform Prototype	*8 hrs*	
Print Final Tilt Platform Design	*8 hrs*	
Design Electronic Housing Model in CAD	*8 hrs*	
Print Electronic Housing Prototype	*8 hrs*	
Assemble Electronic Housing Prototype	*8 hrs*	
Print Final Electronic Housing Design	*8 hrs*	
Team	**112 hrs**	
Propose DMEA Project to Professor Levine	*8 hrs*	
Review and Commit to Parts List	*8 hrs*	
Design Idea Contract	*8 hrs*	
Work Breakdown Structure	*8 hrs*	
Review Github / Version Control	*8 hrs*	
Review and Determine STM Communication Protocol	*8 hrs*	
Research TTL Serial Communication Protocol	*8 hrs*	
Review and Iterate Tilt Platform Design	*8 hrs*	
Review and Iterate Electronic Housing Design	*8 hrs*	
Optimize Code	*8 hrs*	
Assemble Prototype	*8 hrs*	
Review and Test	*8 hrs*	
Add Electronic Housing and Improvements	*8 hrs*	
Assemble Final Product	*8 hrs*	

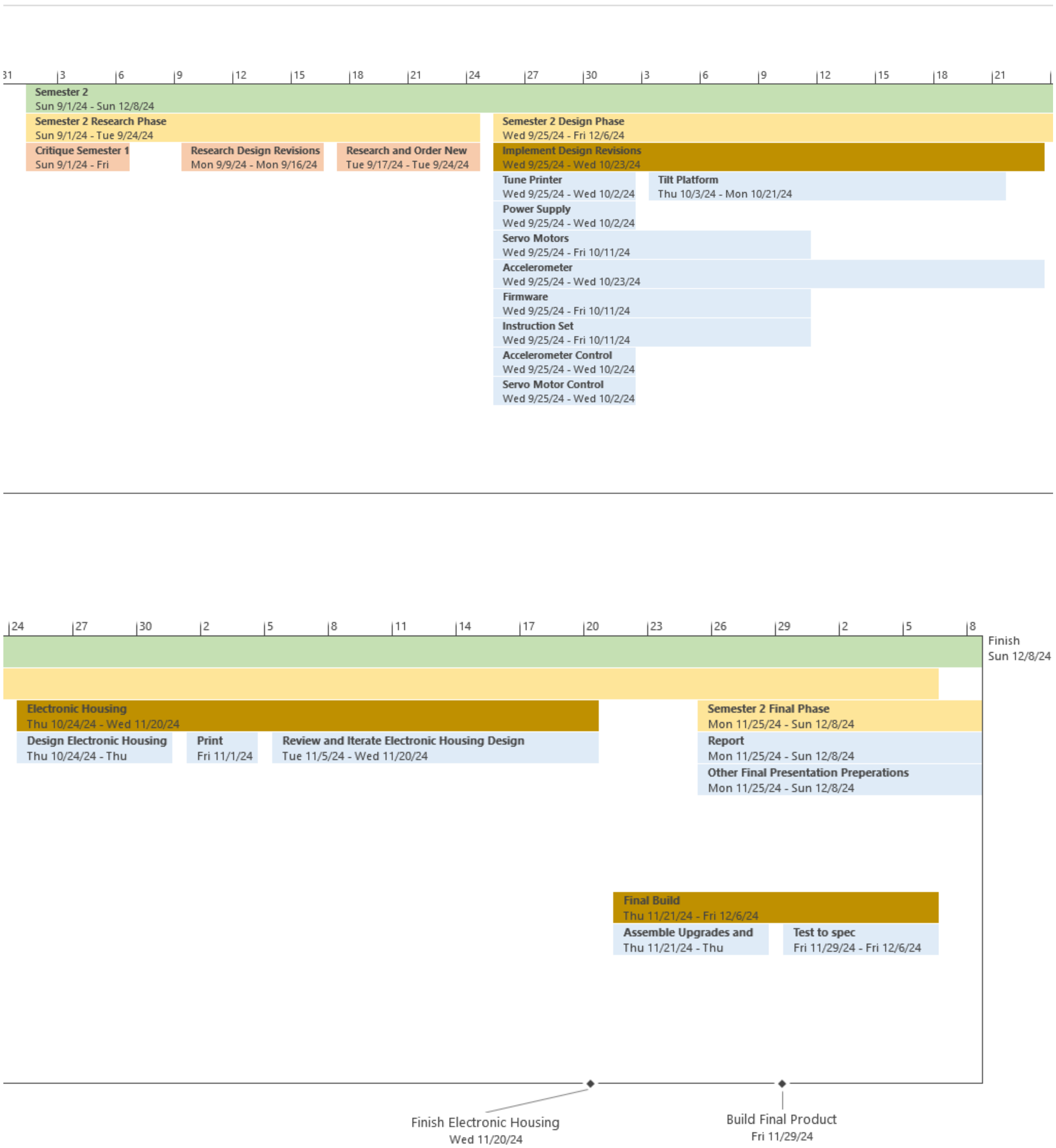
Warren	**32 hrs**	
Pin Assignment	*8 hrs*	
Wire Pins	*8 hrs*	
Pin Assignment	*8 hrs*	
Wire Pins	*8 hrs*	
Lucas	32 hrs	
Wire External Power Supply to Board	*8 hrs*	
Integrate Power Supply into Fixture Design	*8 hrs*	
Receive Data	*8 hrs*	
Display Data Received	*8 hrs*	

V. PROJECT MILESTONES AND TIMELINE

Estimated project timeline grouped by task families







Semester 2
Sun 9/1/24 - Sun 12/8/24
Semester 2 Research Phase
Sun 9/1/24 - Tue 9/24/24
Critique Semester 1
Sun 9/1/24 - Fri
Research Design Revisions
Mon 9/9/24 - Mon 9/16/24
Research and Order New
Tue 9/17/24 - Tue 9/24/24
Semester 2 Design Phase
Wed 9/25/24 - Fri 12/6/24
Implement Design Revisions
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Wed 9/25/24 - Wed 10/2/24
Tilt Platform
Thu 10/3/24 - Mon 10/21/24
Power Supply
Wed 9/25/24 - Wed 10/2/24
Servo Motors
Wed 9/25/24 - Fri 10/11/24
Accelerometer
Wed 9/25/24 - Wed 10/23/24
Firmware
Wed 9/25/24 - Fri 10/11/24
Instruction Set
Wed 9/25/24 - Fri 10/11/24
Accelerometer Control
Wed 9/25/24 - Wed 10/2/24
Servo Motor Control
Wed 9/25/24 - Wed 10/2/24
Finish
Sun 12/8/24
Electronic Housing
Thu 10/24/24 - Wed 11/20/24
Design Electronic Housing
Thu 10/24/24 - Thu
Print
Fri 11/1/24
Review and Iterate Electronic Housing Design
Tue 11/5/24 - Wed 11/20/24
Semester 2 Final Phase
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Report
Mon 11/25/24 - Sun 12/8/24
Other Final Presentation Preperations
Mon 11/25/24 - Sun 12/8/24
Final Build
Thu 11/21/24 - Fri 12/6/24
Assemble Upgrades and
Thu 11/21/24 - Thu
Test to spec
Fri 11/29/24 - Fri 12/6/24
Finish Electronic Housing
Wed 11/20/24
Build Final Product
Fri 11/29/24

VI. CONCLUSION

A. DMEA High level functional requirements

B. DESIGN IDEA

C. Work Breakdown Structure

D. Project Milestones and Timeline

VII. REFERENCES

VIII. GLOSSARY

Appendix D.

	Task Mode	Task Name	Duration	Start	Finish	Predecessors	Resource Names
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14		Research TTL Serial Communication Protocol	6 days?	Tue 3/12/24	Tue 3/19/24		Khan
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17		Assemble Prototype	0 days	Sun 4/7/24	Sun 4/7/24		
18		Hardware	40 days?	Tue 3/12/24	Sun 5/5/24		
19		Power Supply	4 days	Tue 4/2/24	Sun 4/7/24		
20		Wire Power Supply to Board	4 days	Tue 4/2/24	Sun 4/7/24	6	Lucas
21		Accelerometer	16 days	Mon 3/18/24	Sun 4/7/24		
22		Pin Assignment	5 days	Tue 3/19/24	Mon 3/25/24	13	Warren
23		Wire Pins	4 days	Tue 4/2/24	Sun 4/7/24	22	Warren
24		Servo Motors	2 days	Fri 3/15/24	Mon 3/18/24		
25		Pin Assignment	1 day	Fri 3/15/24	Fri 3/15/24	13	Warren
26		Wire Pins	1 day	Mon 3/18/24	Mon 3/18/24	25	Warren
27		Fixture	40 days?	Tue 3/12/24	Sun 5/5/24		
28		Tune Printer	6 days?	Tue 3/12/24	Tue 3/19/24		
31		Tilt Platform	34 days	Wed 3/20/24	Sun 5/5/24		
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37		Servo Control	15 days	Tue 3/19/24	Mon 4/8/24		
38		Movement Signaling	5 days	Tue 3/19/24	Sun 3/24/24		Khan,Warren
39		Confirm Servo Movement	11 days	Mon 3/25/24	Mon 4/8/24		Khan,Warren
40		Accelerometer Control	10 days	Tue 3/19/24	Mon 4/1/24		
41		Receive Data	4 days	Tue 3/19/24	Sun 3/24/24		Lucas
42		Display Data Received	5 days	Tue 3/26/24	Mon 4/1/24	41	Lucas
43		Instruction Set	10 days	Tue 3/19/24	Tue 4/2/24		
44		Create Movement Profiles	8 days	Tue 3/19/24	Thu 3/28/24		Khan,Lucas
45		Recall and Execute Movement Profiles	2 days	Fri 3/29/24	Mon 4/1/24	44	Khan,Lucas
46		Instruction Set Prototype Finished	0 days	Tue 4/2/24	Tue 4/2/24		
47		Semester 1 Final Phase	10 days	Mon 4/29/24	Fri 5/10/24		
48		Report	9 days	Mon 4/29/24	Wed 5/8/24		Lucas
49		Poster	10 days	Mon 4/29/24	Thu 5/9/24		Team
50		Present Semester 1 Prototype	0 days	Fri 5/10/24	Fri 5/10/24		
51		Semester 2	72 days	Sun 9/1/24	Sun 12/8/24		
52		Semester 2 Research Phase	18 days	Sun 9/1/24	Tue 9/24/24		
53		Critique Semester 1 Prototype	6 days	Sun 9/1/24	Fri 9/6/24		
54		Research Design Revisions	6 days	Mon 9/9/24	Mon 9/16/24	53	
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70		Design Electronic Housing Model in CAD	6 days	Thu 10/24/24	Thu 10/31/24	57	Xavior
71		Print Electronic Housing Prototype	2 days	Fri 11/1/24	Mon 11/4/24	70	Xavior
72		Review and Iterate Electronic Housing Design	6 days	Tue 11/5/24	Wed 11/20/24	71	Xavior
73		Finish Electronic Housing	0 days	Wed 11/20/24	Wed 11/20/24		
74		Final Build	12 days	Thu 11/21/24	Fri 12/6/24	72	
75		Assemble Upgrades and Electronic Housing	6 days	Thu 11/21/24	Thu 11/28/24	72	
76		Test to spec	6 days	Fri 11/29/24	Fri 12/6/24	75	
77		Build Final Product	0 days	Fri 11/29/24	Fri 11/29/24		
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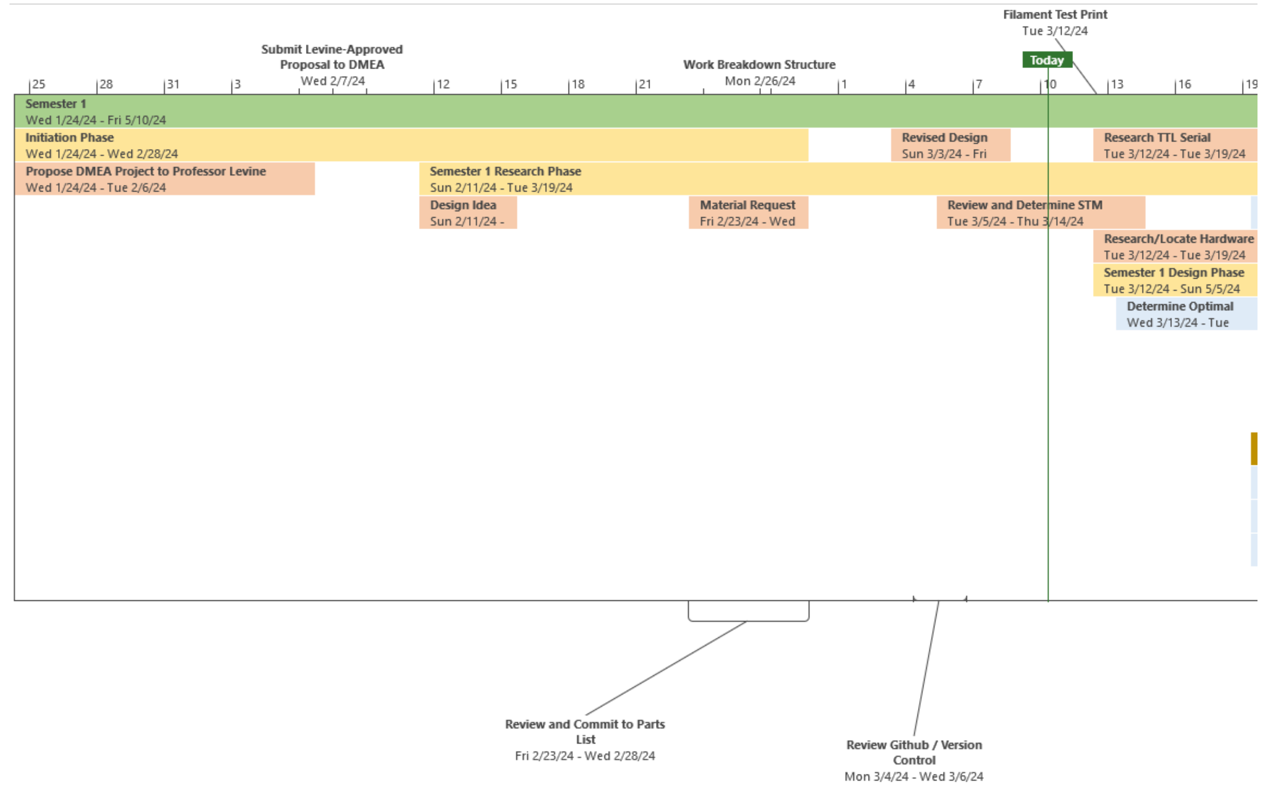
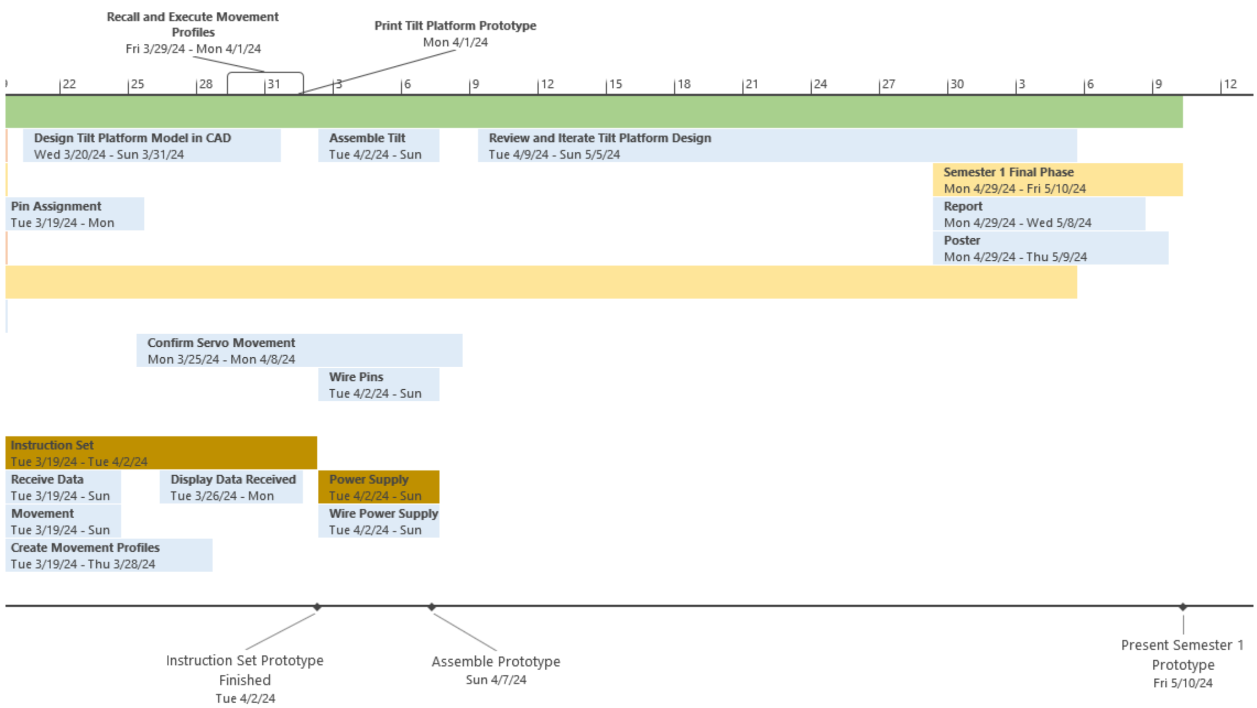
80		Other Final Presentation Preperations	11 days	Mon 11/25/24	Sun 12/8/24		

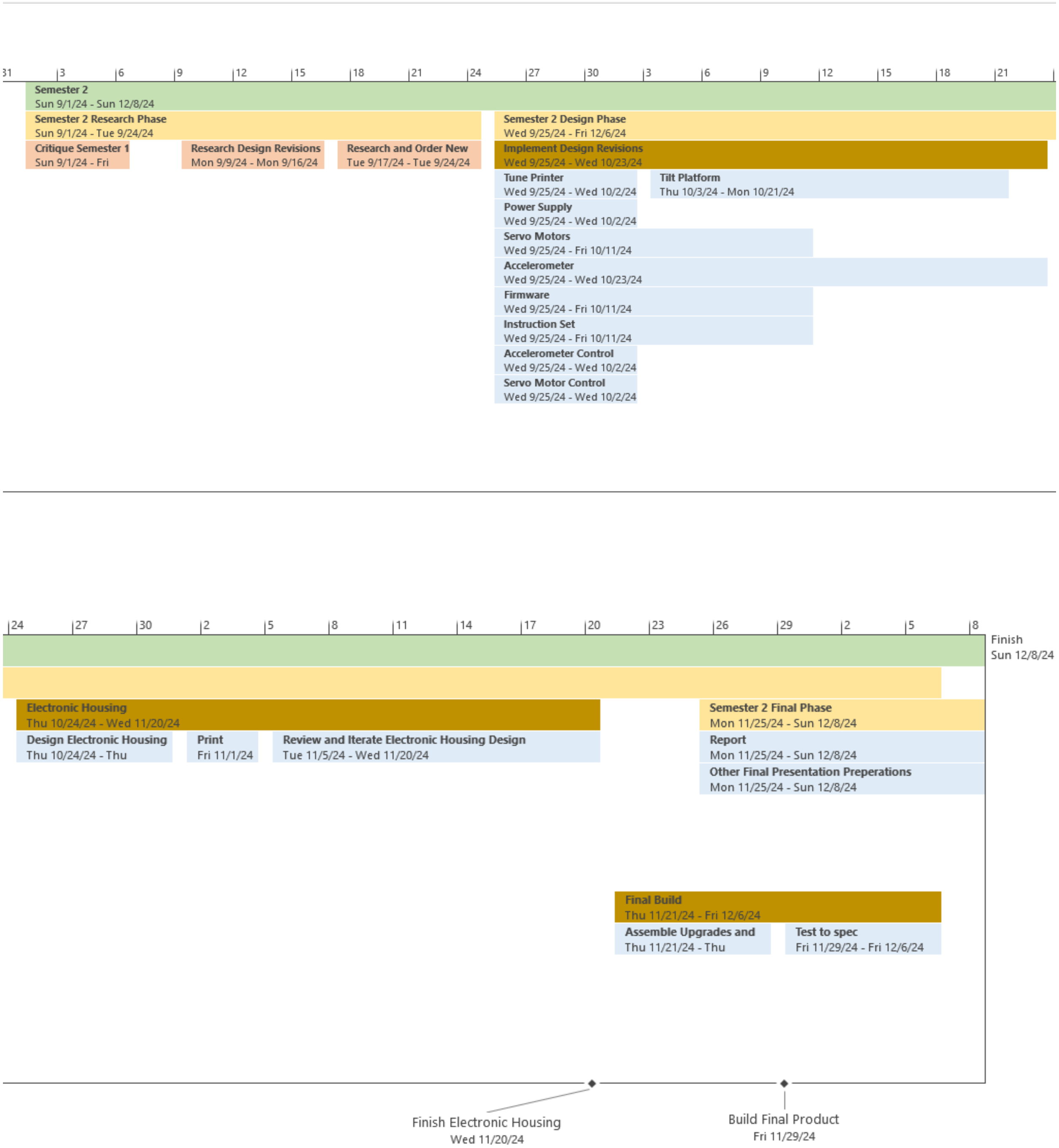
APPENDIX E.



Filament Test Print
Tue 3/12/24
Submit Levine-Approved Proposal to DMEA
Wed 2/7/24
Work Breakdown Structure
Mon 2/26/24
Today
Semester 1
Wed 1/24/24 - Fri 5/10/24
Initiation Phase
Wed 1/24/24 - Wed 2/28/24
Revised Design
Sun 3/3/24 - Fri
Research TTL Serial
Tue 3/12/24 - Tue 3/19/24
Propose DMEA Project to Professor Levine
Wed 1/24/24 - Tue 2/6/24
Semester 1 Research Phase
Sun 2/11/24 - Tue 3/19/24
Design Idea
Sun 2/11/24 -
Material Request
Fri 2/23/24 - Wed
Review and Determine STM
Tue 3/5/24 - Thu 3/14/24
Research/Locate Hardware
Tue 3/12/24 - Tue 3/19/24
Semester 1 Design Phase
Tue 3/12/24 - Sun 5/5/24
Determine Optimal
Wed 3/13/24 - Tue
Review and Commit to Parts List
Fri 2/23/24 - Wed 2/28/24
Review Github / Version Control
Mon 3/4/24 - Wed 3/6/24



Recall and Execute Movement Profiles
Fri 3/29/24 - Mon 4/1/24
Print Tilt Platform Prototype
Mon 4/1/24
Design Tilt Platform Model in CAD
Wed 3/20/24 - Sun 3/31/24
Assemble Tilt
Tue 4/2/24 - Sun
Review and Iterate Tilt Platform Design
Tue 4/9/24 - Sun 5/5/24
Semester 1 Final Phase
Mon 4/29/24 - Fri 5/10/24
Pin Assignment
Tue 3/19/24 - Mon
Report
Mon 4/29/24 - Wed 5/8/24
Poster
Mon 4/29/24 - Thu 5/9/24
Confirm Servo Movement
Mon 3/25/24 - Mon 4/8/24
Wire Pins
Tue 4/2/24 - Sun
Instruction Set
Tue 3/19/24 - Tue 4/2/24
Receive Data
Tue 3/19/24 - Sun
Display Data Received
Tue 3/26/24 - Mon
Power Supply
Tue 4/2/24 - Sun
Movement
Tue 3/19/24 - Sun
Wire Power Supply
Tue 4/2/24 - Sun
Create Movement Profiles
Tue 3/19/24 - Thu 3/28/24
Instruction Set Prototype Finished
Tue 4/2/24
Assemble Prototype
Sun 4/7/24
Present Semester 1 Prototype
Fri 5/10/24



Semester 2
Sun 9/1/24 - Sun 12/8/24
Semester 2 Research Phase
Sun 9/1/24 - Tue 9/24/24
Semester 2 Design Phase
Wed 9/25/24 - Fri 12/6/24
Critique Semester 1
Sun 9/1/24 - Fri
Research Design Revisions
Mon 9/9/24 - Mon 9/16/24
Research and Order New
Tue 9/17/24 - Tue 9/24/24
Implement Design Revisions
Wed 9/25/24 - Wed 10/23/24
Tune Printer
Wed 9/25/24 - Wed 10/2/24
Tilt Platform
Thu 10/3/24 - Mon 10/21/24
Power Supply
Wed 9/25/24 - Wed 10/2/24
Servo Motors
Wed 9/25/24 - Fri 10/11/24
Accelerometer
Wed 9/25/24 - Wed 10/23/24
Firmware
Wed 9/25/24 - Fri 10/11/24
Instruction Set
Wed 9/25/24 - Fri 10/11/24
Accelerometer Control
Wed 9/25/24 - Wed 10/2/24
Servo Motor Control
Wed 9/25/24 - Wed 10/2/24
Finish
Sun 12/8/24
Electronic Housing
Thu 10/24/24 - Wed 11/20/24
Semester 2 Final Phase
Mon 11/25/24 - Sun 12/8/24
Design Electronic Housing
Thu 10/24/24 - Thu
Print
Fri 11/1/24
Review and Iterate Electronic Housing Design
Tue 11/5/24 - Wed 11/20/24
Report
Mon 11/25/24 - Sun 12/8/24
Other Final Presentation Preperations
Mon 11/25/24 - Sun 12/8/24
Final Build
Thu 11/21/24 - Fri 12/6/24
Assemble Upgrades and
Thu 11/21/24 - Thu
Test to spec
Fri 11/29/24 - Fri 12/6/24
Finish Electronic Housing
Wed 11/20/24
Build Final Product
Fri 11/29/24

APPENDIX F. RESUMES

MUJTABA KHAN

Education

Bachelor of Science, Computer Engineering
California State University, Sacramento, CA, Expected: December 2024
GPA: 3.44

Related Course Work:

Advanced Logic Design	Advanced Computer Organization	Circuit Analysis
Computer Architecture Design	Data Structure & Algorithms Analysis	Electronics
Embedded System Design	Microcontrollers	Signals & Systems
Probability & Random Signals		

Technical Skills

Programming Languages: C, Debugging, Java, MATLAB, MIPS Assembly, Python, Verilog, VHDL
Hardware: Analog Discovery 2, PIC24F curiosity Dev. Microcontroller, STM32
Software: Eclipse, Linux, ModelSim, PSpice, Quartus Prime, Visual Studio, Xilinx

Projects

Audio Reactive LED *Fall 2022*

- Built using STM32 microcontroller, written in C, adapts to room sound: low activates 1-2 LEDs, medium activates 4 LEDs, and high activates all 7 LEDs, provides customizable gain option

Unix Shell *Spring 2021*

- Written in C, supports and accepts same commands as Unix

Movie Database *Fall 2021*

- Written in Java, parses through users' input, user is given 6 options: search by actor, year, runtime, director, or title, adds movies to database that is not already present

Custom PC Build *Summer 2019*

- Built PC, purchased all components separately, and assembled accordingly

Work Experience

- **Dairy Heaven, Carmichael, CA** *April 2015 – October 2022*
  Manager/Employee, created new menu items, designed new logos, developed schedules, received orders from customers, managed inventory, opened/closed restaurant

Awards

Dean’s Honor List *Spring 2021 – Fall 2022*

- Recognized for Dean's Honor List, spanning Spring 2021 to Fall 2022, awarded to undergraduates achieving a 3.25 GPA or higher

High School Perfect Attendance *Spring 2019*

- Consistently maintained perfect attendance through all four years of high school

LUCAS FEIL

WARREN KING

Education

Bachelor of Science, Electrical Engineering
California State University, Sacramento, CA, Expected: December 2024
GPA: 2.78

Related Course Work:

Introduction to Logic Design	Engineering Economics	Probability and Random Signals
Network Analysis	Power System Analysis I	Modern Communication Systems
Applied Electromagnetics	Intro to Microprocessors	Electronics II
Signals & Systems	Introduction to Feedback Systems	Intro to Machine Vision

Technical Skills

Programming Languages: C, Java, MATLAB, Python
Hardware: Arduino, RaspberryPi, PIC24F, STM32
Software:,Cadence PSpice, OrCAD, SolidWorks

Projects

Smartphone Based Security System *Spring 2023*

- Built using STM32 microcontroller, programmed in C, uses an infrared proximity sensor to detect intruders and trigger alarm, servos activate camera of mounted smart phone and pan phone back and forth to record video footage of intrusion

X-Ray Detector Resolution Analysis *Summer 2021*

- Series of scripts written in python, assess image resolution of in development CMOS x-ray detector, evaluate the resolution of a sample set of x-ray exposure images captured by the sensor at different x-ray dosages, plot results as a performance curve.

X-Ray Generator Test Fixture *Spring 2018*

- Built using Arduino microcontroller, programmed in C, emulates output signals from x-ray generator to imaging system, allows testing of imaging systems without needing to connect to an actual x-ray generator

Work Experience

MXImaging, Torrance, CA *July 2017- –August 2017*
July 2018-August 2018
January 2021-March 2021

Intern, designed and built test fixtures, verified and replicated user reported bugs, assisted with product development and testing

Awards

Dean's Honor List *Fall 2022, Fall 2023*

Semester Honors are awarded and the notation "Deans Honors List" is posted to the permanent academic record for freshmen earning a 3.0 GPA and other undergraduates earning a 3.25 GPA.

XAVIOR PAUTIN