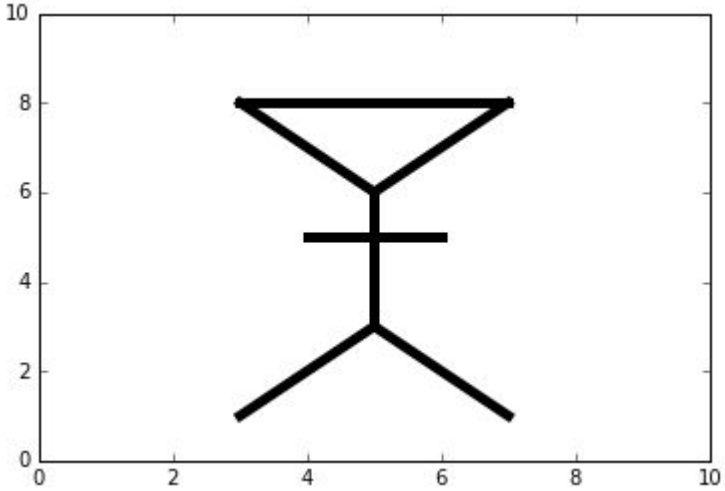
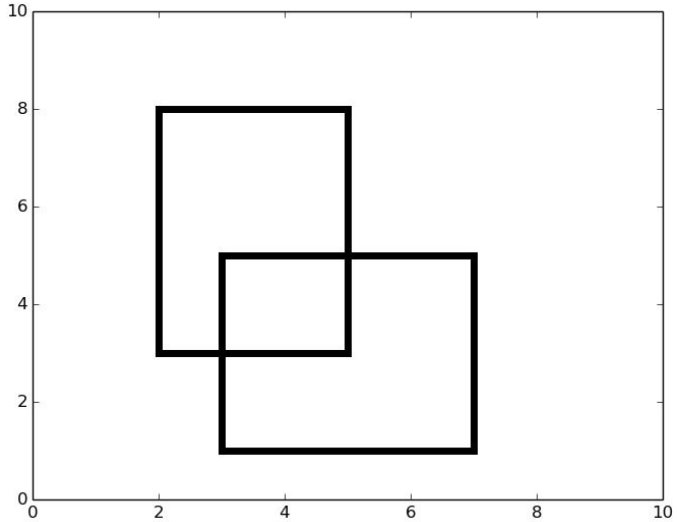
Detailed Design and Build Review Update

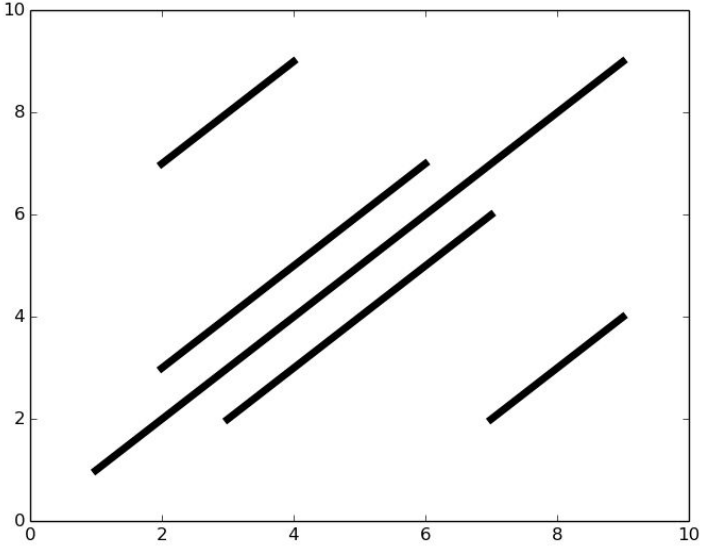
Friction Force Explorers
Neil Jassal
Rachel Holladay
Yichu Jin
Zhaodong Zheng

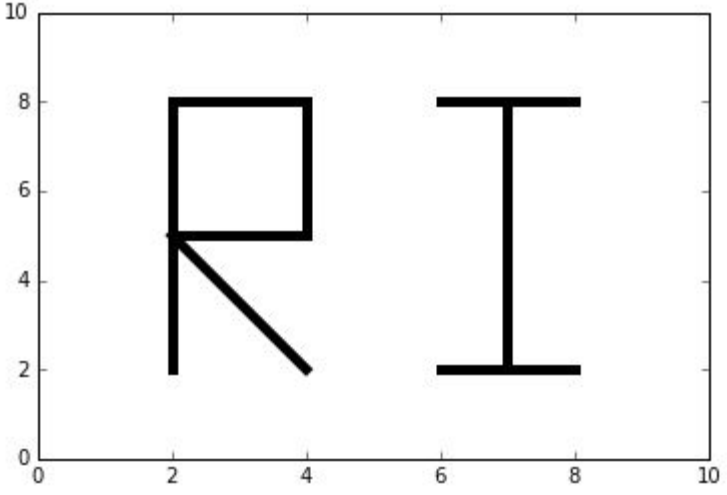
Objective:

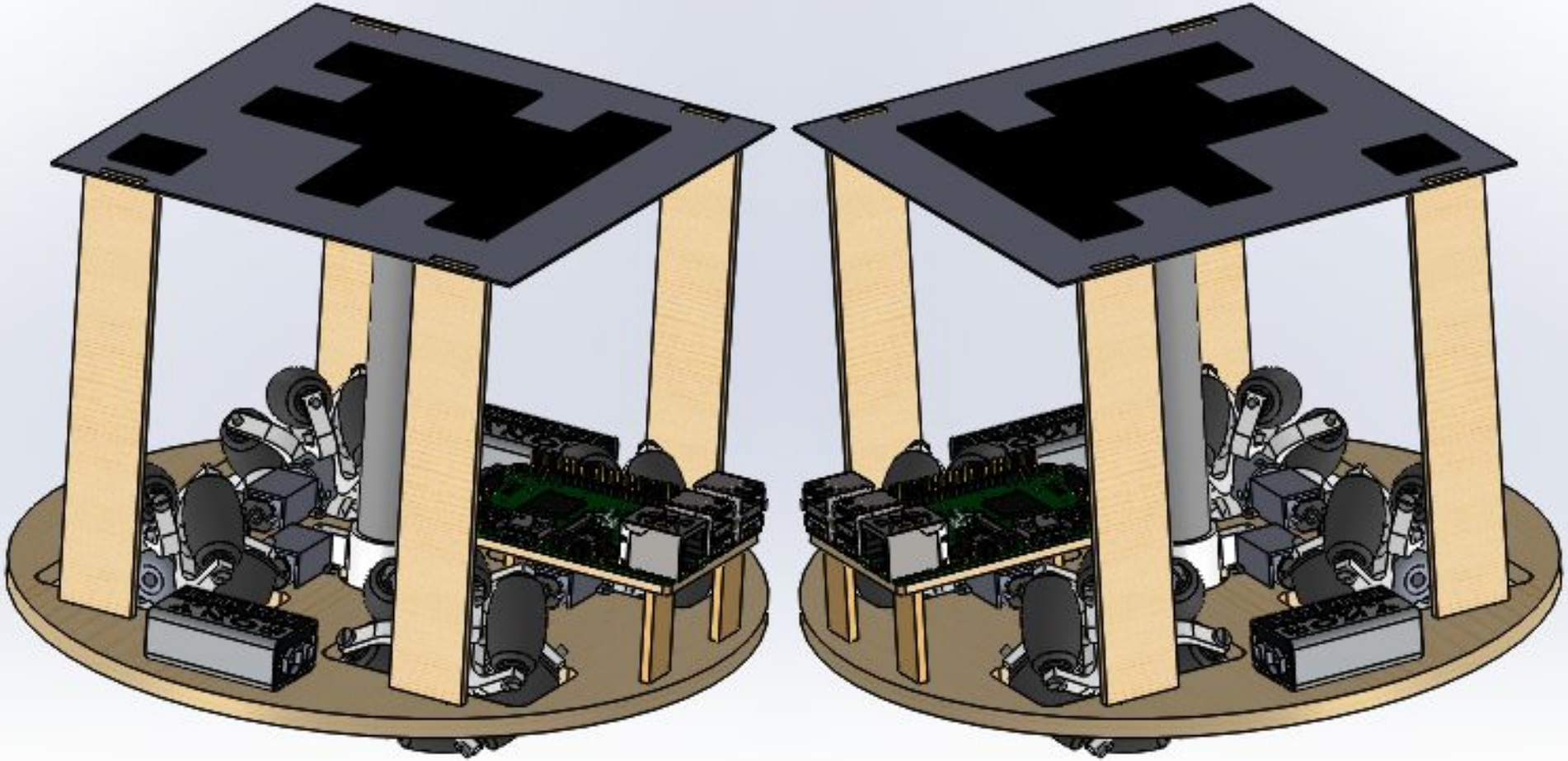
To develop a multi-agent system that collaboratively and efficiently draws inputted images at variable scale.

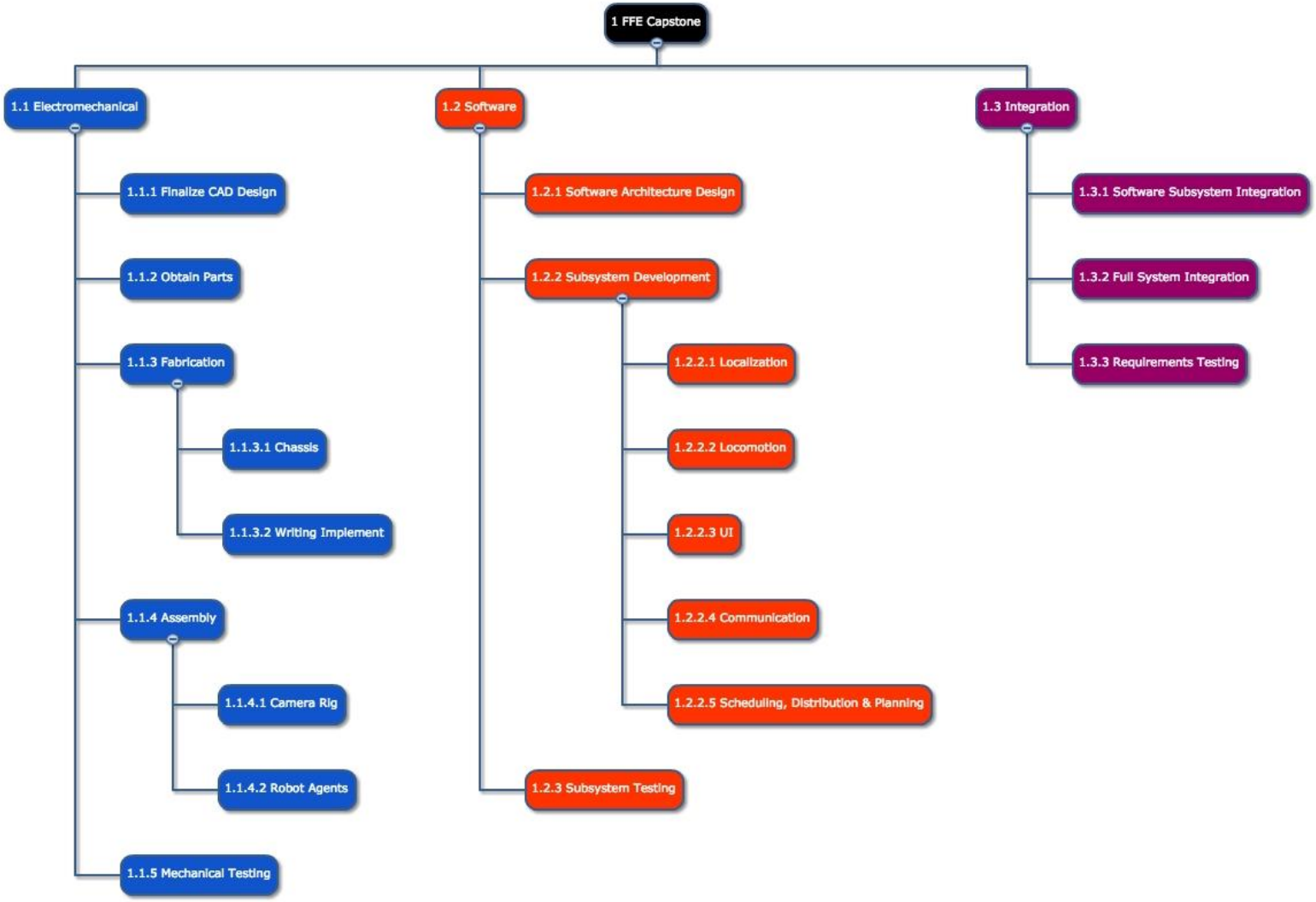

0
2
4
6
8
10


0
2
4
6
8
10


0
2
4
6
8
10

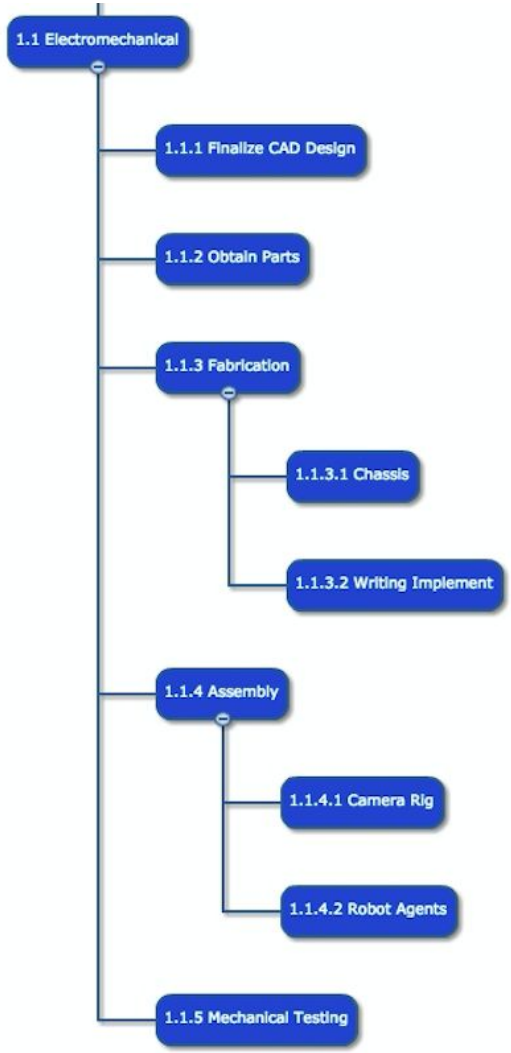

0
2
4
6
8
10




1 FFE Capstone
1.1 Electromechanical
1.1.1 Finalize CAD Design
1.1.2 Obtain Parts
1.1.3 Fabrication
1.1.3.1 Chassis
1.1.3.2 Writing Implement
1.1.4 Assembly
1.1.4.1 Camera Rig
1.1.4.2 Robot Agents
1.1.5 Mechanical Testing
1.2 Software
1.2.1 Software Architecture Design
1.2.2 Subsystem Development
1.2.2.1 Localization
1.2.2.2 Locomotion
1.2.2.3 UI
1.2.2.4 Communication
1.2.2.5 Scheduling, Distribution & Planning
1.2.3 Subsystem Testing
1.3 Integration
1.3.1 Software Subsystem Integration
1.3.2 Full System Integration
1.3.3 Requirements Testing

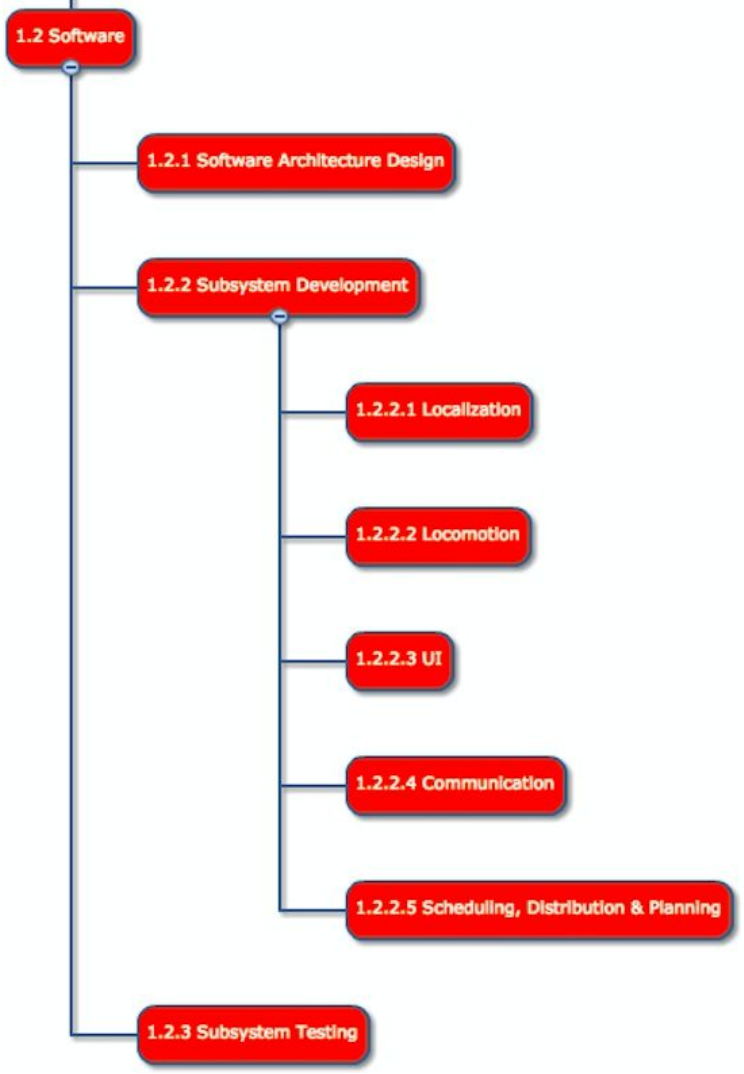
Electromechanical WBS Tree

WBS#:	1.1.4.1	Task:	Assemble Camera Rig
Est. Effort (hrs):	3	Owner:	Don
Resources:	Scrap wood	Work products:	Camera rig
Description:	Build the rig used to hold the camera for the vision system above the drawing space		
Input:	Measurements from demo space		
Dependencies:	Confirmation of demo space location		
Risks:	No extra wood is available, demo space does not have adequate room for the camera rig		



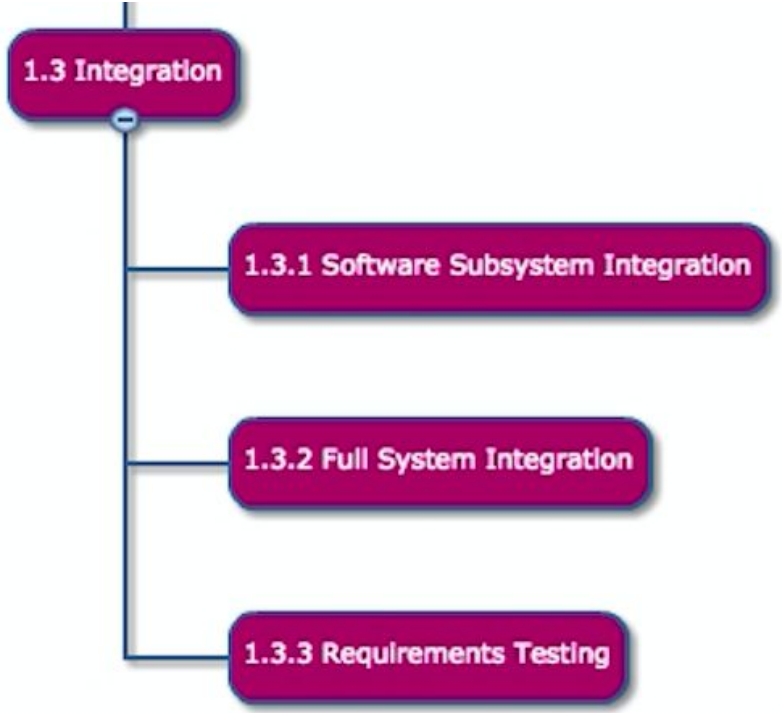
Software WBS Tree

WBS#:	1.2.2.4	Task:	Communication
Est. Effort (hrs):	8	Owner:	Neil
Resources:	Wireless comm. libraries	Work products:	Functions for sending info. back and forth from robots
Description:	Create a reliable communication system between the robots and the central data processing unit		
Input:	Software flowchart, decisions on software libraries		
Dependencies:	Software architecture design		
Risks:	Wireless hardware is unreliable or interfaces poorly with other software or hardware		



Integration WBS Tree

WBS#:	1.3.1	Task:	Software Integration
Est. Effort (hrs):	3	Owner:	All
Resources:	Software subsystems	Work products:	Complete software pipeline
Description:	Test integration of all software components by creating an end to end pipeline consisting of all software subsystems		
Input:	Completed and individually verified software subsystems		
Dependencies:	Subsystem testing		
Risks:	Subsystems cannot integrate with each other		



Capstone

Feb 2017 (Eastern Time)

Sun	Mon	Tue	Wed	Thu	Fri	Sat
29	30	31	1	2	3	4
1.2.1 Software Architecture Design						
1.1.1 Finalize CAD						
5	6	7	8	9	10	11
1.2.1 Software Architecture Design						
	1.2.2.5 Scheduling, Distribution, Planning					
	1.1.2 Obtain Parts					
12	13	14	15	16	17	18
1.2.2.5 Scheduling, Distribution, Planning						
	1.2.2.4 Communication Subsystem Development					
	1.1.3.1 Chassis Fabrication					
19	20	21	22	23	24	25
1.2.2.5 Scheduling, Distribution, Planning						
1.2.2.4 Communication Subsystem Development						
	1.1.3.2 Writing Implement Fabrication					
26	27	28	1	2	3	4
	1.2.2.3 Locomotion Subsystem Development					
	1.1.4.1 Camera Rig Assembly					
	1.1.4.2 Robot Agent Assembly					
	1.2.2.1 Localization Subsystem Development					

Capstone

Mar 2017 (Eastern Time)

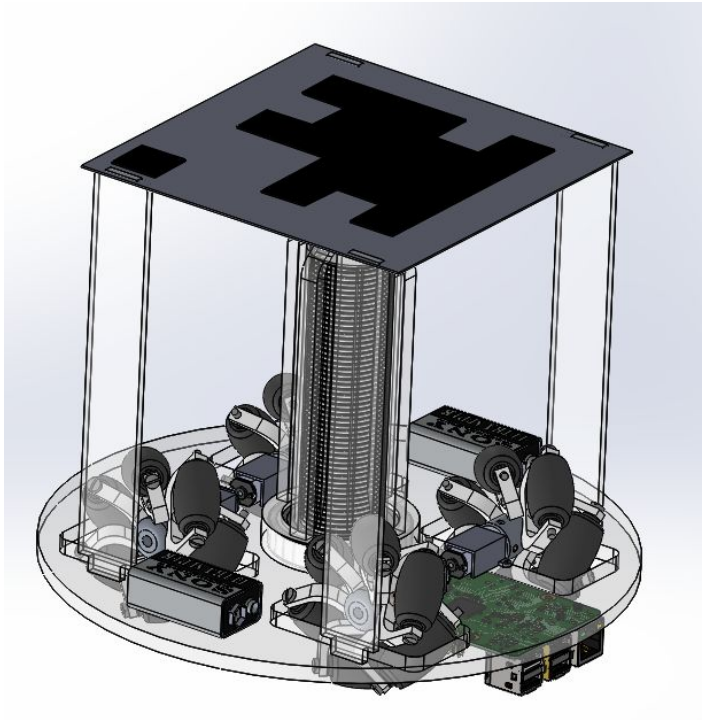
Sun	Mon	Tue	Wed	Thu	Fri	Sat
26	27 1.2.2.3 Locomotion Subsystem Development 1.1.4.1 Camera Rig Assembly 1.1.4.2 Robot Agent Assembly 1.2.2.1 Localization Subsystem Development	28	1	2	3	4
5 1.2.2.3 Locomotion Subsystem Development	6 1.2.2.3 UI Subsystem Development 1.1.5 Mechanical Testing	7	8	9	10 Spring Break	11
12 Spring Break	13	14	15	16	17	18
19 Spring Break	20 1.1.5 Mechanical Testing 1.2.3 Software Subsystem Testing	21	22	23	24	25
26	27 1.3.1 Software Subsystem Integration	28	29	30	31	1

Capstone

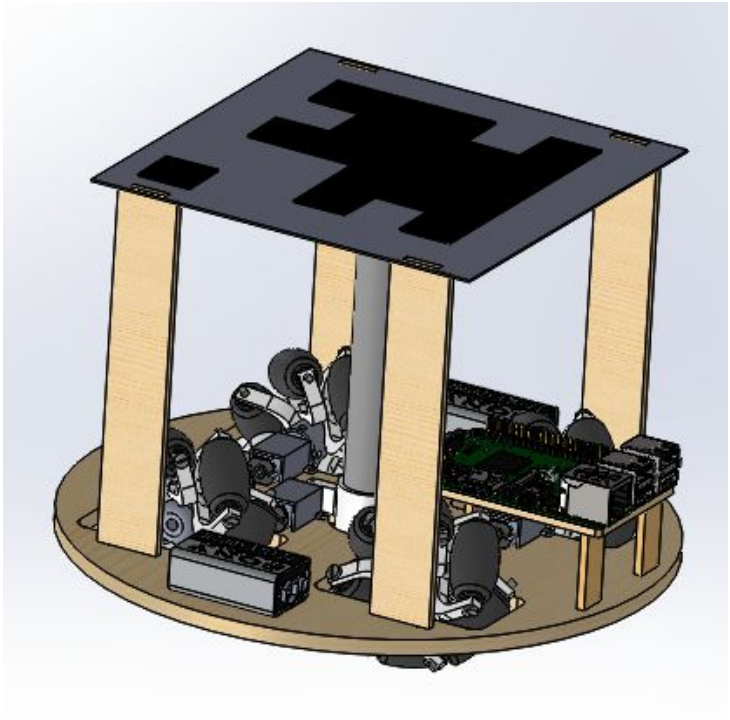
Apr 2017 (Eastern Time)

Sun	Mon	Tue	Wed	Thu	Fri	Sat
26	27	28	29	30	31	1
2	3	4	5	6	7	8
	1.3.2 Full System Integration and Testing					
9	10	11	12	13	14	15
1.3.2 Full System Integration and Testing						
16	17	18	19	20	21	22
1.3.2 Full System Integration and Testing				CMU Carnival		
23	24	25	26	27	28	29
CMU Carnival	1.3.3 Requirements Testing					
30	1	2	3	4	5	6
	Demo Preparation			Final Demo		

Mechanical Updates - Full System

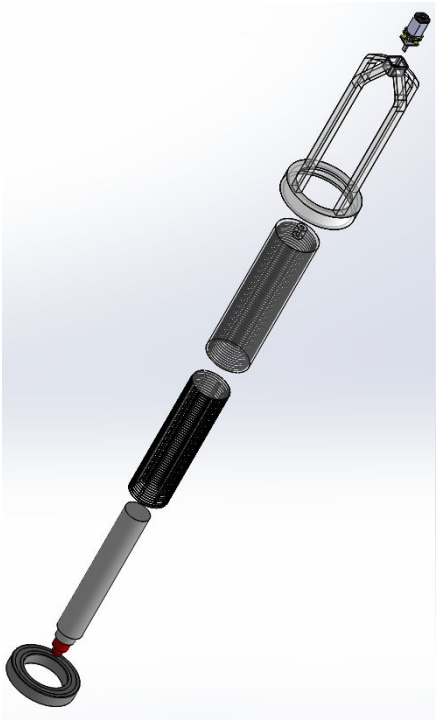


Dad

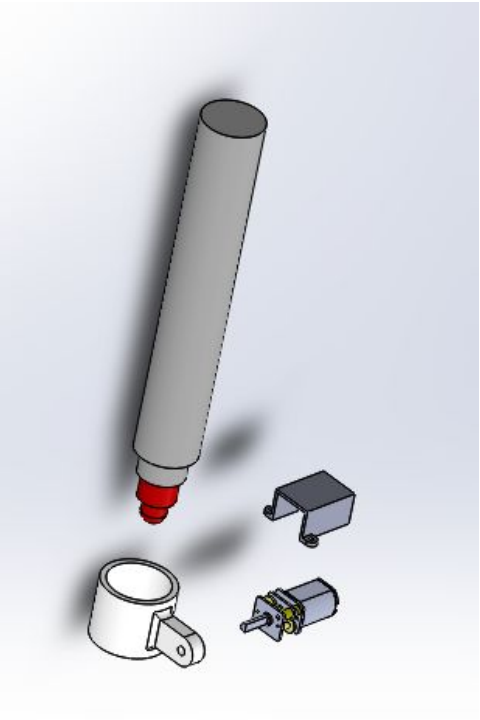


Son

Mechanical Updates - Painting Mechanism



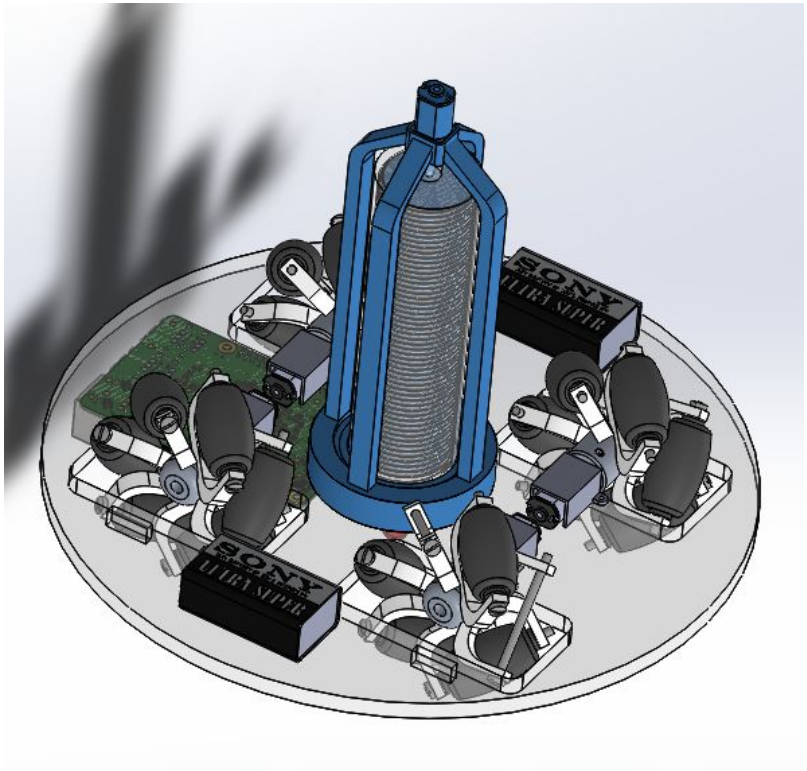
Dad



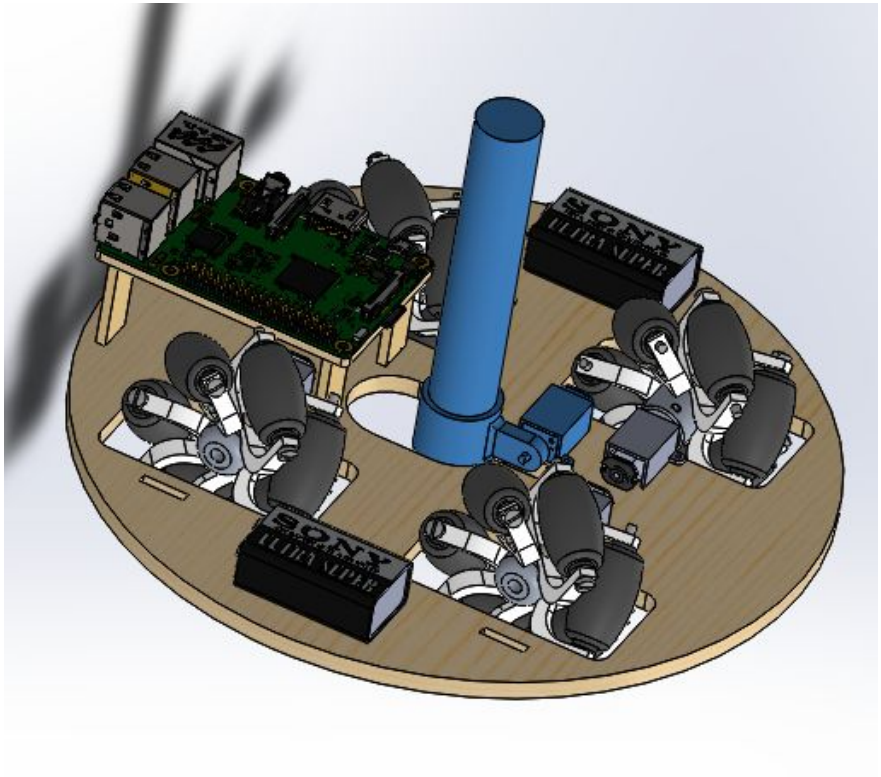
Son

- Use lever mechanism instead of screw mechanism
- Decrease mechanical complexity, fabrication cost, and fabrication time
- Depends on the marker dimension, either use internal ribs or clip fitting mechanism to hold the chalk.

Mechanical Updates - Painting Mechanism

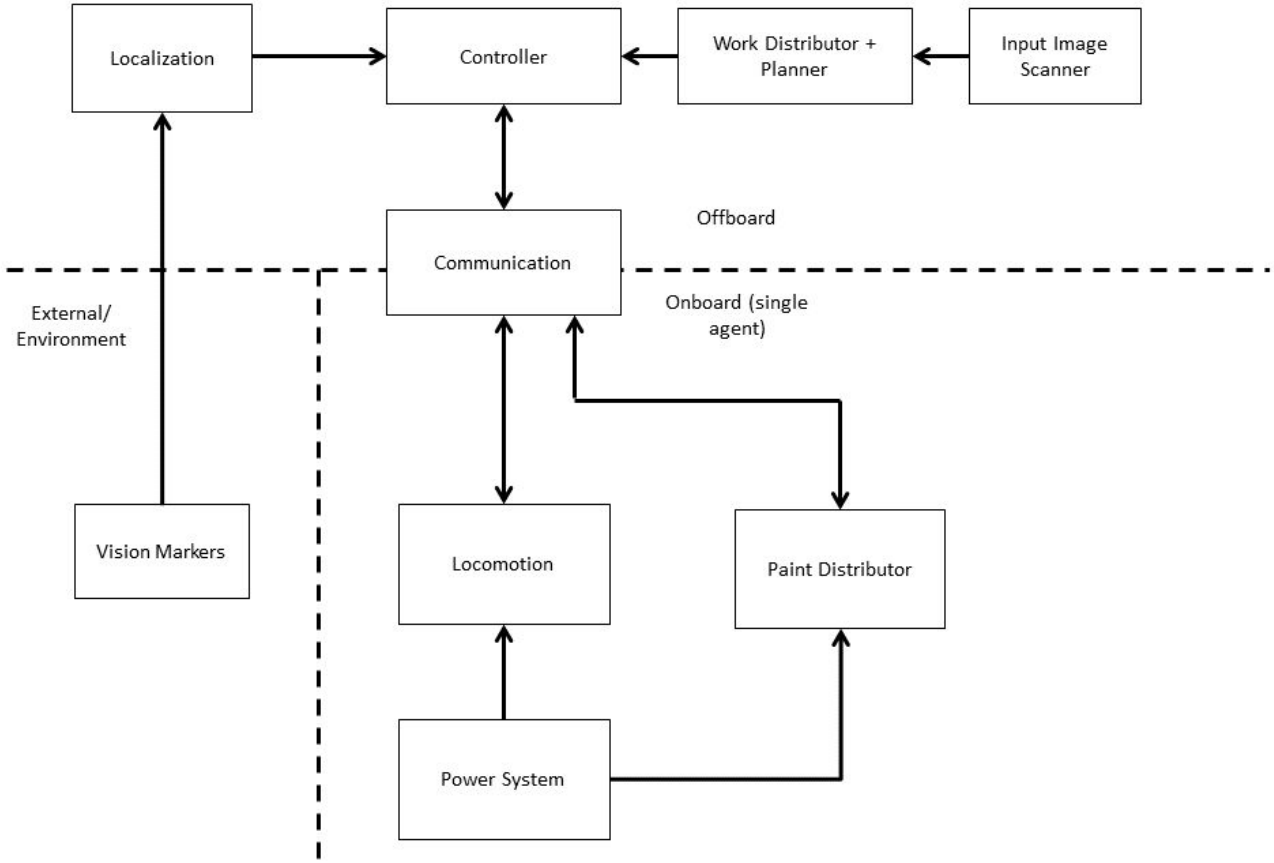


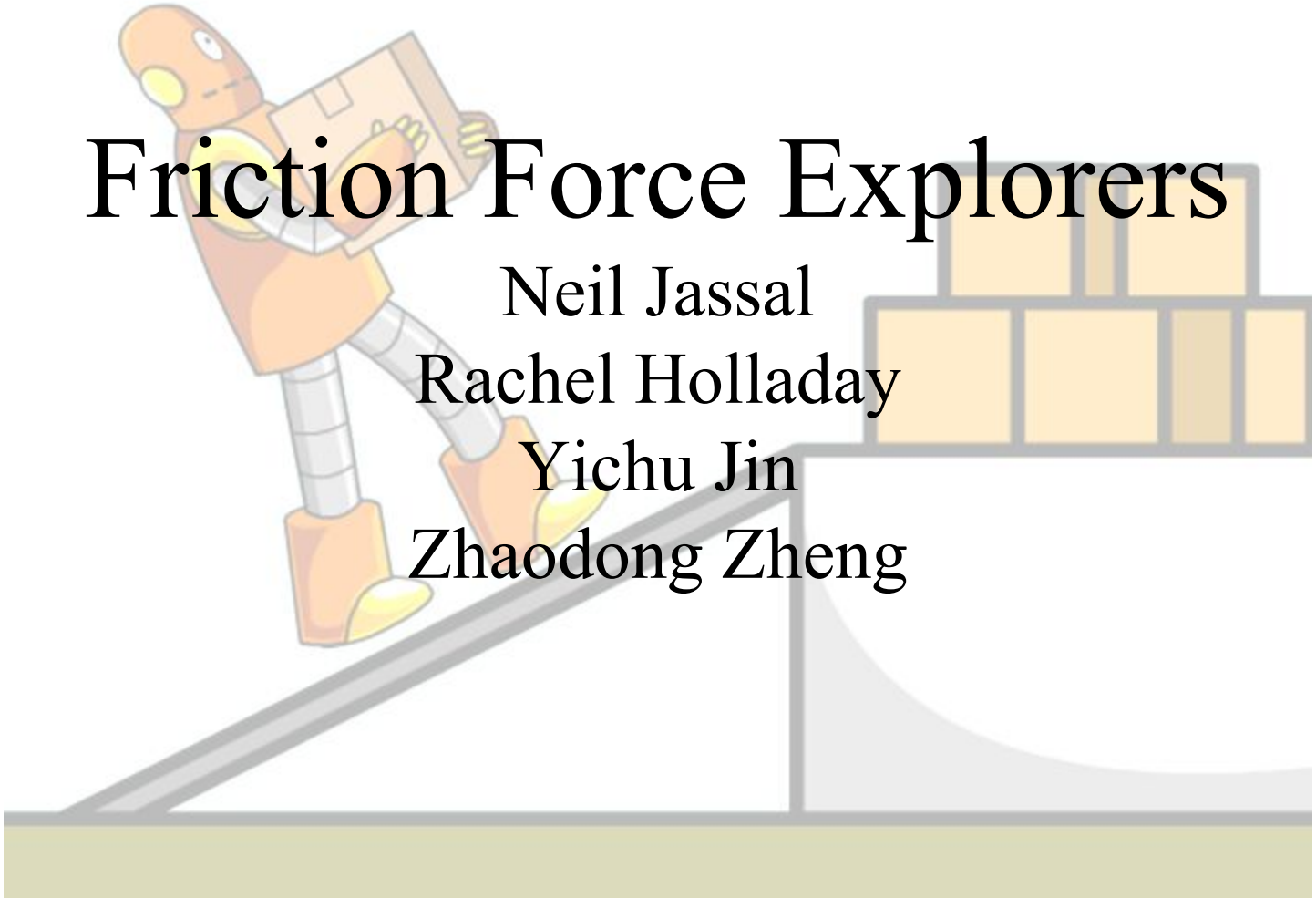
Dad



Son

Software Updates



Friction Force Explorers

Neil Jassal
Rachel Holladay
Yichu Jin
Zhaodong Zheng