



METAL MOOSE

1391

ENGINEERING NOTEBOOK



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KICKOFF



DAY 1 WAS SPENT WATCHING KICKOFF AND SPLITTING INTO SMALL GROUPS TO CONDUCT A DEEPER ANALYSIS OF THE GAME. THE GOAL FOR THESE GROUPS WAS TO UNDERSTAND AND EXPLORE THE GAME RULES, SCORING, AND FIELD. AFTER A FEW HOURS, WE CAME BACK TOGETHER TO DISCUSS OUR FINDINGS. WE ALSO REVIEWED OUR SEASON PLAN, AND SET UP ROUGH TIMELINES FOR WHEN EACH PHASE OF THE ROBOT DESIGN WOULD BE COMPLETE, AS WELL AS MORE SPECIFIC TIMELINES FOR THE FIRST WEEK OF DESIGN.

	Week 1							Week 2							Week 3							Week 4							Week 5							Week 6						
	Sa	Su	M	T	W	Th	F	Sa	Su	M	T	W	Th	F	Sa	Su	M	T	W	Th	F	Sa	Su	M	T	W	Th	F	Sa	Su	M	T	W	Th	F	Sa	Su	M	T	W	Th	F
Date	1/4	1/5	1/6	1/7	1/8	1/9	1/10	1/11	1/12	1/13	1/14	1/15	1/16	1/17	1/18	1/19	1/20	1/21	1/22	1/23	1/24	1/25	1/26	1/27	1/28	1/29	1/30	1/31	2/1	2/2	2/3	2/4	2/5	2/6	2/7	2/8	2/9	2/10	2/11	2/12	2/13	
strategy	Initial thoughts							Build initial needed field elements							Build remaining needed field elements							Build subsystems							Build robot							Build competition						
Field Elements																																										
Prototype group 1																																										
Prototype group 2																																										
Design group 1																																										
Design group 2																																										
Build group 1																																										
Build group 2																																										
Wire																																										
Programmers																																										
Driver practice																																										
Auton																																										

OUR INITIAL VERSION OF THE SEASON PLAN



GAME ANALYSIS

INITIAL GOALS:

- SWERVE DRIVE CHASSIS
- SCORE CORAL ON L1, L2, L3, L4
- PROPELL ALGAE INTO PROCESSOR
- COLLECT ALGAE FROM REEF
- DEEP HANG

GOALS FOR DISTRICTS:

- PICK UP CORAL FROM GROUND
- PICK UP ALGAE FROM GROUND
- SHOOT ALGAE INTO THE BARGE

Actions Value Table	Easy	Hard
Low Value	Get Coral from HP L1	Algae from Ground (Med)
High Value	Auto Ranking Point Co-op Drive Knock Algae (Med) L2 + L3 Algae Processor Vertical Ground Coral Grab Algae from Reef	Coral RP Deep Hang Laying down Coral L4 (Med) Shoot in Net (Med)

MINIMUM FOR 1ST EVENT

IDEAL FOR 1ST EVENT

DISTRICTS + WORLDS

CAN SQUISH,
LARGER



THIS YEAR PRESENTED THE CHALLENGE OF BOTH GAME PIECES BEING VERY DIFFERENT FROM EACH OTHER IN DIMENSION, MATERIAL, AND SCORING LOCATION. WE ANALYZED EACH PIECE, AND THE DIFFERENT WAYS WE COULD INTAKE AND SCORE IT. THE MAIN POINT OF DISCUSSION WAS REGARDING GROUND VS SOURCE INTAKE FOR CORAL, AND GROUND VS REEF INTAKE FOR ALGAE.





CORAL:

Intake Evaluation	Pros	Cons
Ground Pickup	<p>Coral can be rolled a little farther from hp station</p> <p>Can path around source defense</p> <p>Coral that falls near reef can be picked up</p>	<p>Need to track coral on ground during autonomous</p> <p>Might break during match due to defense</p> <p>Handoff to end effector may be less streamlined</p>
Source Pickup	<p>Easy to collect coral during autonomous</p> <p>Less precision needed while lining up</p> <p>One spot of consistent pickup</p>	<p>May be easier to be defended</p> <p>Potentially longer cycles</p> <p>Dead spots wasting time</p>

OUR CONCLUDING DECISION:

- PROTOTYPE BOTH SOURCE AND GROUND INTAKES FOR CORAL
- FOCUS ON SOURCE INTAKE TO PUT ON FIRST BOT AND START AUTONOMOUS PROGRAMMING
- LOOK AT WHAT OTHER TEAMS ARE TRYING AND ANALYZING
- REVISIT TOPIC AFTER TESTING ALL PROTOTYPES



ALGAE:

Intake Evaluation	Pros	Cons
Ground Pickup	<p>No need for algae gripper on end effector</p> <p>Can pick up any algae that falls on ground</p> <p>Processor may be easier to score in</p>	<p>Chasing around rolling algae</p> <p>Longer cycles</p> <p>Getting in the way of other robots while following around algae</p>
Reef Pickup	<p>Pickup simultaneously while scoring</p> <p>No need for follow up for algae</p> <p>Can score in barge quicker</p>	<p>Heavier end effector</p> <p>Algae getting caught in robot</p> <p>Size of mechanism</p>

OUR CONCLUDING DECISION:

- HAVE AN ALGAE MECHANISM ON THE END EFFECTOR
- WORK TO KEEP IT LIGHTWEIGHT IN THE FUTURE
- PROTOTYPE TO SEE HOW SMALL WE CAN MAKE THE ALGAE MECHANISM



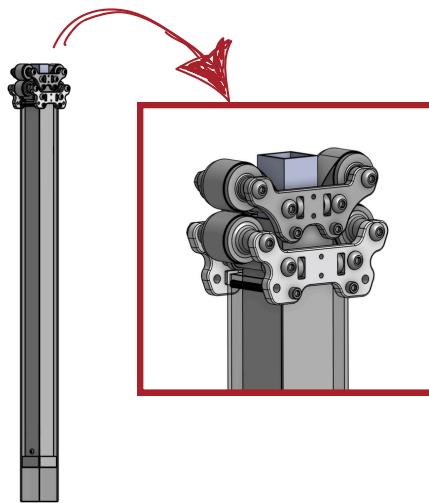
ELEVATOR OR ARM?:

ANOTHER DECISION WE MADE WAS WHETHER WE WANTED A TELESCOPING ARM, A PIVOTING ARM, OR AN ELEVATOR. WE LOOKED AT EXAMPLES FROM PAST ROBOTS AND BRAINSTORMED DIFFERENT WAYS TO GET THE HEIGHT NEEDED FOR THE HIGHER LEVELS OF THE REEF.

TELESCOPING ARM:



EXAMPLE FROM 2910's 2023 ROBOT



THRIFTY TELESCOPING ARM

ARM WITH PIVOT:



EXAMPLE FROM 1391's 2023 ROBOT



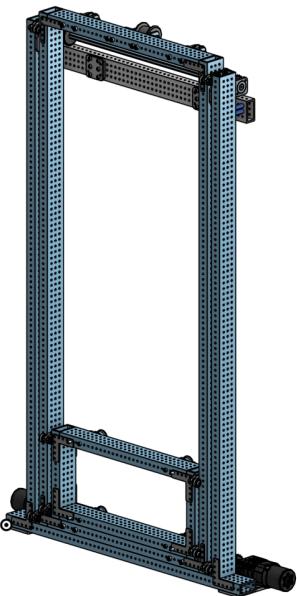
EXAMPLE FROM 6328's 2023 ROBOT



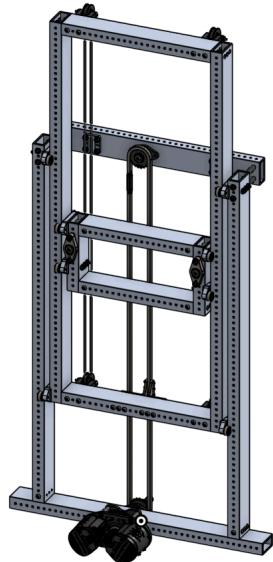
ELEVATOR:



EXAMPLE FROM 4414's 2023 ROBOT



THRIFTY ELEVATOR



WCP GREYT ELEVATOR

CENTER OF GRAVITY VS COMPLEXITY CHART:

	Higher COG	Medium COG	Lower COG
Complex	Pivoting arm		Telescoping Arm
Simple		Elevator	

OUR CONCLUDING DECISION:

- USE AN ELEVATOR DUE TO SIMPLICITY OF DESIGN
- TEST VARIOUS STAGE HEIGHTS AND GEOMETRIES
- COMBINE KNOWLEDGE FROM COTS ELEVATORS AND PAST EXAMPLES IN ORDER TO MACHINE OUR OWN
- LIGHTEN AS MUCH AS POSSIBLE TO LOWER CENTER OF GRAVITY