

# Concept Gen & Eval



Team Exo:

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# Overview

- Project Description
- Customer Requirements
- Concept Generation
- Concept Evaluation
- Budget Planning



# Project Description

- Our team was tasked with the challenge of creating a test stand for a robotic actuator.
- The stand will be made to test the robot actuator
- In order to test we must learn how to communicate with the actuator
- The actuator uses the CAN bus protocol
- The actuator has an integrated MIT Mini Cheetah controller

# Customer Requirements

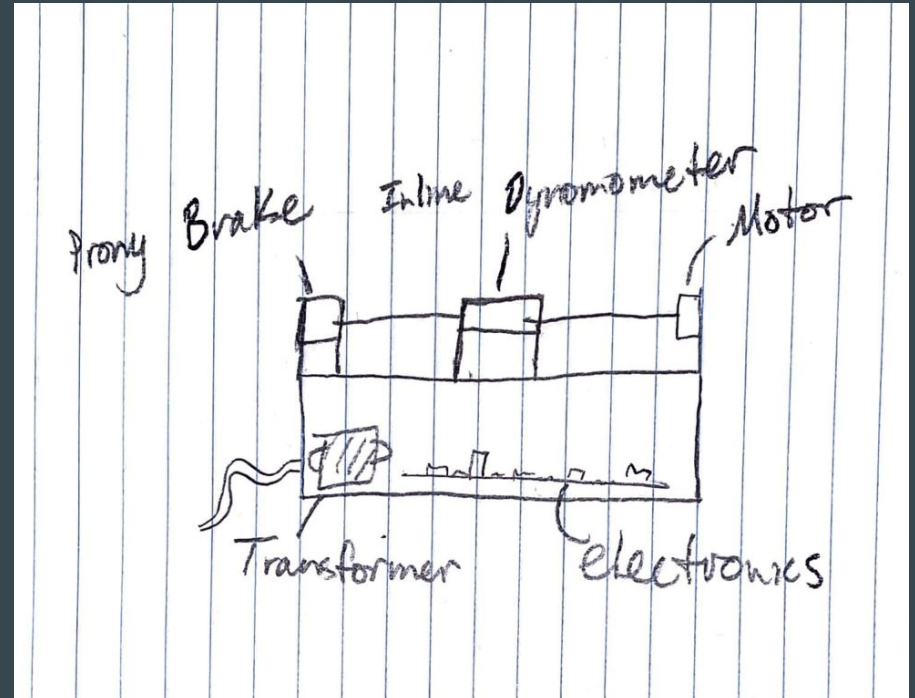
The customer asked that the team:

- Build a test stand for the actuator that will be able to withstand peak operating conditions
- Provide a method of measuring torque and speed of the motor
- Measure the amount of power that the actuator requires during different conditions
- Some additional requirements include: programming/validating various control modes, and (if time permits) retrofitting the exoskeleton

Note: These requirements have been listed in priority.

# Concept Generation-Cuddeback

- Prony Brake
- Inline Dynamometer
- Electronics beneath motor mounting

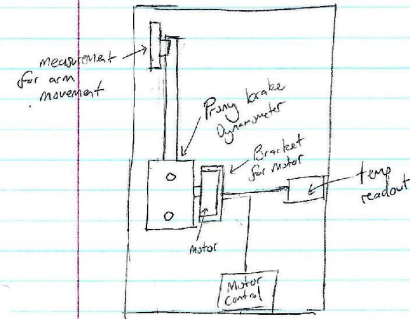


# Concept Generation-Davidson

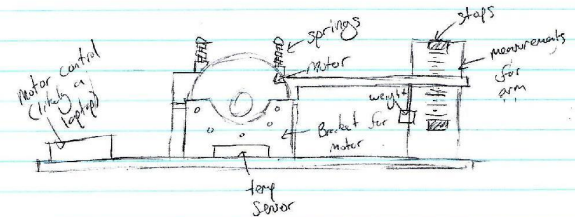
- Prony Brake
- Temp and Speed readouts
- Simple dynamometer

Joshua  
Davidson

## Concept Generation #1

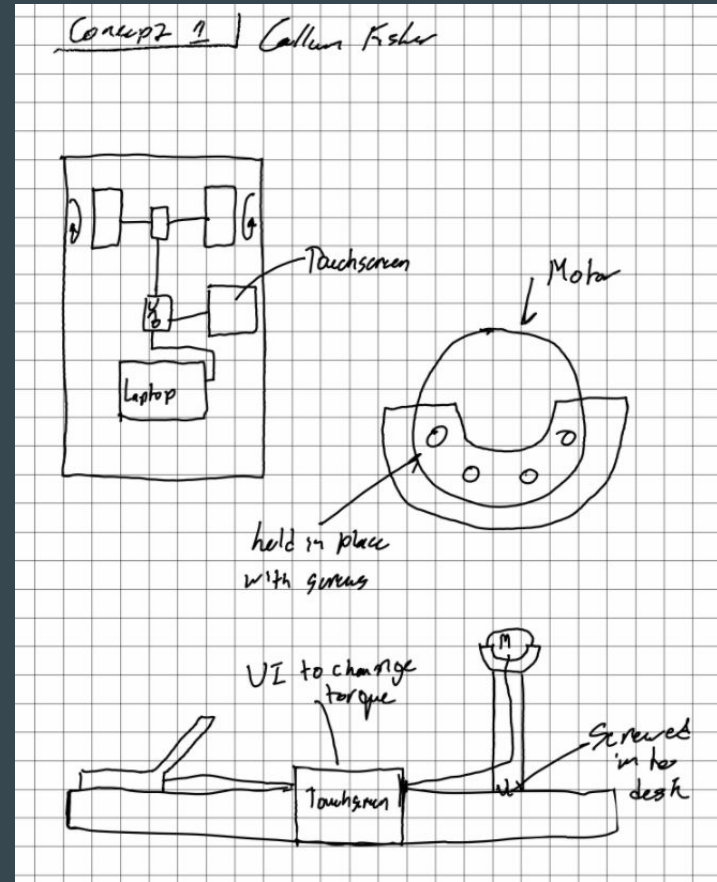


Motor connected to prony brake dynamometer, and thermometer for temp & torque readings. likely controlled by a laptop



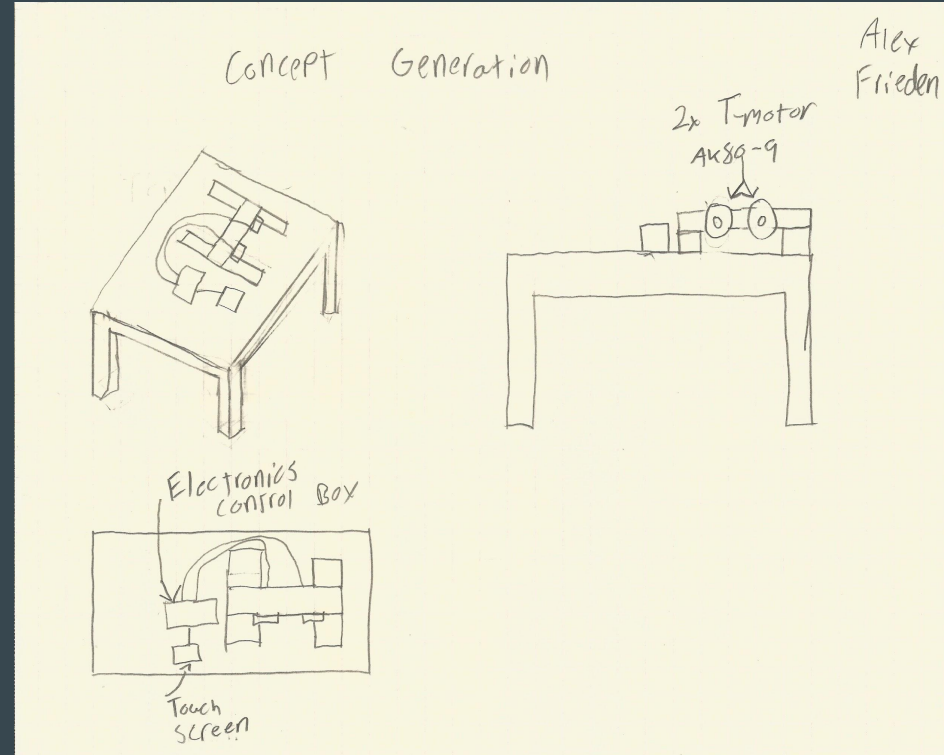
# Concept Generation-Fisher

- Touchscreen interface
- Held in place with screws
- Electronics middle of table
- 3D printed mounting for motors
- Dynamometer in between the motors



# Concept Generation-Frieden

- Frame made with 8020.net 20-4040 aluminum extrusions
- Bolted to the table to provide support
- Controlled with 3d-printed electronics control box
- Operated using touchscreen control



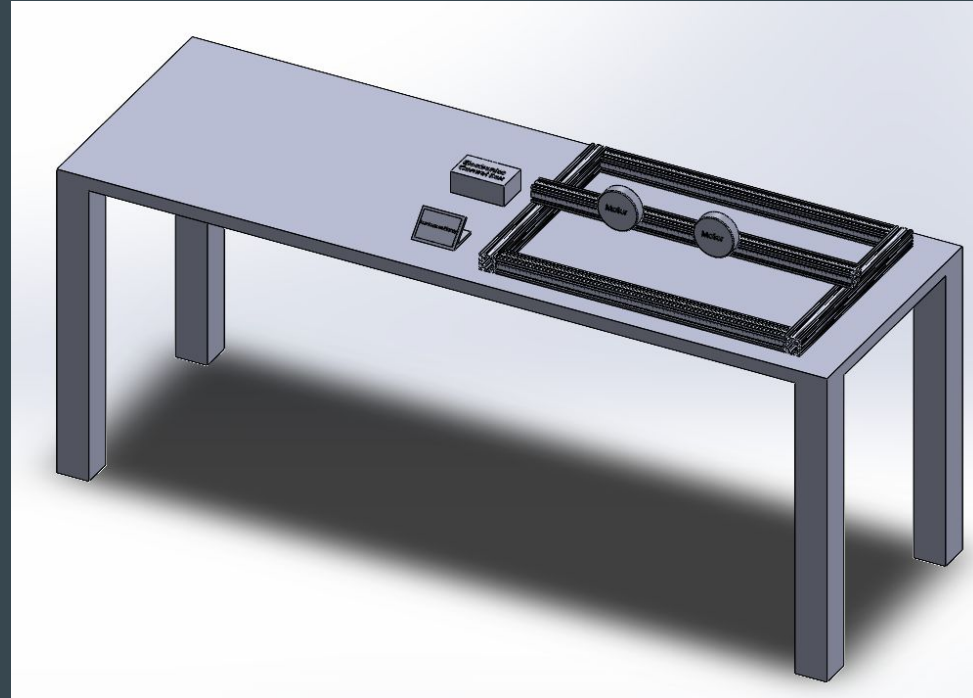


# Concept Evaluation

- 1 improves
- 0 is a negative
- S is the same

Criteria\Concept	Chance	Callum	Josh	Alex
Safety	1	1	1	1
Cost	0	0	0	0
Min Deflection	S		0	1
Ease of Assembly	0	0	0	0
Sum of 1	1	1	2	2
Sum of 0	2	3	2	2
Sum of S	1	0	0	0

Note: The datum is a bar drilled into a table.



# Budget Planning

Item	Purchase Link	Quantity	Cost Per Unit	Shipping Cost	Total Cost	Budget Remaining	Purchase Request Submitted?
T-Motor AK80-9	<a href="#">Link</a>	2	\$579.90	\$0	\$1,159.80	\$1,840.20	Yes
Teensy 4.1 Development board	<a href="#">Link</a>	1	\$37.99	\$0	\$37.99	\$1,802.21	Not Submitted
Husky 6 ft. Adjustable Height Solid Wood Top Workbench	<a href="#">Link</a>	1	\$326.45	\$0	\$326.45	\$1,475.76	Yes
Husky 26 in. 4-Drawer Rolling Cabinet Tool Box Chest in Gloss Black	<a href="#">Link</a>	1	\$140.84	\$0	\$140.84	\$1,334.92	Not Submitted
Markforged 800cc Onyx Filament Spool	<a href="#">Link</a>	1	\$207.44	\$4.50	\$211.94	\$1,122.98	Not Submitted
Markforged Carbon Fiber CFF 50cc Filament Spool	<a href="#">Link</a>	1	\$163.77	\$4.50	\$168.27	\$954.71	Not Submitted
seeed studio Serial CAN-Bus Module Based on MCP2551 and MCP2515	<a href="#">Link</a>	1	\$16.90	0	\$16.90	\$937.81	N/A

- Currently the purchase request form for the two T-Motor AK80-9 and Husky 6 ft Adjustable table have been submitted
- Budget will be updated as more materials are required and requested

# Conclusion: Future Planning

- Generate CAD models for motor mountings
- Create arduino sketch to control the motors
- Purchase and solder connectors for motors
- Purchase 80-20 extrusions