



FAMU-FSU
College of
Engineering

Virtual Design Review 5

Team 510 – Danfoss IGV

02/29/2024



Team Overview



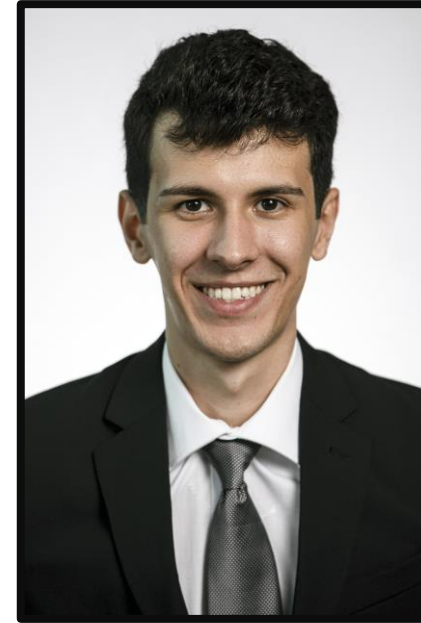
Joseph Bechara
Controls Engineer



Hunter Dabbs
Systems Engineer



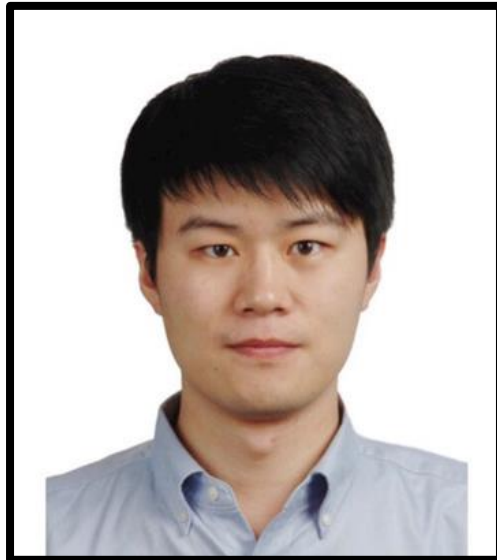
Tye Fountain
*Mechanical Design
Engineer*



Thiago Todesco
*Manufacturing
Engineer*



Sponsor and Advisor



Engineering Mentor
Yiwei Liu
Manufacturing Engineer



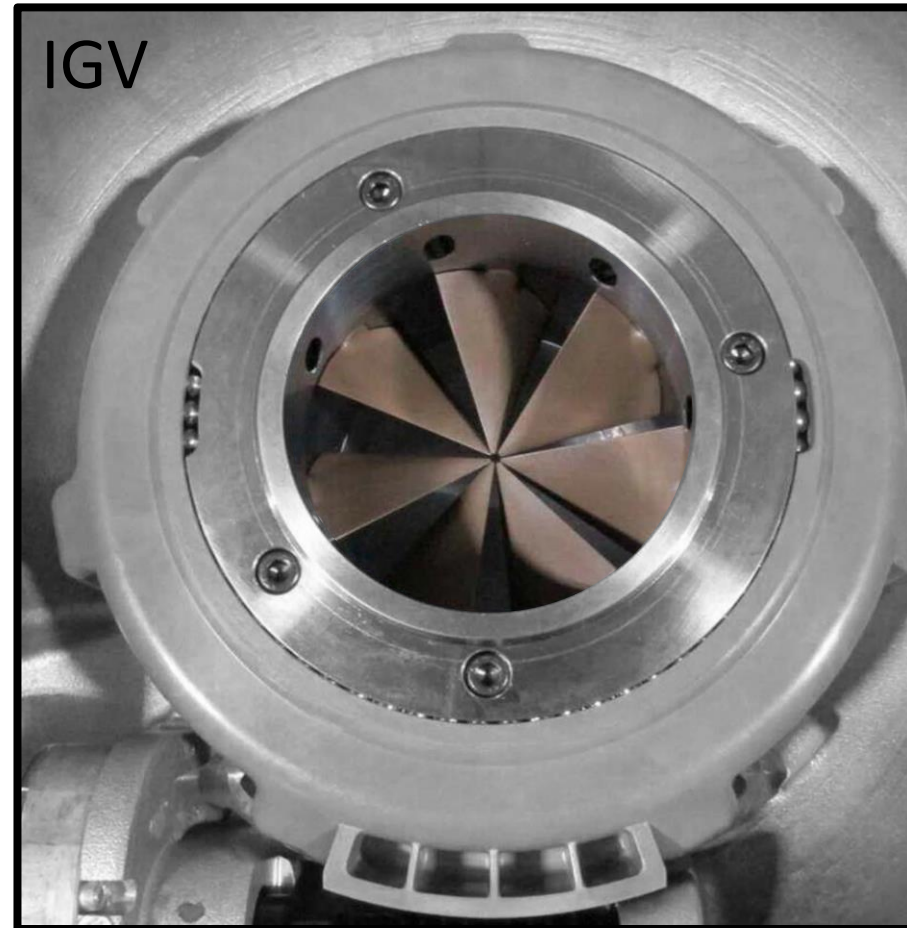
Academic Advisor
Shayne McConomy, Ph.D.
Teaching Faculty II



Objective

Develop an apparatus that tests the functionality of four different Danfoss Inlet Guide Vanes (IGVs), giving relevant data and prompting the operator with a pass or fail message.

Danfoss



Background



Background



Project Overview

Determine the functions
the fixture needs to
accomplish

Improve current method
performance and
measurements

Detect blade open/close,
ball indicator movement
and Inlet Guide Vane model

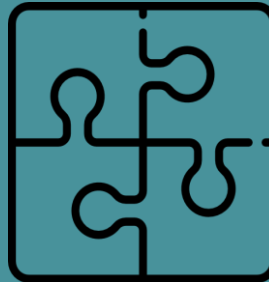
Assumptions



Operators will be trained using the testing fixture's documentation



Current workstation remains unchanged

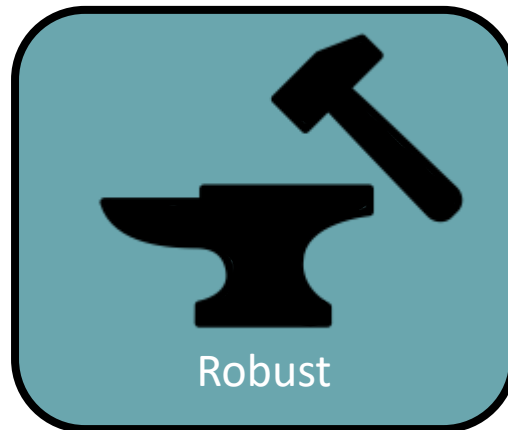
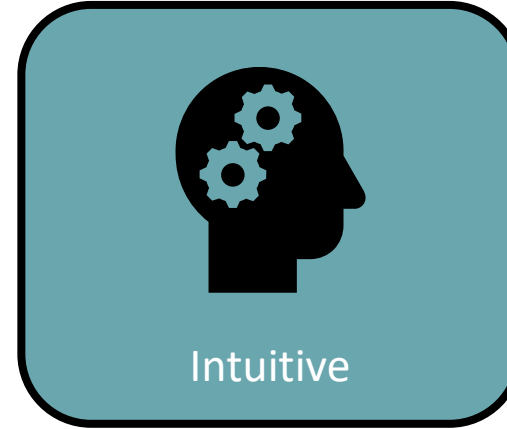
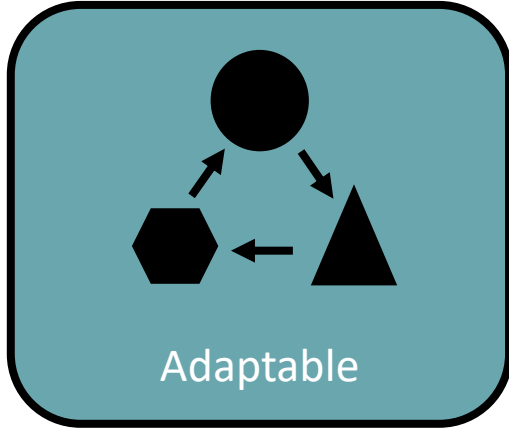


Production ready IGV



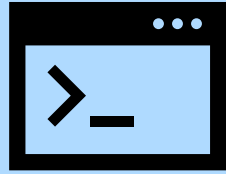
Operators able to lift 50 pounds

Key Goals

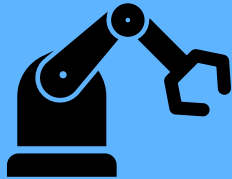


Targets and Metrics

Controls



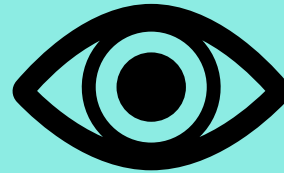
Structure



Provision



Sensing



Communication



Concept Selection Overview

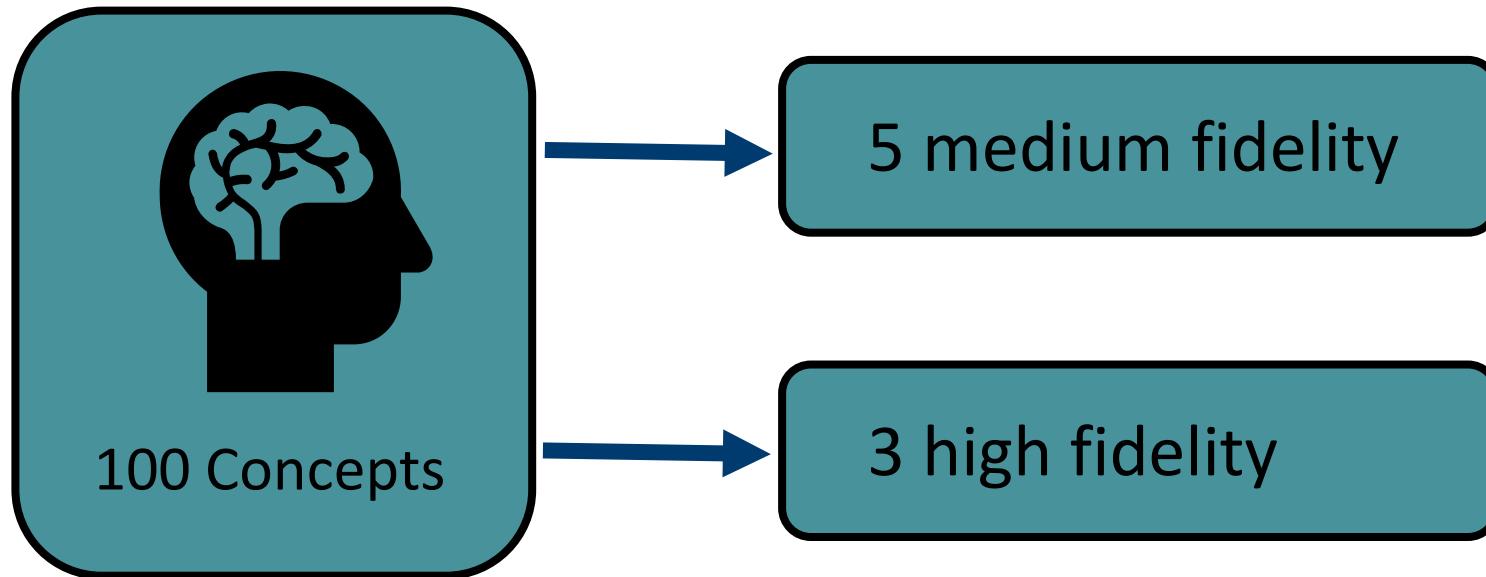
**Binary
Pairwise
Comparison**

**House of
Quality**

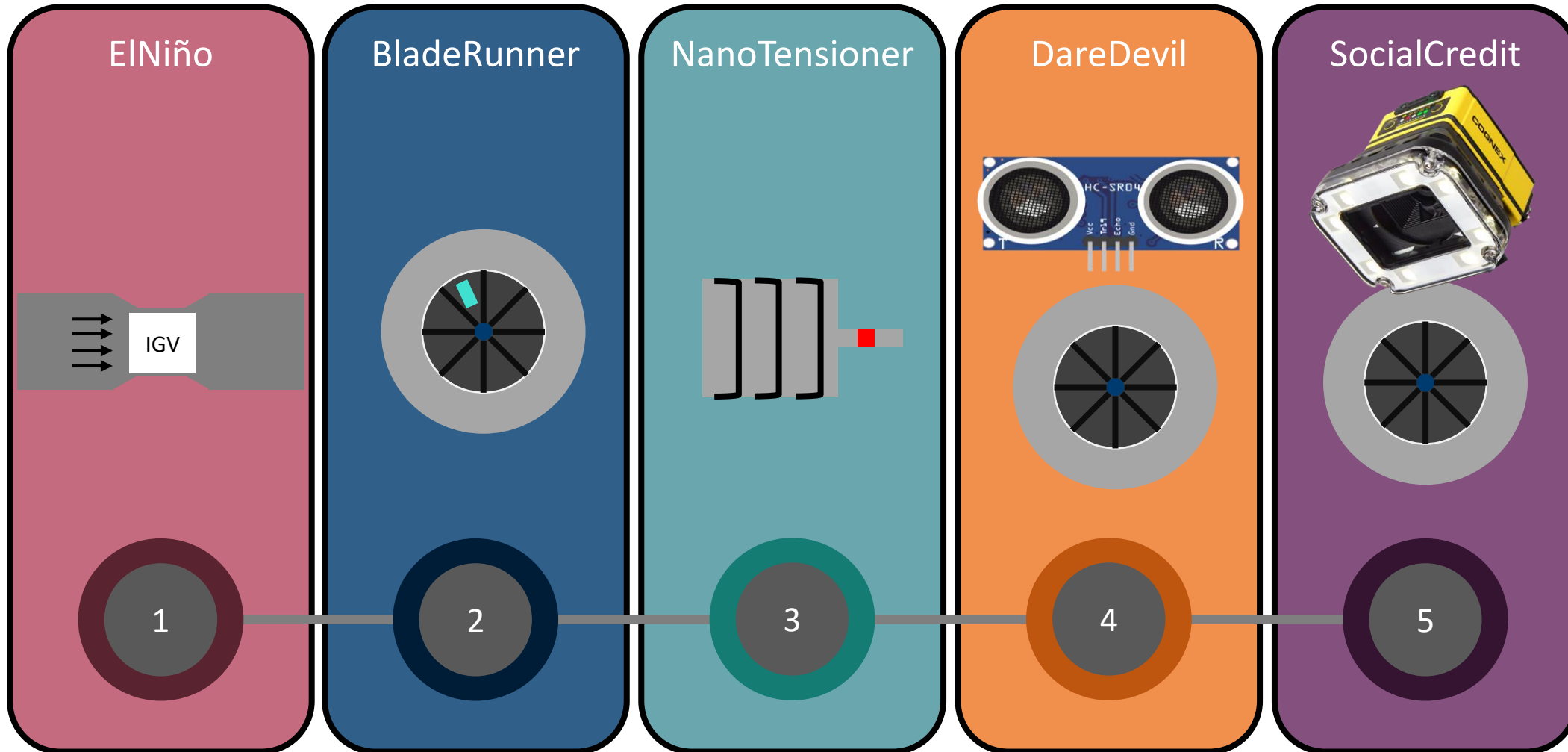
Pugh Charts

**Analytical
Hierarchy
Process**

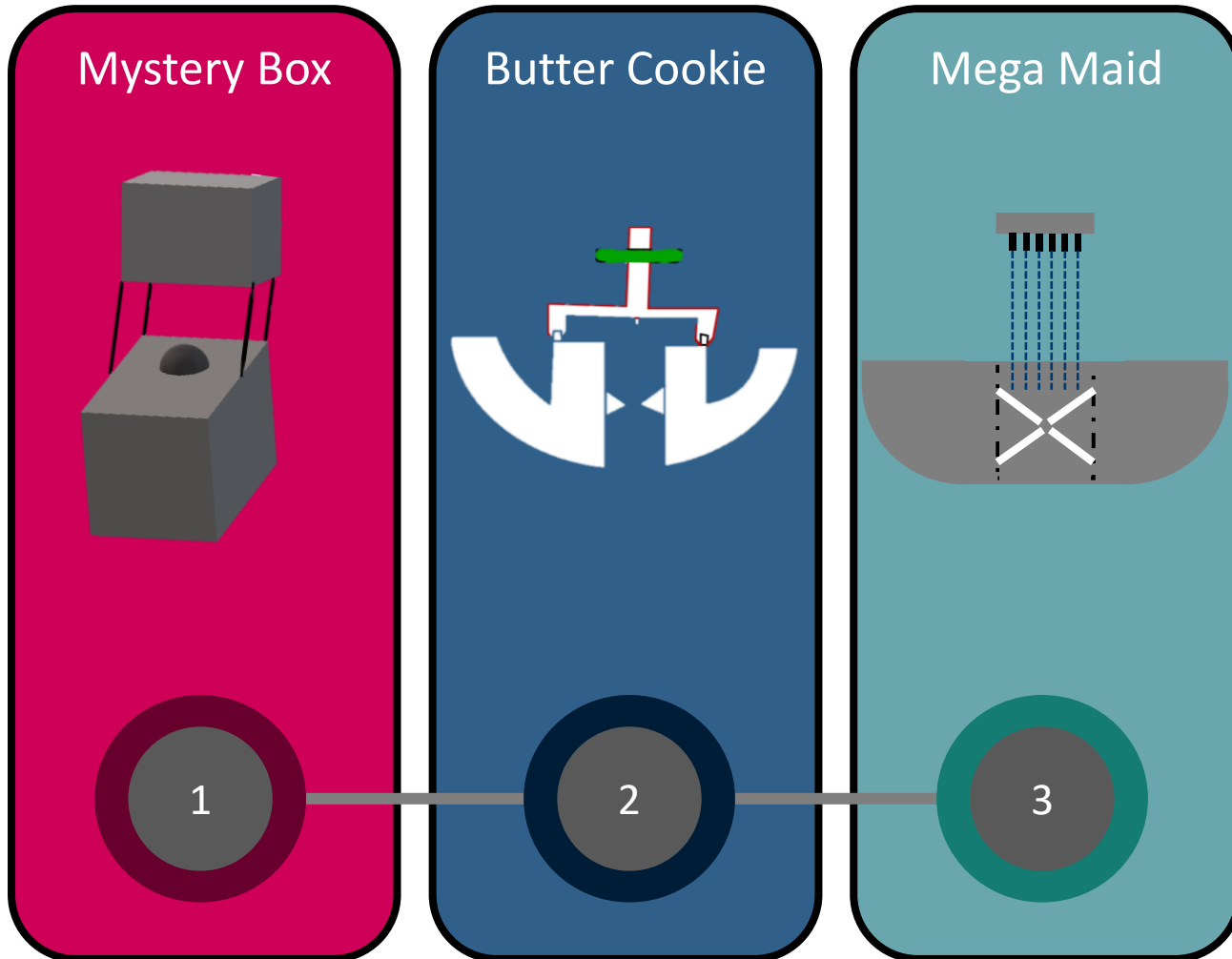
Concept Generation



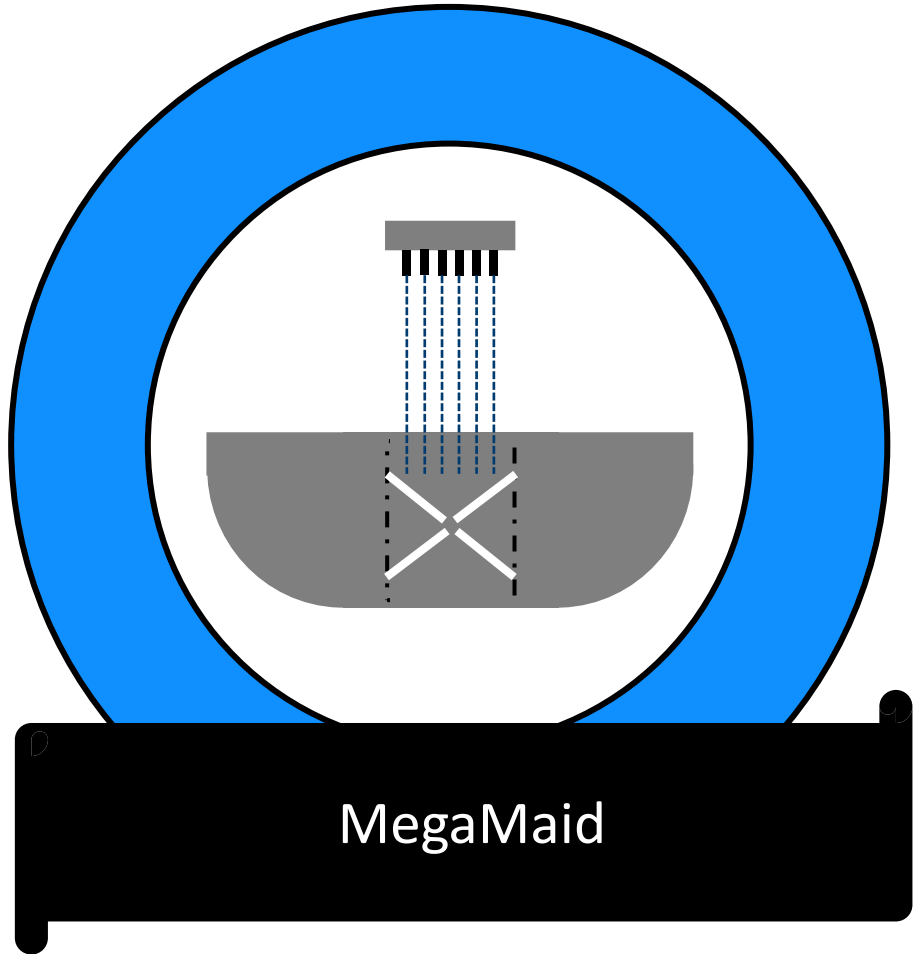
Medium Fidelity Concepts



High Fidelity Concepts



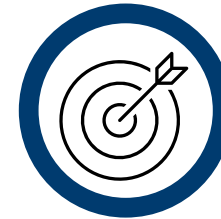
Final Selection



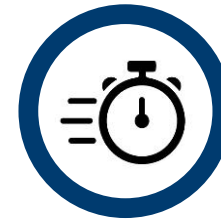
MegaMaid



Stable design



Accurate and precise

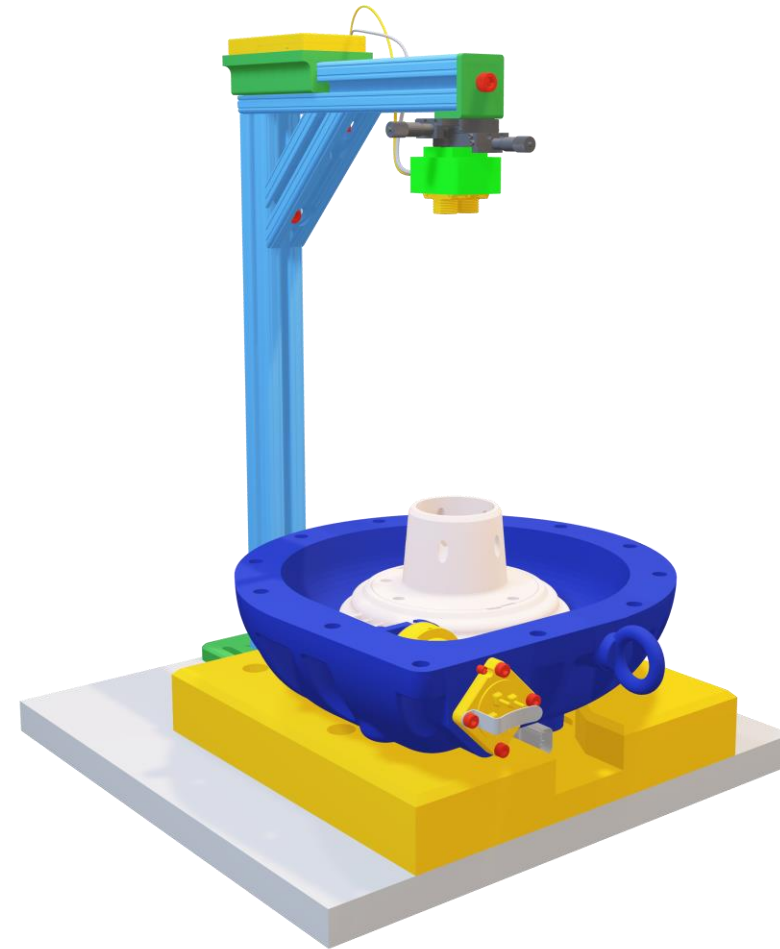
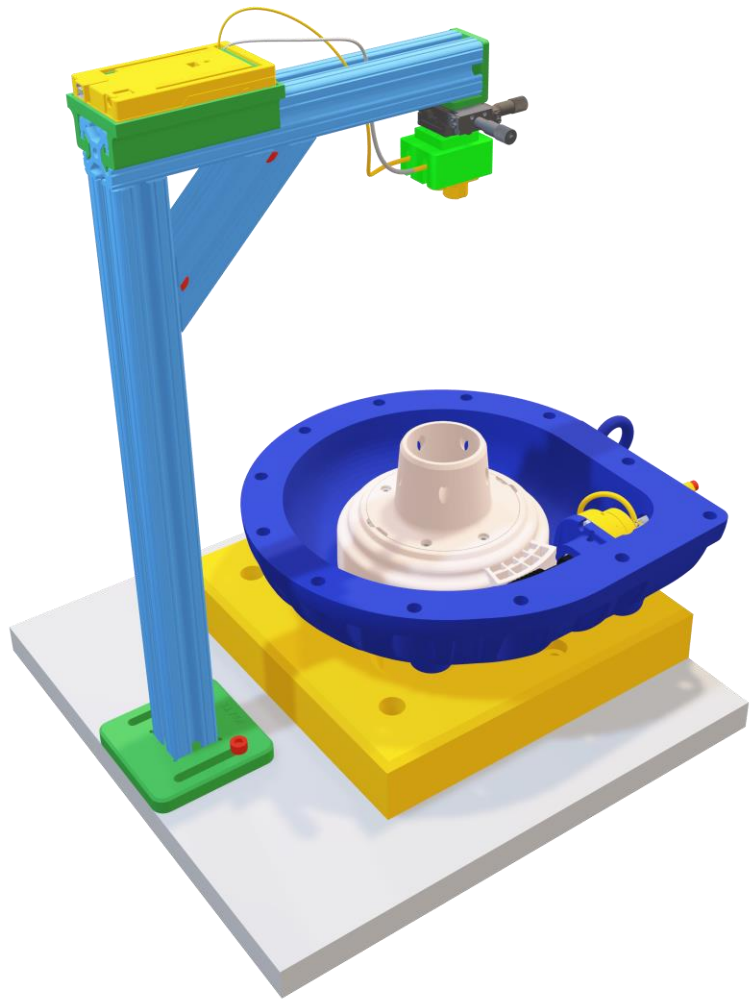


Fast



Durable

Current Design



Current Design Baseplate



Utilize Existing Baseplate



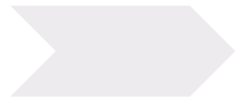
Current Design Structural Frame



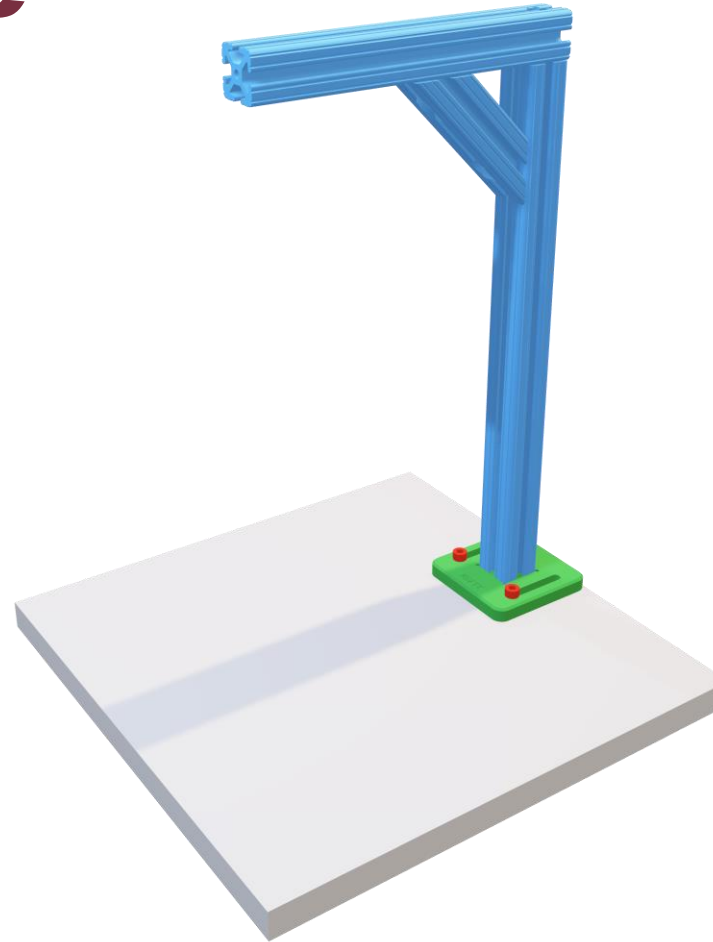
8020 Aluminum



Test Plate



Workstation Table



Current Design Arduino Case



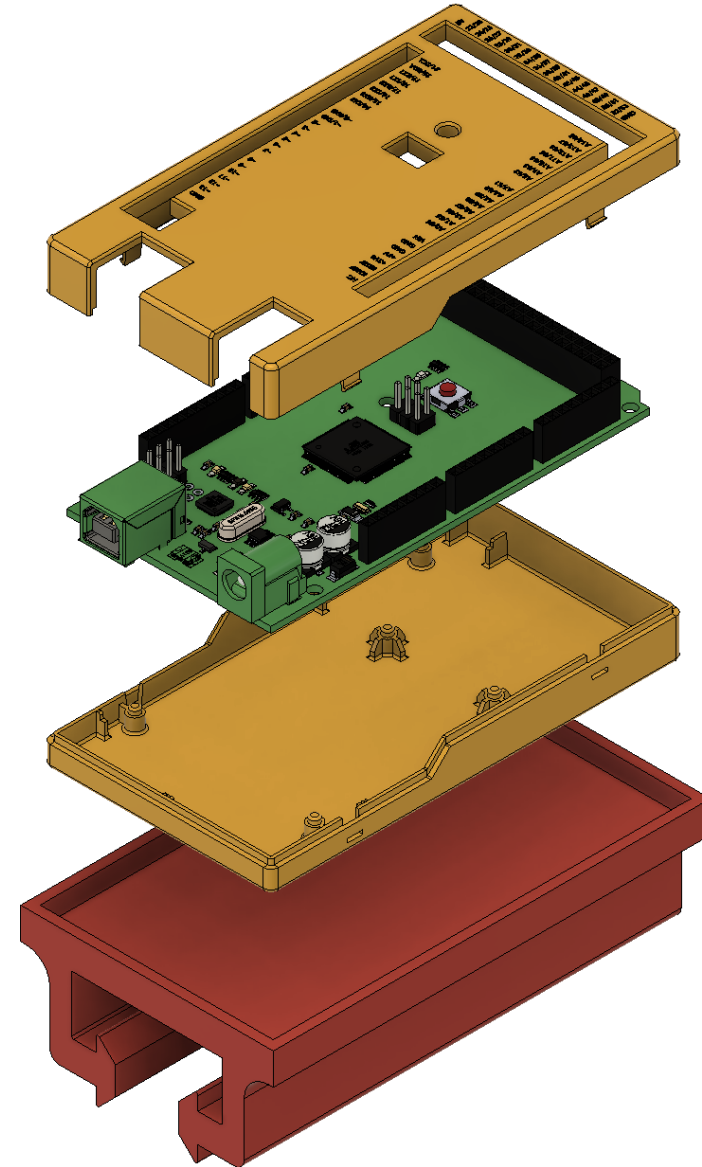
8020 Hardware



Arduino Protection Case



Arduino



Current Design Laser Positioning



Screws



8020 Hardware



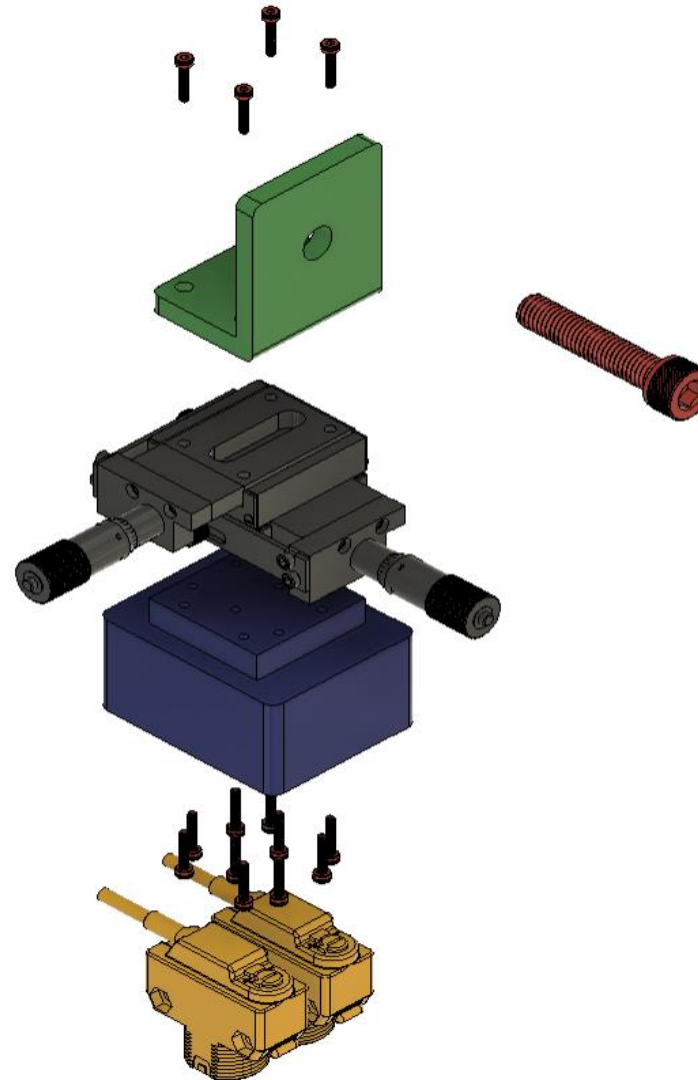
X-Y Positioning axis



Laser Hardware



Laser



Current Design Blade Functionality



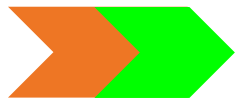
Laser Receiver Status



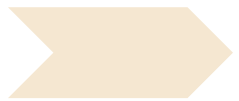
Black Tape



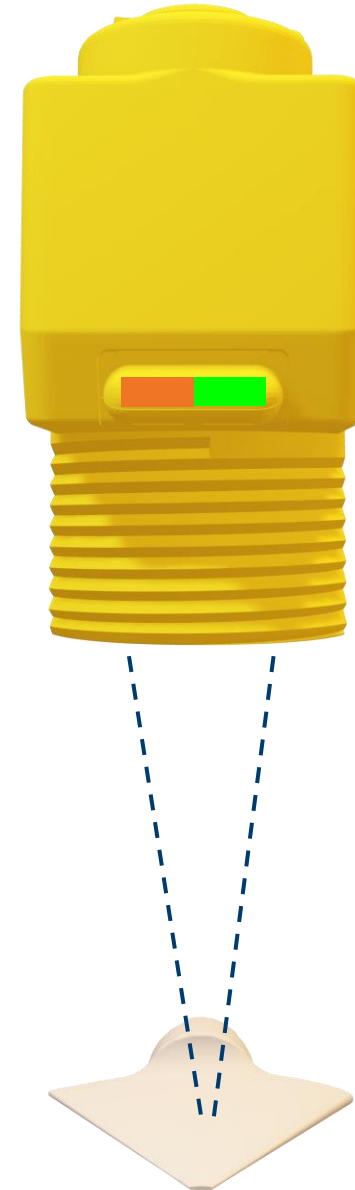
Current Design Blade Functionality



Laser Receiver Status

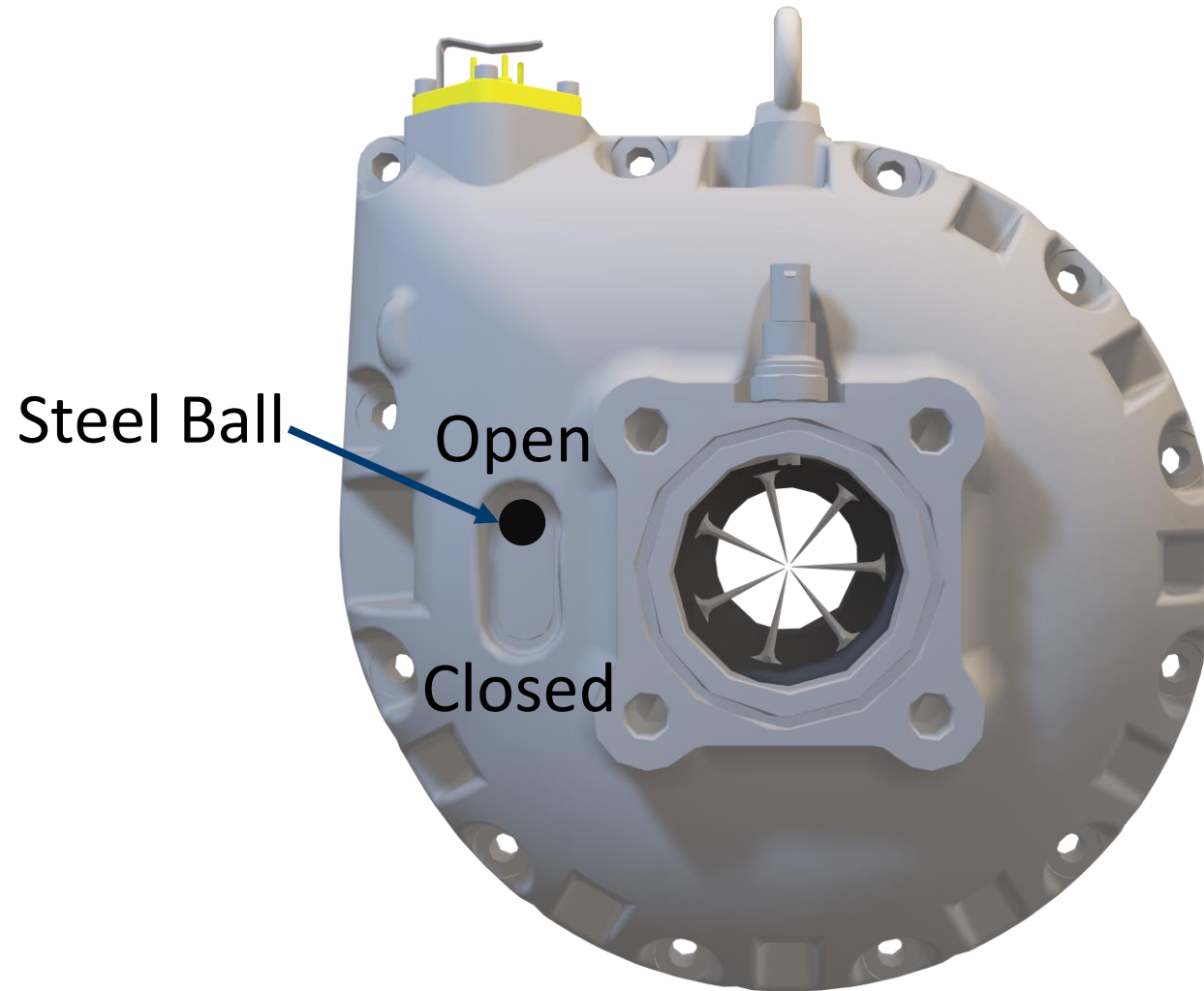


IGV Blade



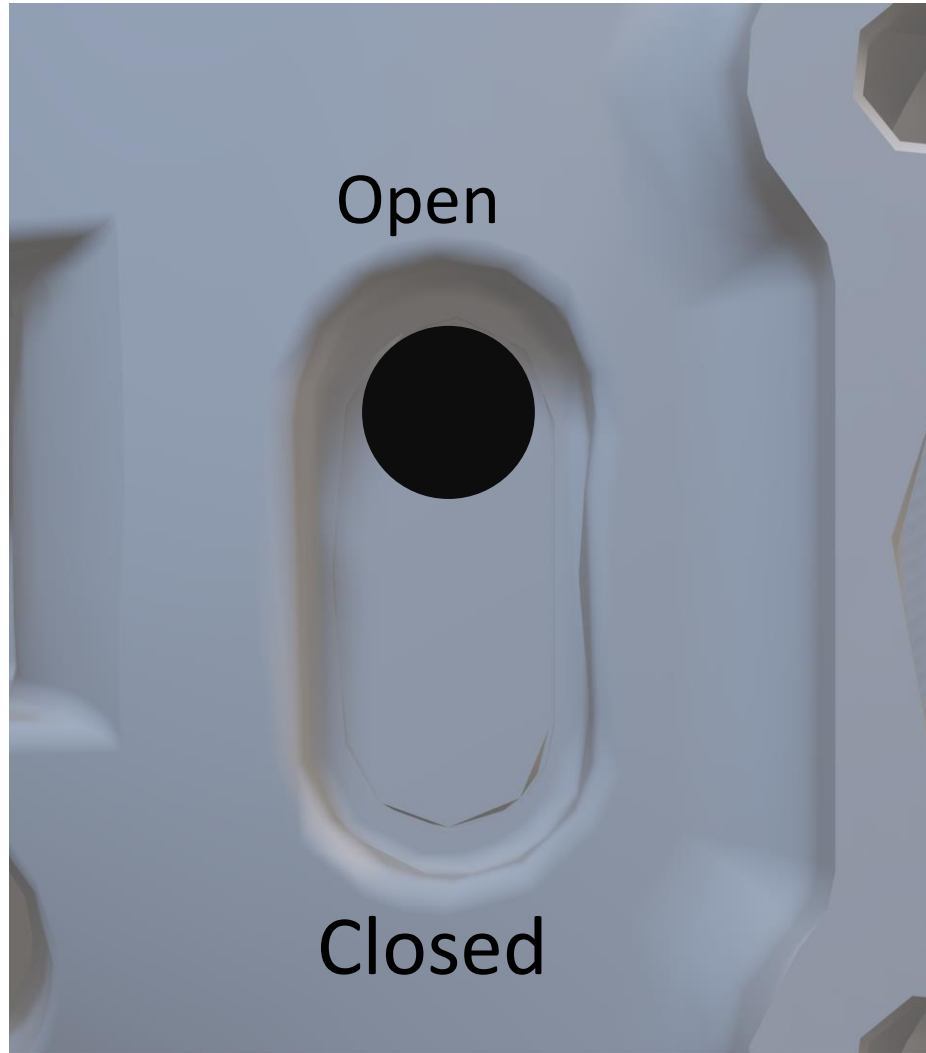
Current Design

Steel Ball Tracking



Current Design

Steel Ball Tracking



Current Design

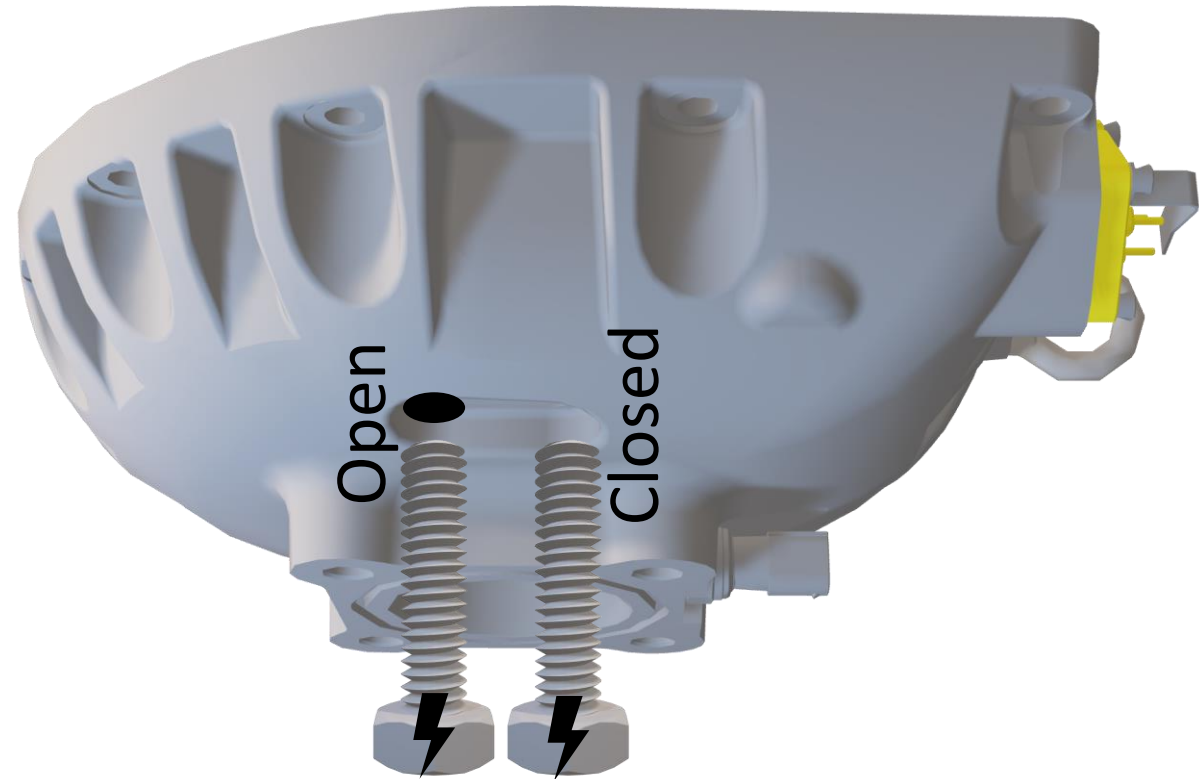
Steel Ball Tracking



The ball moves relative to the blades



Magnetic flux is tracked as the ball moves



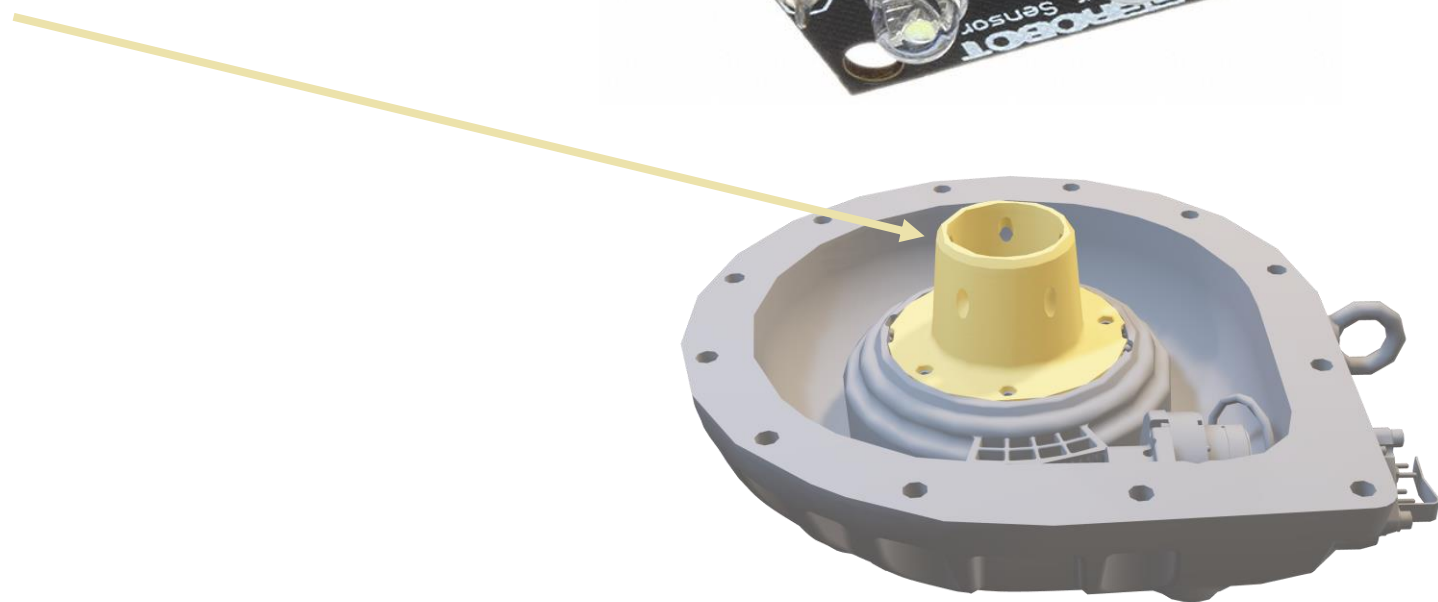
Tracking IGV Model








Color Sensor →

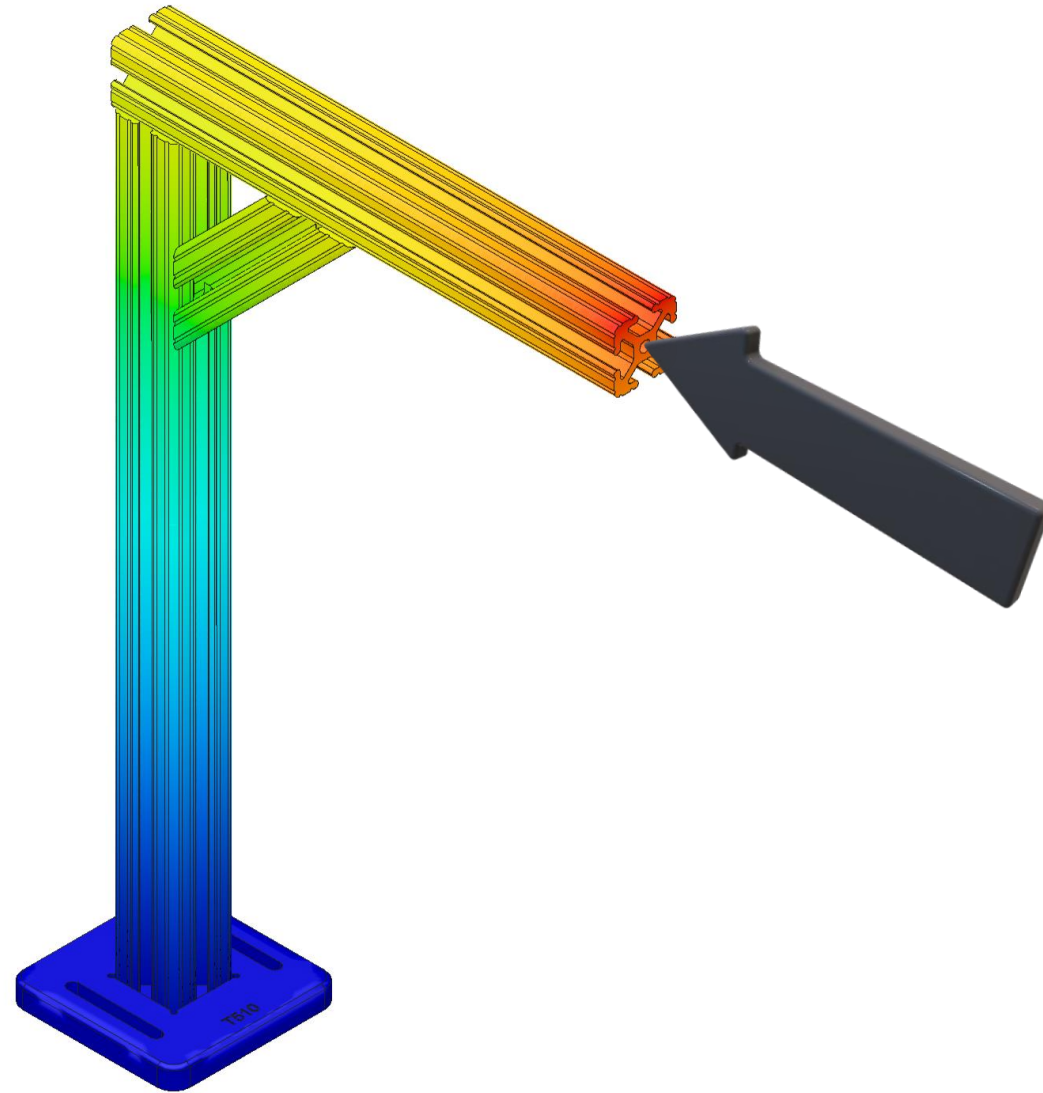


IGV

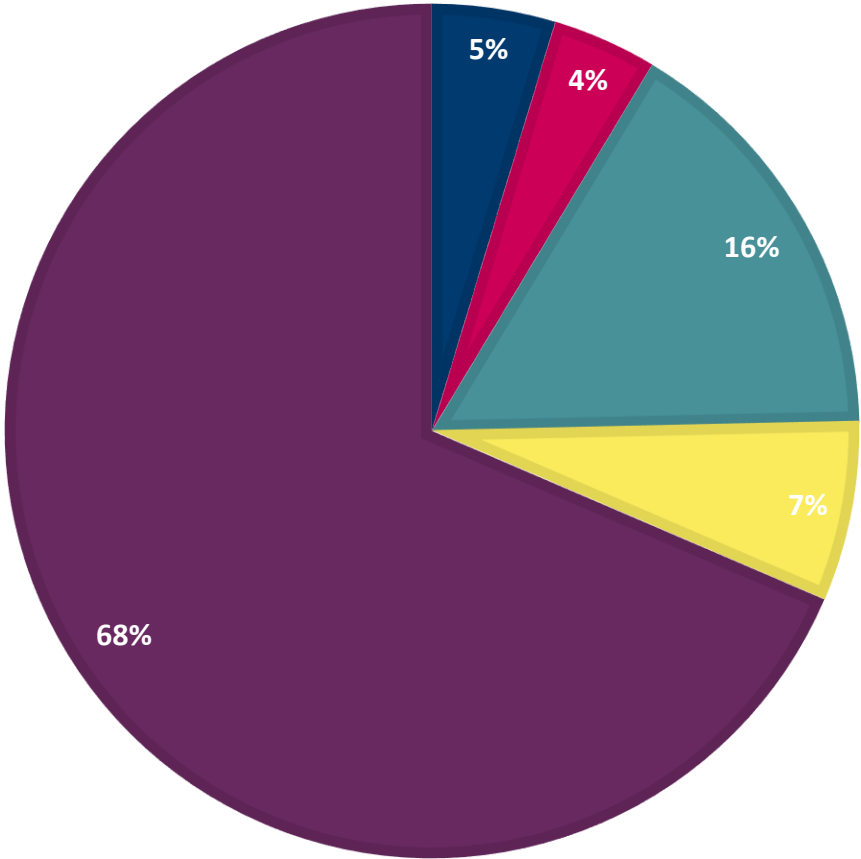


Current Design FEA Analysis

	Displacement (mm)
	0.00
	0.03
	0.06
	0.08
	0.10

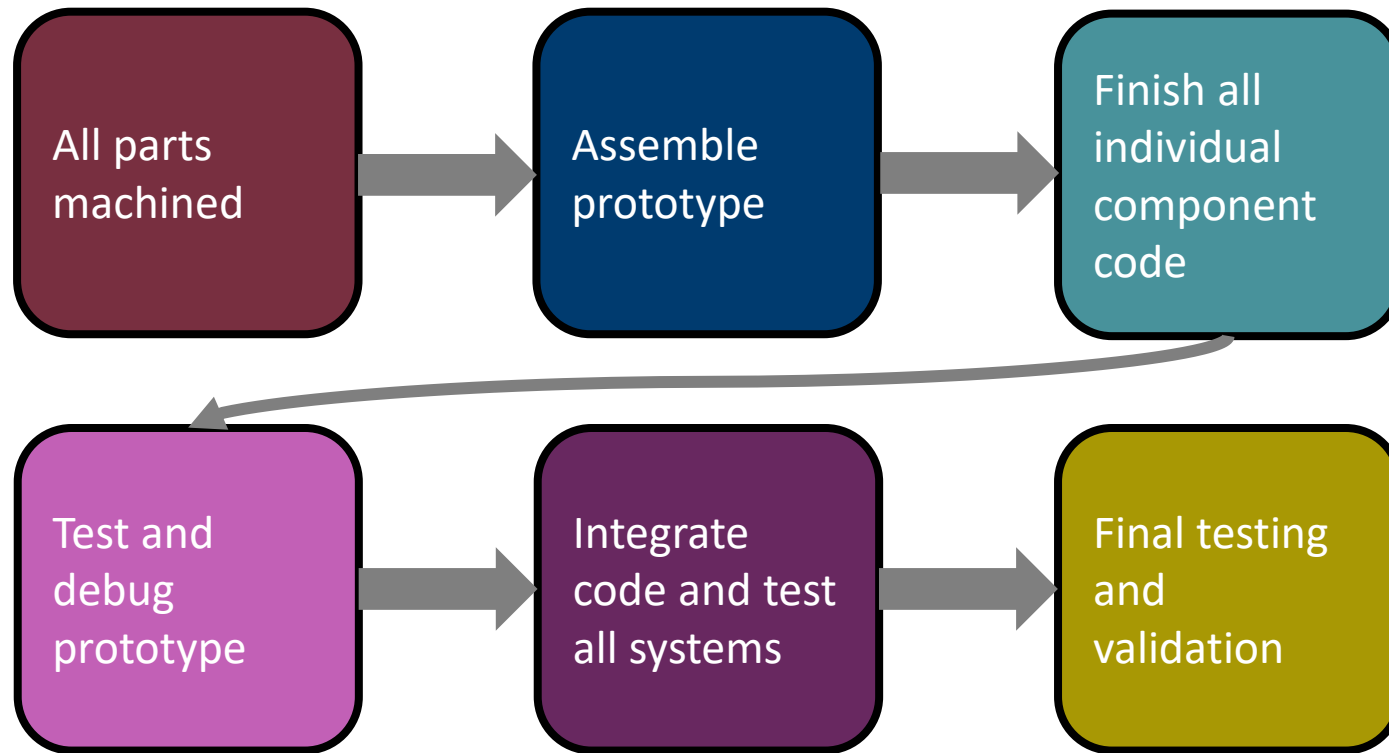


Budget Breakdown



Remaining Budget	(\$3,427.47)
Micrometer	(\$801.50)
Lasers	(\$340.00)
Miscellaneous	(\$233.47)
Aluminum	(\$197.57)

Future Work



Questions

