FAMU-FSU College of Engineering

Virtual Design Review 4
Team 510 – Danfoss IGV

01/30/2024

Team Overview

Joseph Bechara
Controls Engineer

Hunter Dabbs
Systems Engineer

Tye Fountain
Mechanical Design Engineer

Thiago Todesco
Manufacturing Engineer

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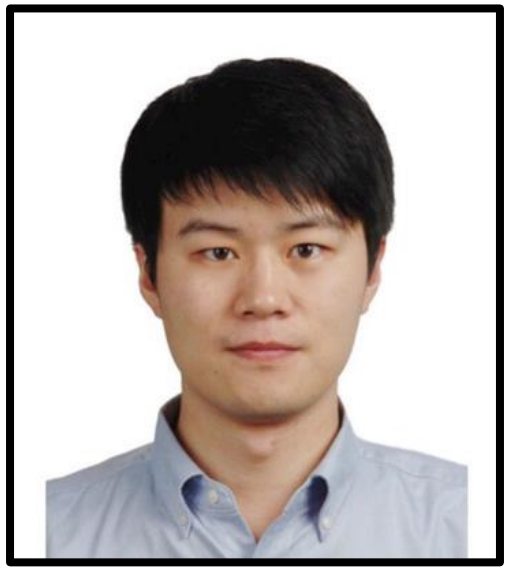
Sponsor and Advisor

Engineering Mentor
Bruce Barnett
Manufacturing Engineer (Retired)



Engineering Mentor
Yiwei Liu
Manufacturing Engineer

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

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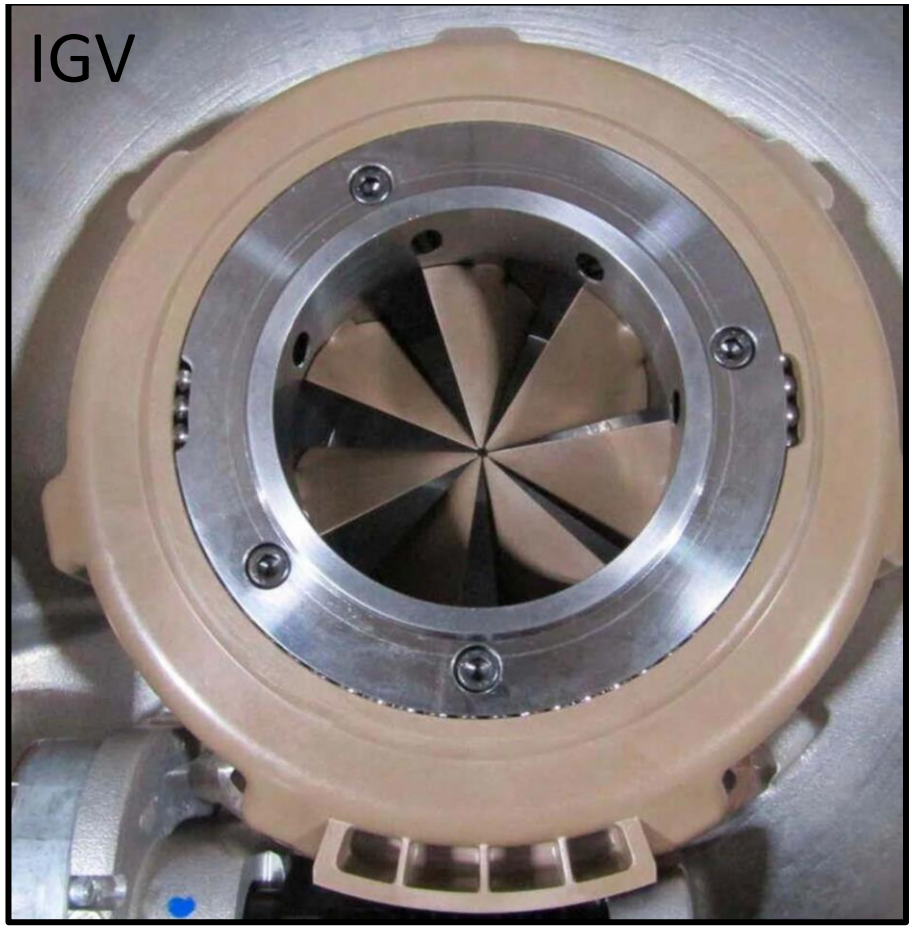
Objective

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.



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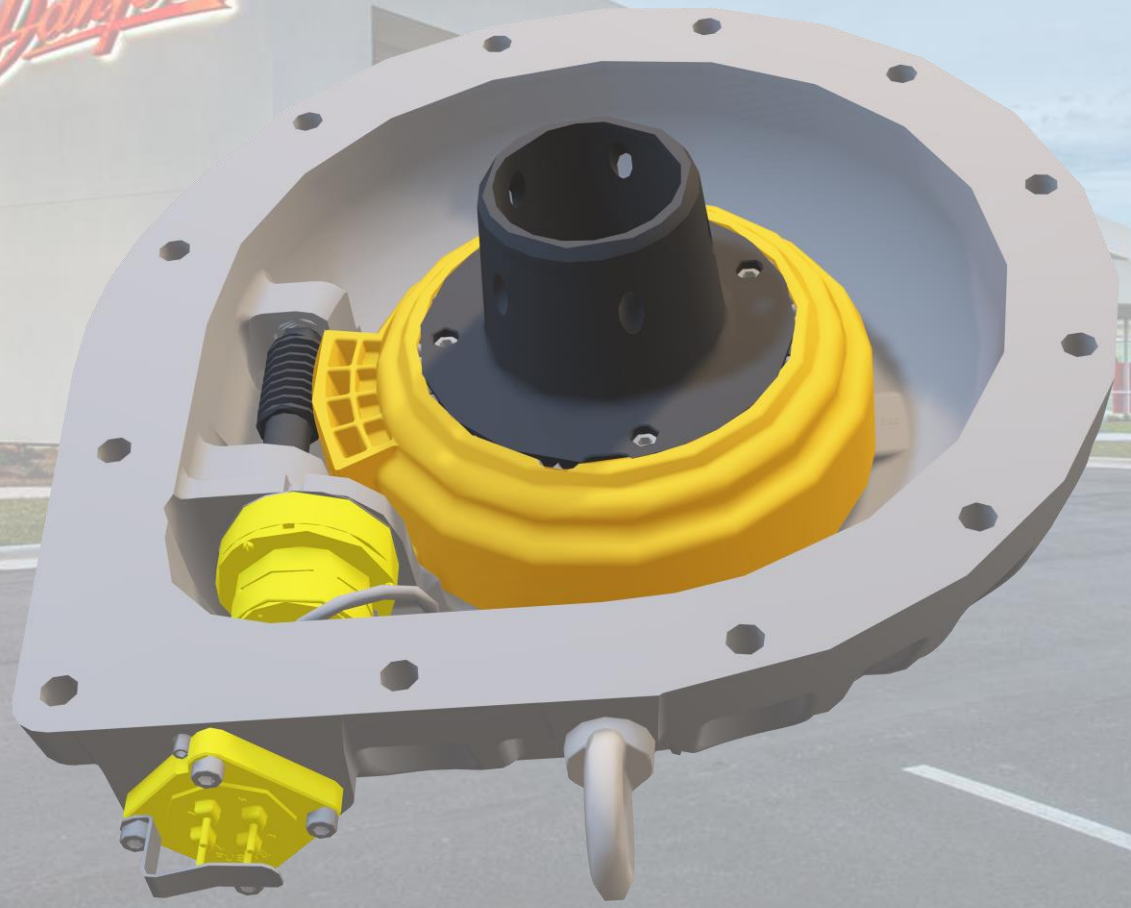
Background



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Project Overview

What functions the fixture needs to accomplish

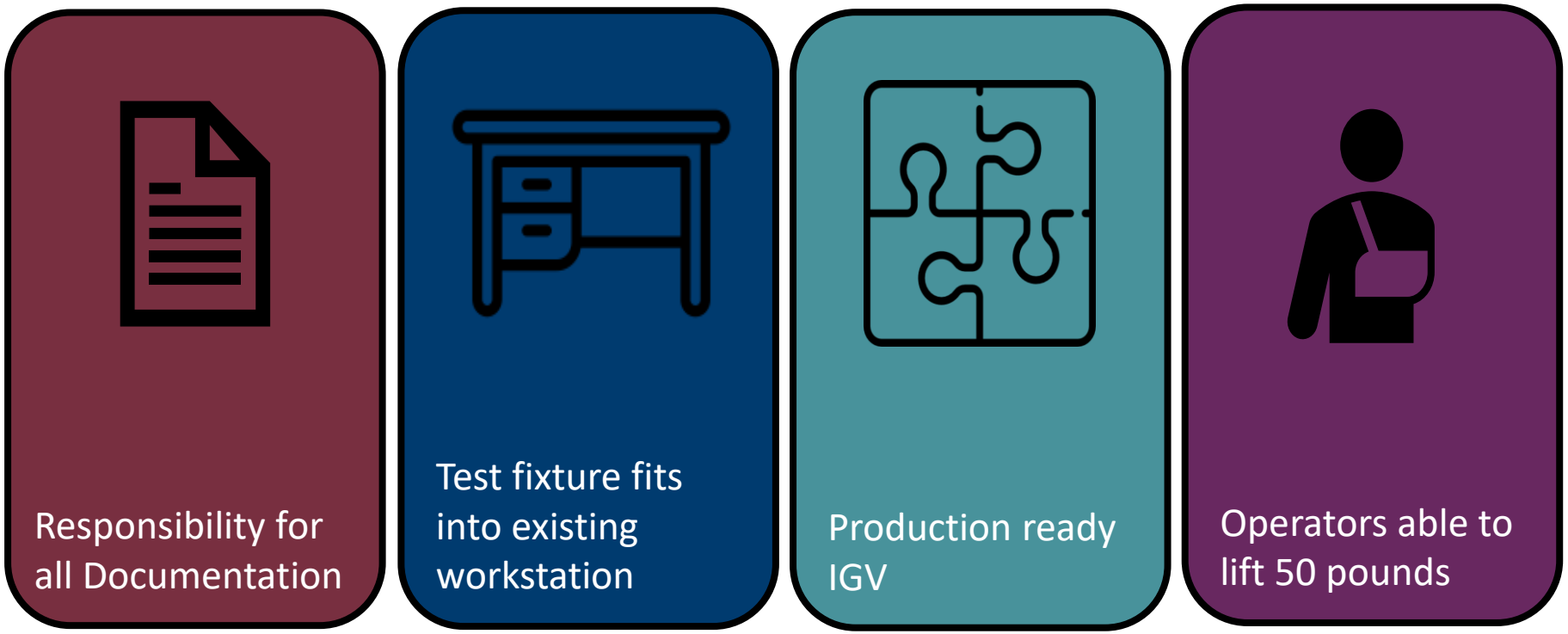
What the current method performs poorly or not being measured

What parameters are currently being measured

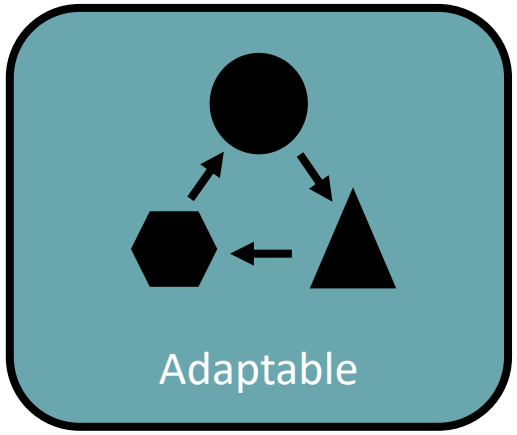
Detect blade open/close, ball indicator movement and Inlet Guide Vane model

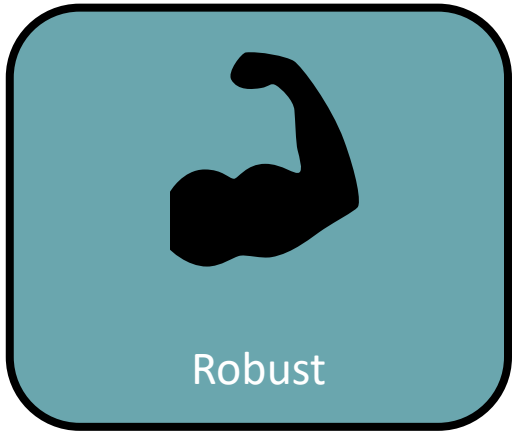
Motor movement

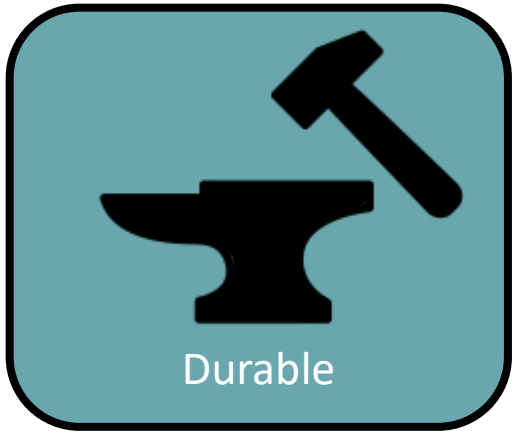
Assumptions



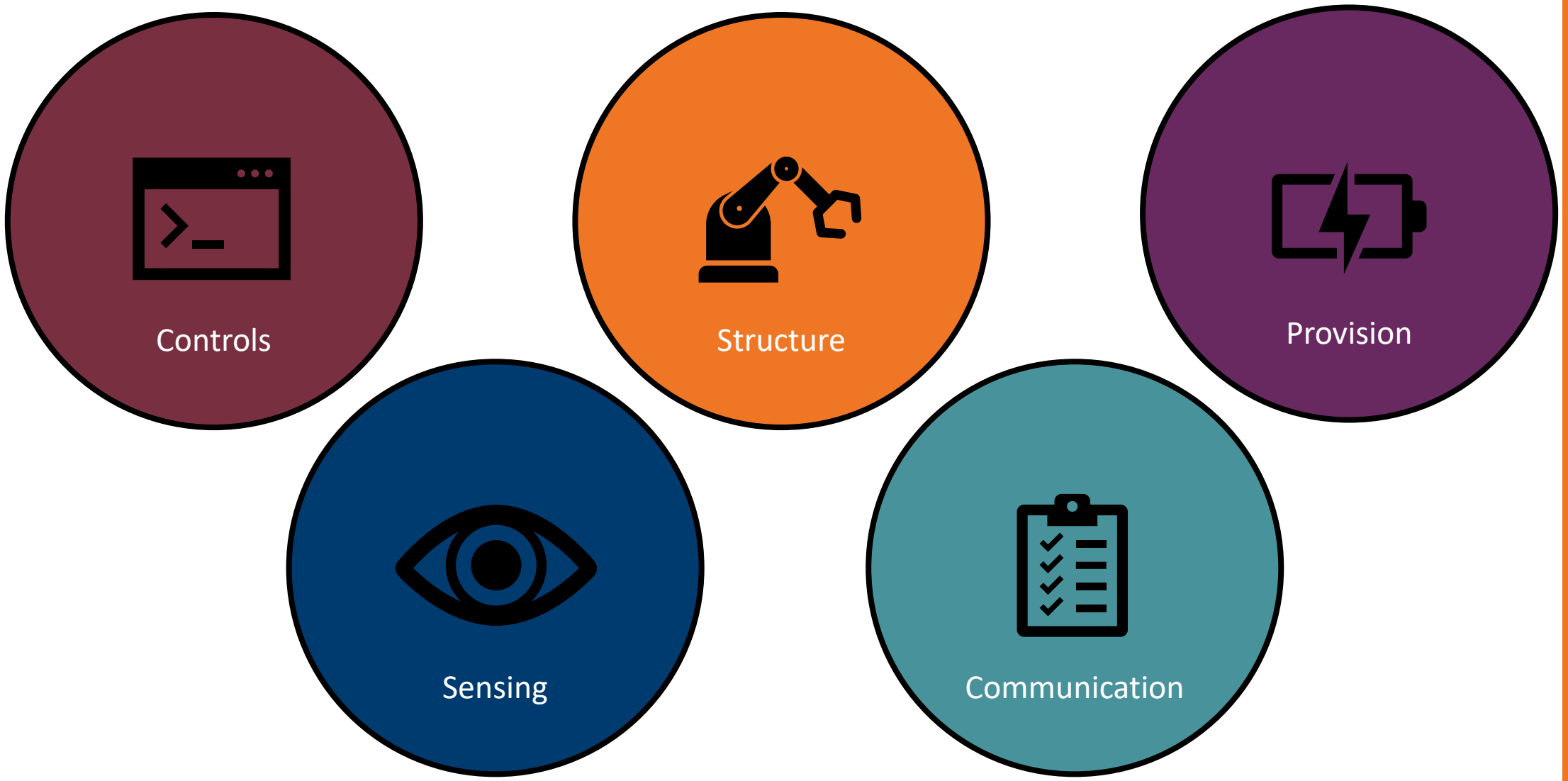
Key Goals







Targets and Metrics



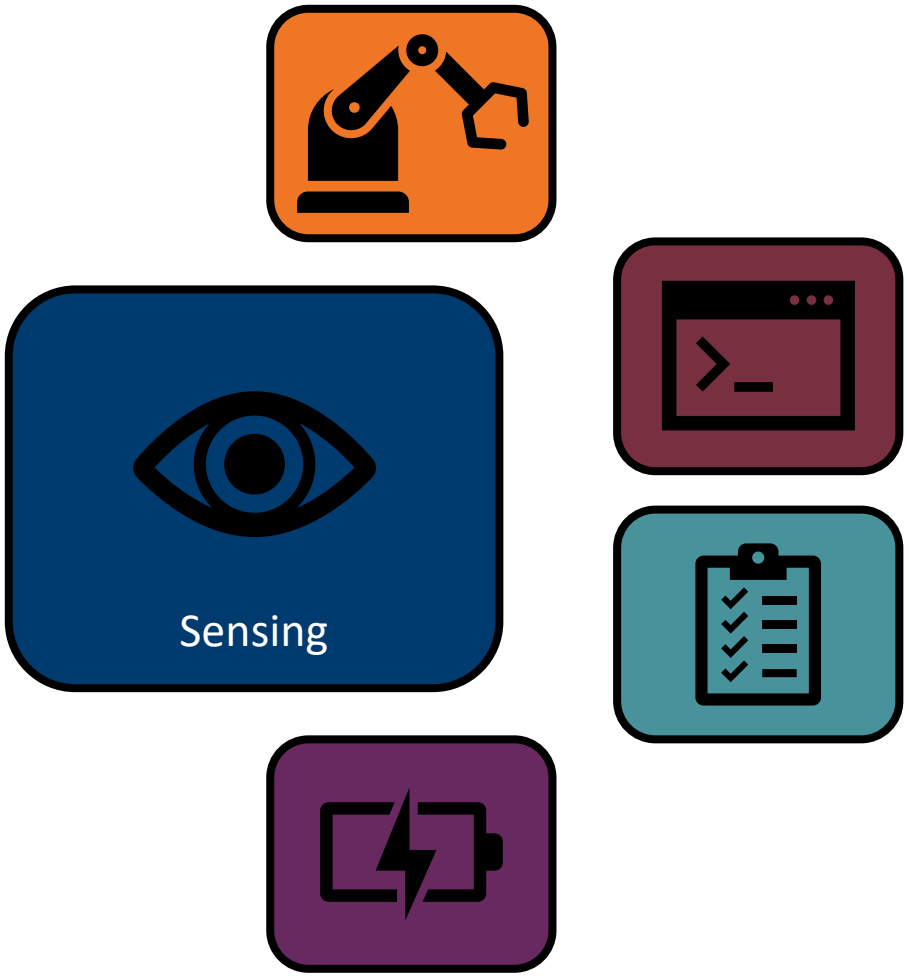
Targets and Metrics

Determining IGV model

Tracking movement of IGV blades

Tracking test state

Tracking ball indicator location



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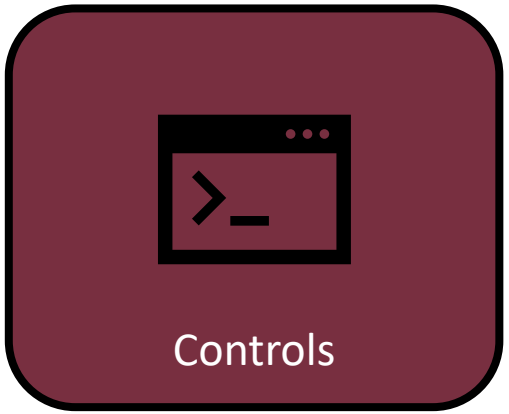
Targets and Metrics

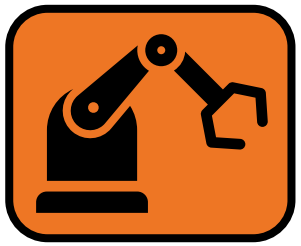
Start/Stop test

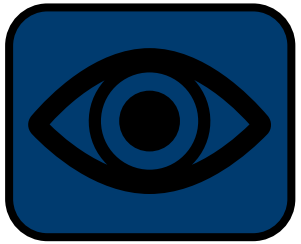
Open/Close IGV

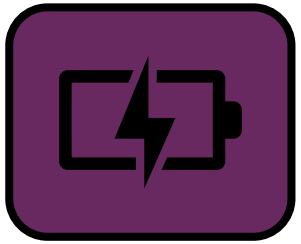
Read and process ball indicator location

Store test data







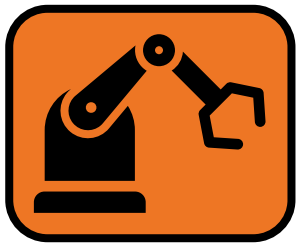


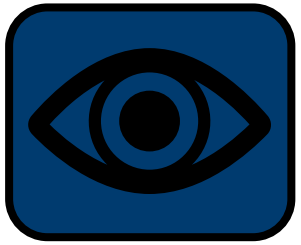
Targets and Metrics

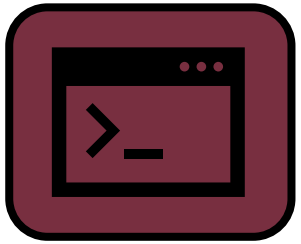
Supplies power to test system

Supplies power to IGV motor

Provisions





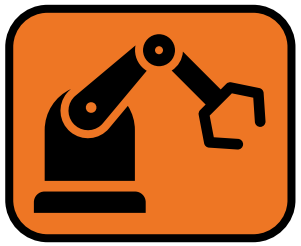


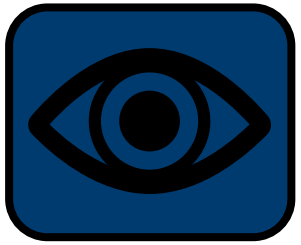
Targets and Metrics

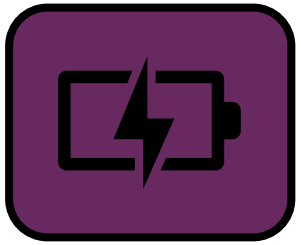
Receive inputs from user

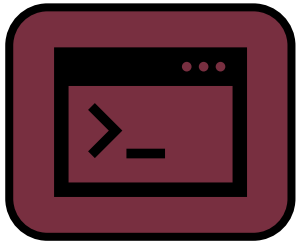
Indicate Results to User

Communication





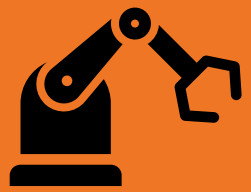




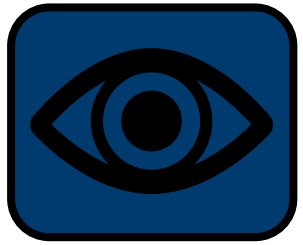
Targets and Metrics

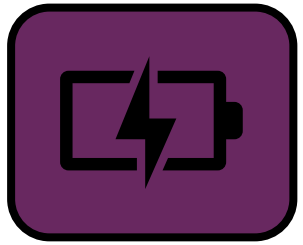
Resist an impact force of 10 Newtons

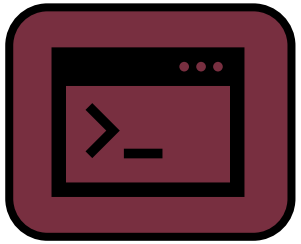
Prevent tipping with a max force of 10 Newtons at the top



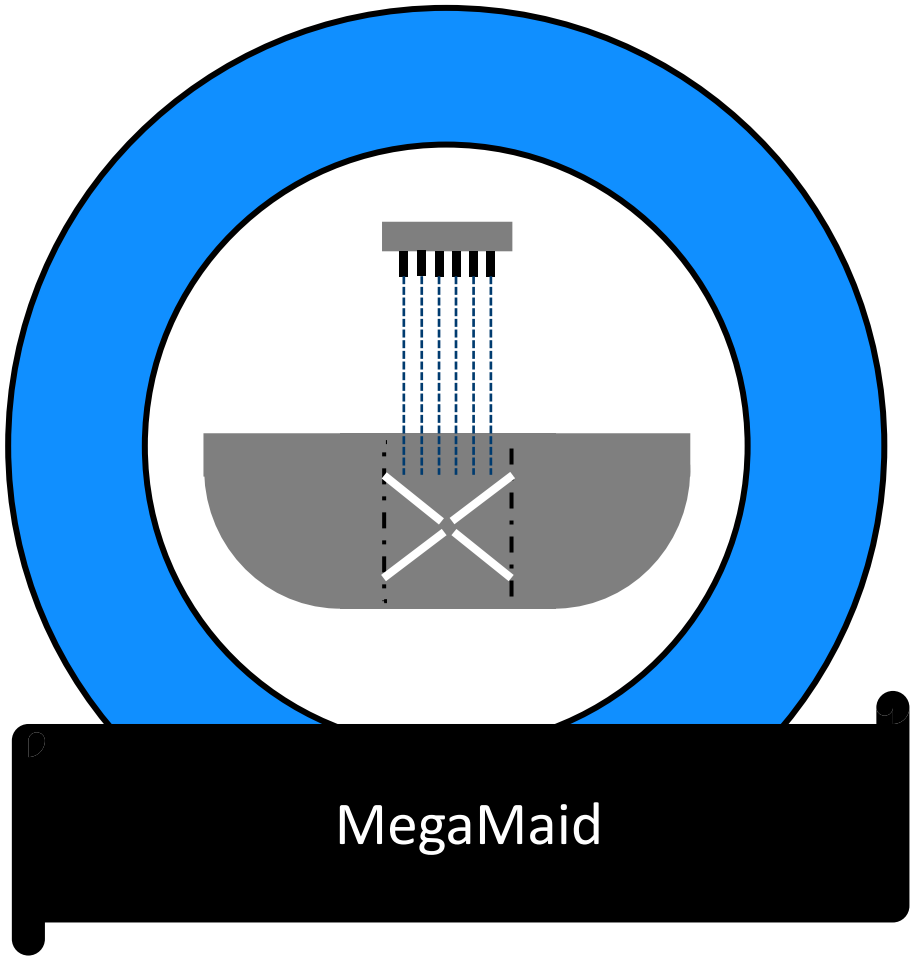
Structure







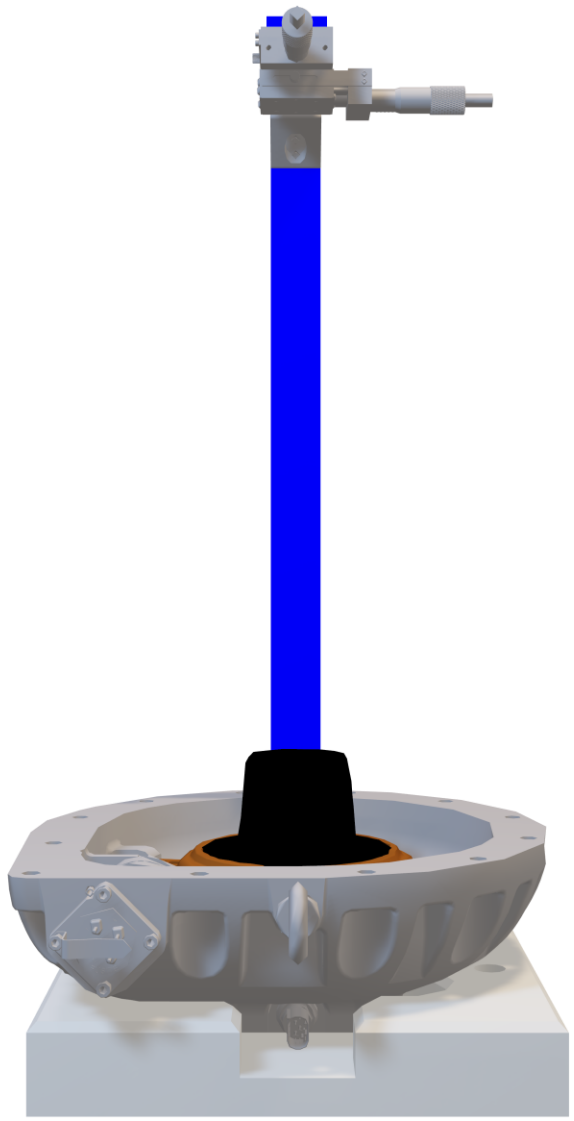
Final Selection



- Stable design
- Accurate and precise
- Fast
- Durable

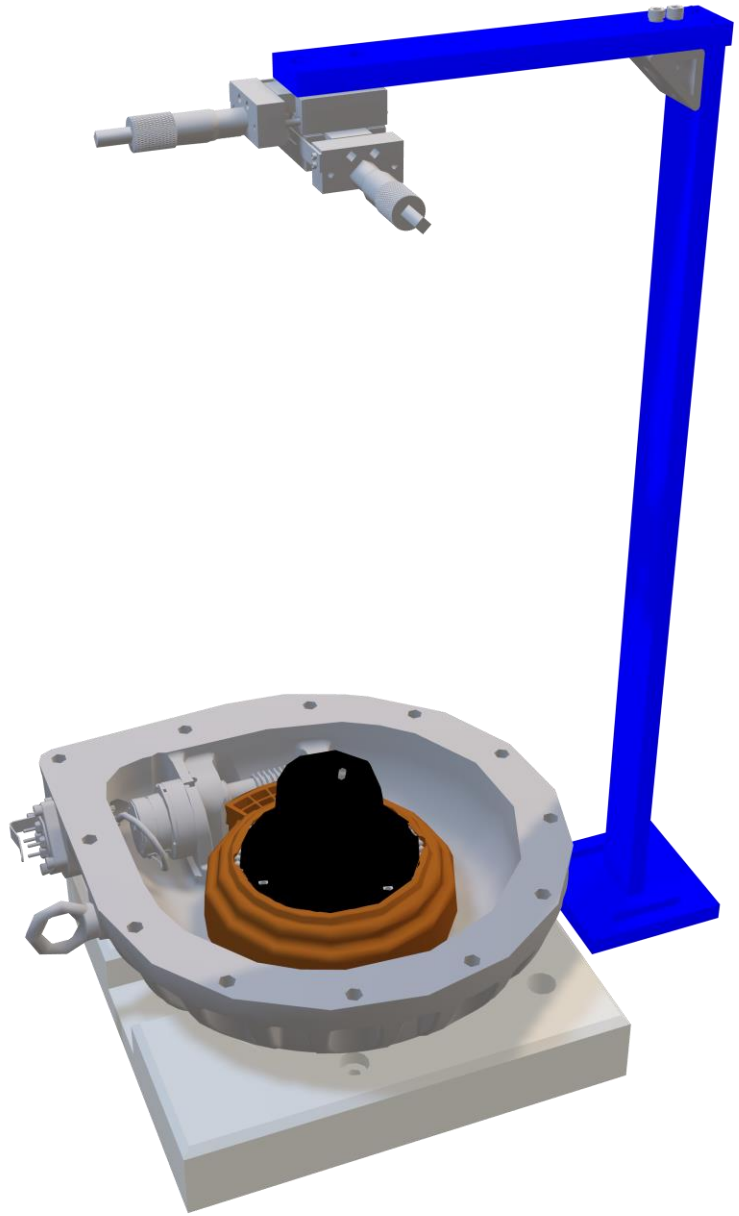
Current Design

- Utilize Existing Baseplate
- L-Shaped Beam
- Two-Axis Movement
- Laser Transmitter and Receiver Modules



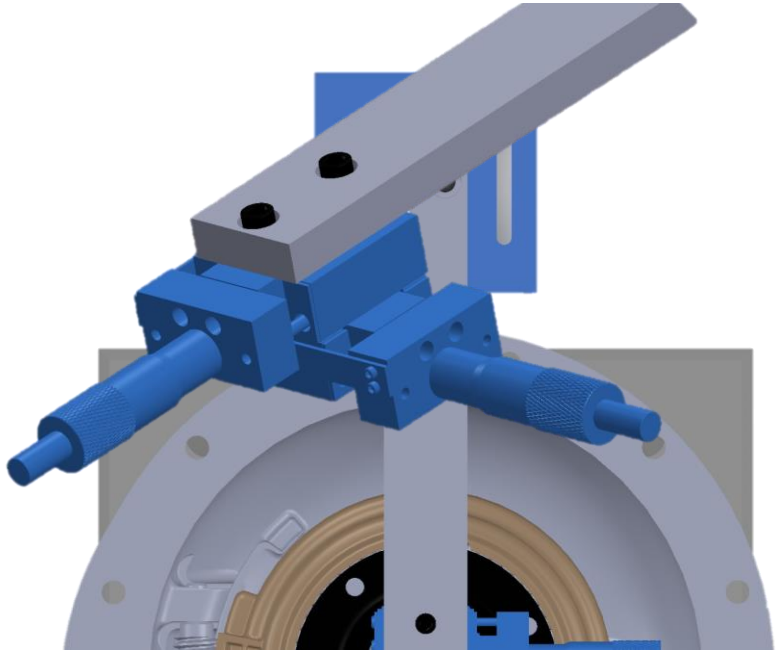
Current Design
Structural Frame

- Aluminum Frame
- 3 Rectangular Aluminum Bars
- Gussets



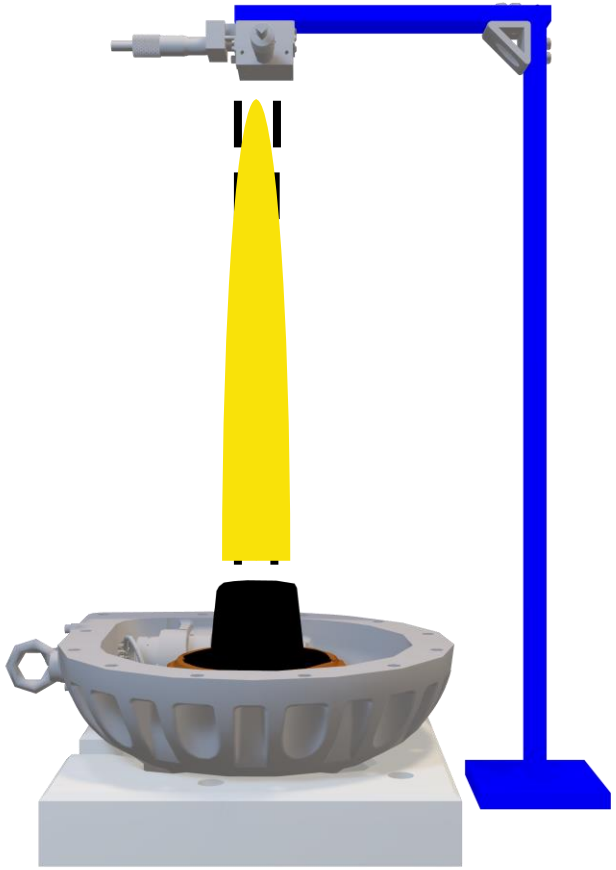
Current Design Mobility

- Base Movement
- Two Axis Movement
- Linear x-axis Movement
- Linear y-axis Movement

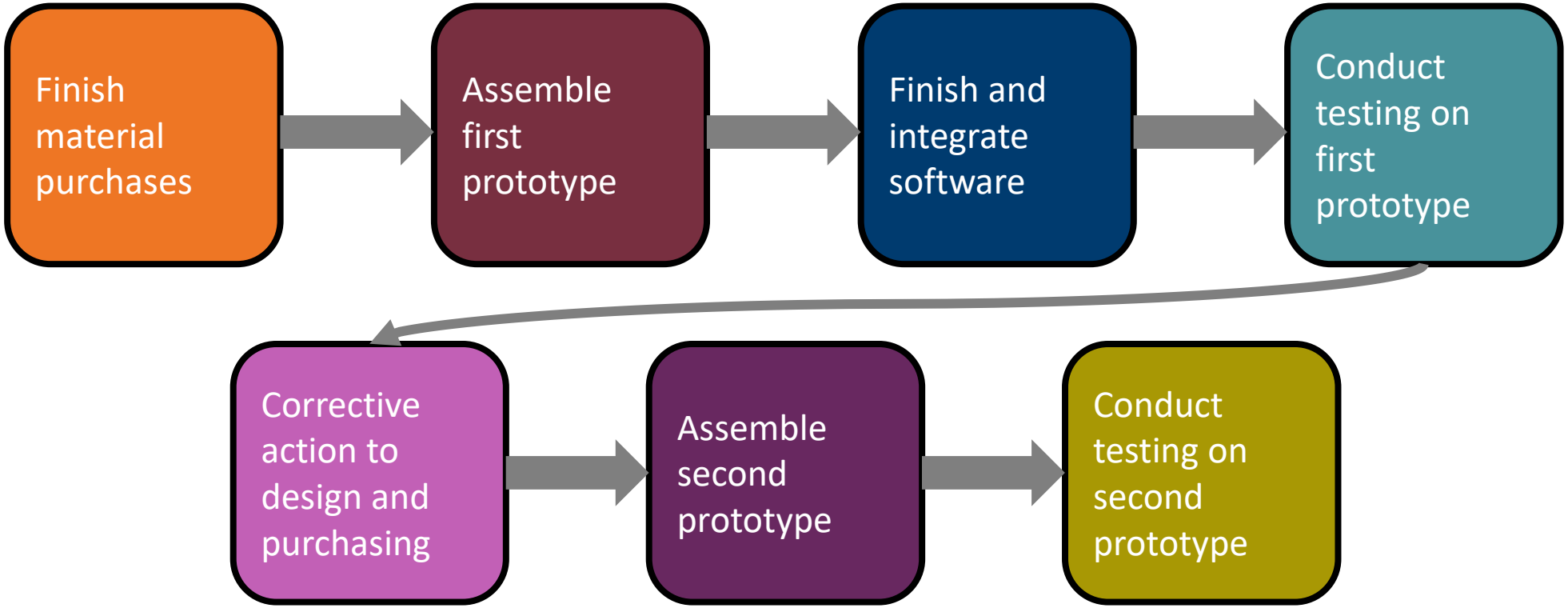


Testing

- Two Laser Modules
- Tracking Two Blades at Once
- Reflective Tape for Receiver
- Two-Axis Adjustment for Calibration



Future Work


Finish material purchases
Assemble first prototype
Finish and integrate software
Conduct testing on first prototype
Corrective action to design and purchasing
Assemble second prototype
Conduct testing on second prototype

Questions

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