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Boeing Underwater Glider

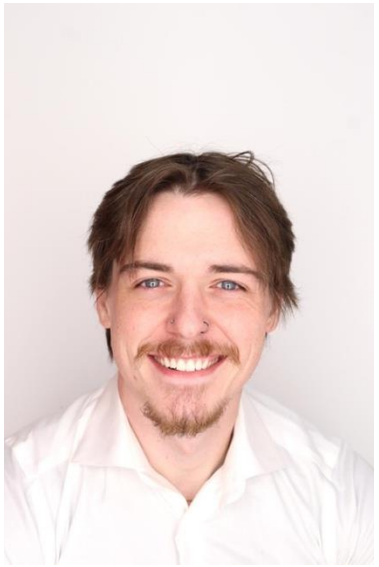
Team 502

October 8, 2024

Jake Burns, Tristan Hardy, Nicolas Lorin, Justin Sepulveda, Martin White

Team Introductions

Jake Burns
Simulations Engineer



Tristan Hardy
Modeling Engineer

Nicolas Lorin
Controls Engineer

Justin Sepulveda
Systems Engineer

Martin White
Materials Engineer

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Sponsor and Advisor

Project Sponsor
Shawn Butler

Project Sponsor
JaQuan Young

Academic Advisor
Shayne McConomy

Faculty Advisor
Kourosh Shoele

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Objective

Justin Sepulveda

The objective of this project is to conduct deep water oceanographic surveys using a submersible vehicle.

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The Importance of Surveys

Justin Sepulveda

Ocean Currents

- Carries marine life.
- Affects movement of shipping.

Weather Observation

- Hazardous storms.
- Potential to save lives & mitigate damage.

Temperature Measurements

- Detection of climate change.
- Prediction of future weather events.

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Methods of Oceanographic Surveying

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	Pros	Cons
Satellite Remote Sensing.	• Wide coverage • Frequent monitoring.	• Resolution limitations. • Depth limitations.
Buoys and Moorings	• Minimal environmental impact. • Cost effective.	• Limited range. • Regular maintenance required.
Ship-Based Surveying	• High resolution. • Versatile sampling.	• Expensive to operate. • Weather dependent.

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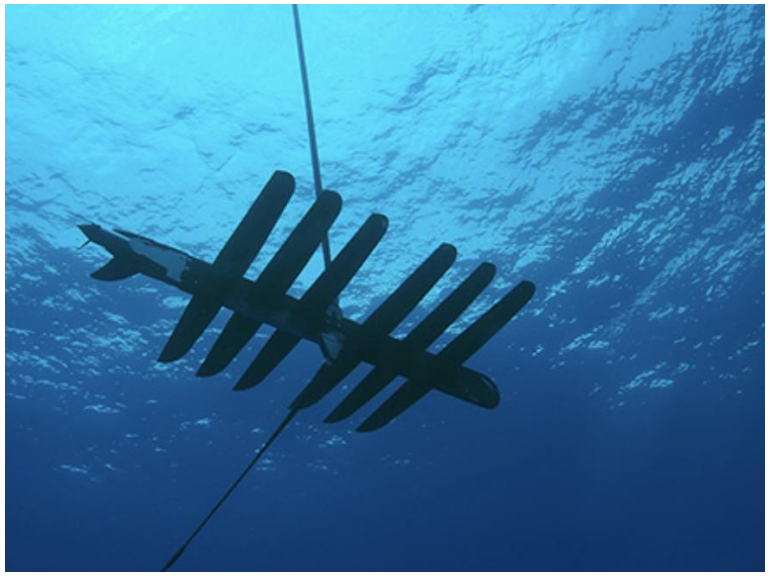
What is an underwater glider?

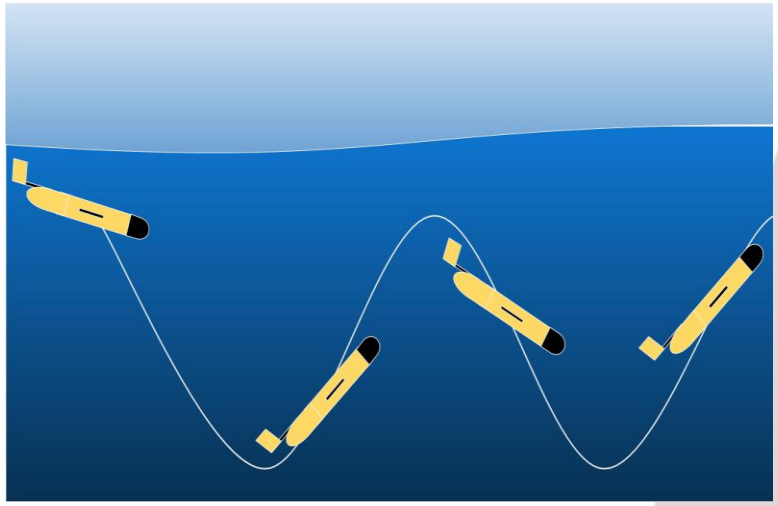
Justin Sepulveda

Underwater gliders are unmanned submersible vehicles.

Low energy usage allows for long range and mission duration.



"Wave Glider." *The Boeing Company,* https://www.boeing.com/defense/autonomous-systems/wave-glider#overview.



Hockley, Christopher, and Brian Butka. "Going Deep to Go Far: How Dive Depth Impacts Seaglider Range." *Earthzine*, 7 Jan. 2021, earthzine.org/going-deep-to-go-far-how-dive-depth-impacts-seaglider-range/.

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Key Goals

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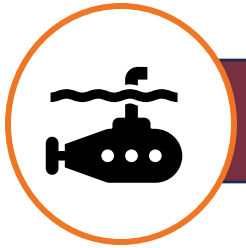
Energy efficiency

Data collection



Motion

Durability

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Assumptions

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No payload.

Members will have proper training.

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Markets

Primary Market

BOEING

NOAA
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
U.S. DEPARTMENT OF COMMERCE

Secondary Markets

DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

Seadrill

NDIA

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Stakeholders

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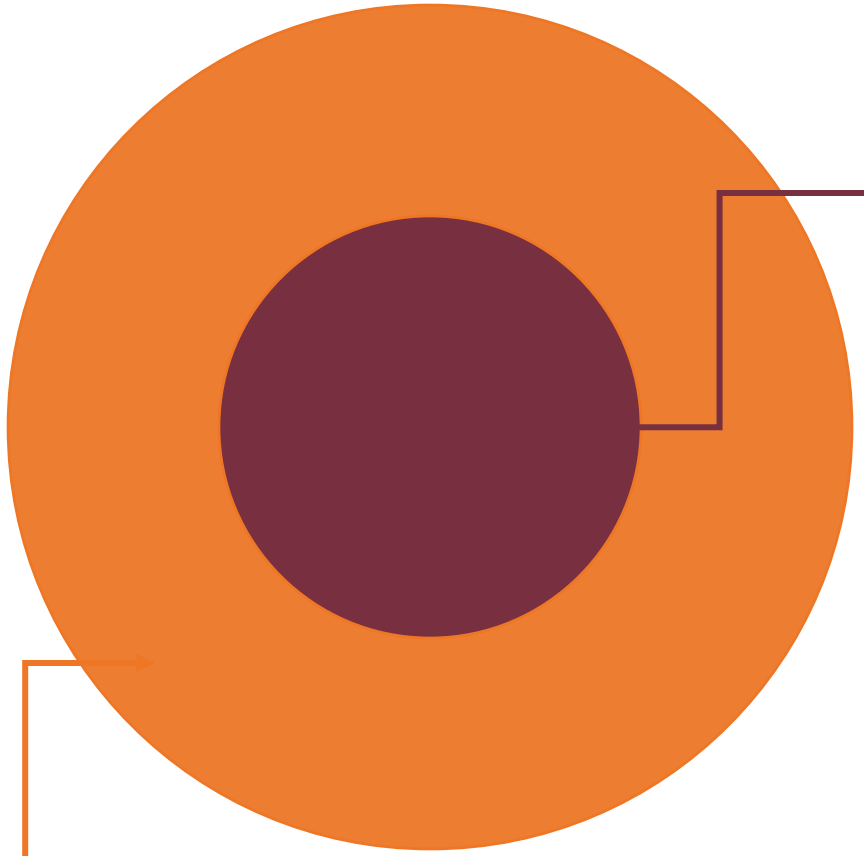

Internal

- Team 502
- Teaching Staff
  - Dr. McConomy
  - Teaching Assistants
- Boeing

External

- FAMU-FSU College of Engineering
  - Faculty Advisors
  - Machine Shop
- Coast Guard

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Customer Needs

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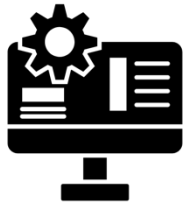
Motion

- Operates at a range of depths (6 feet).
- Ascends and descends through water column.
- Glider cost of transport is minimized.

Sensing Capabilities

- Collects data about surrounding environment to report to user.
- Processes data to make real-time motion adjustments.



Simulation

- Computer simulations that test oceanic conditions and design considerations.
- Optimal pathing of glider is simulated to reduce energy cost.
- Structural simulations ensure glider won't fail under loads.

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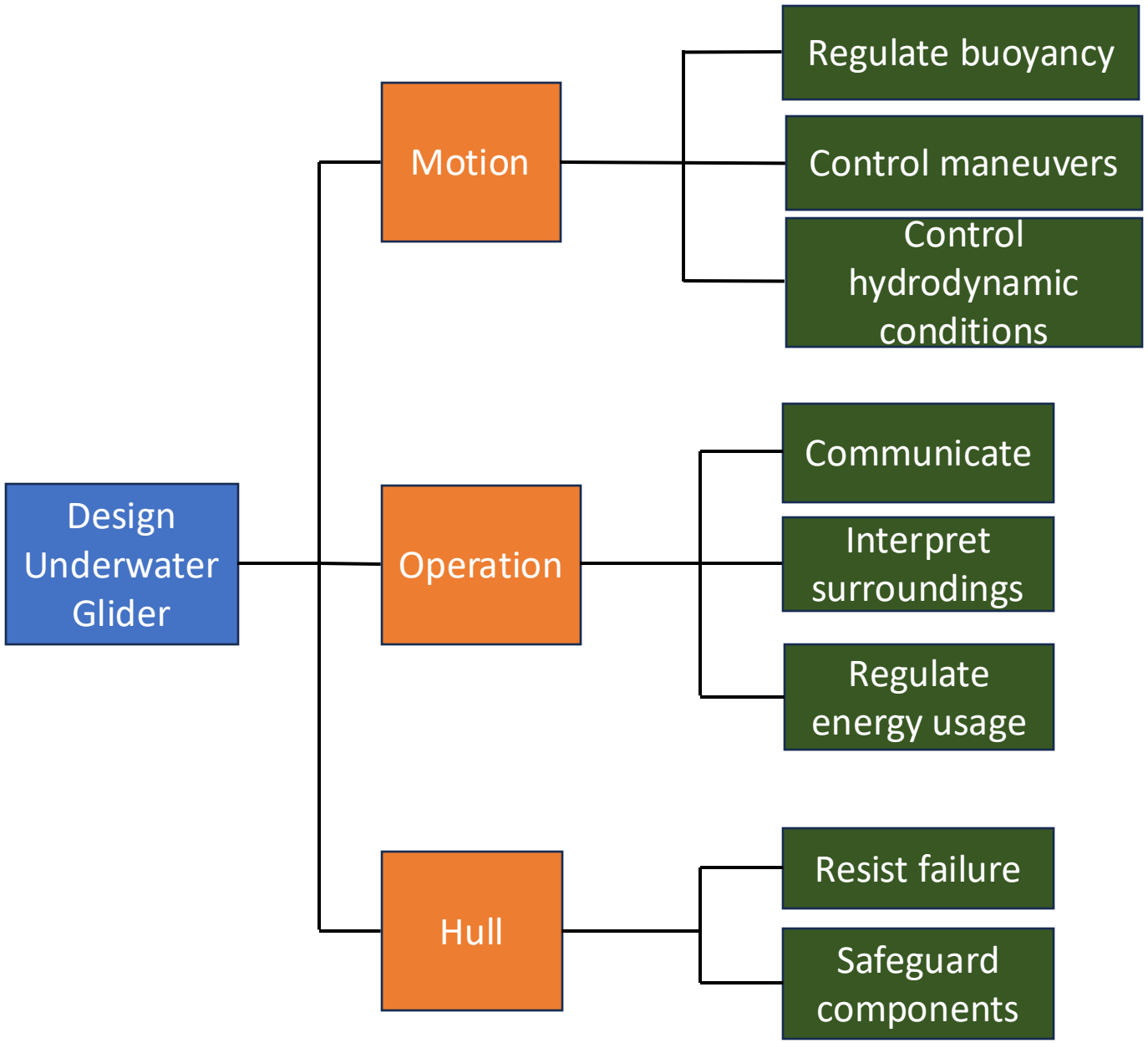
Functional Decomposition



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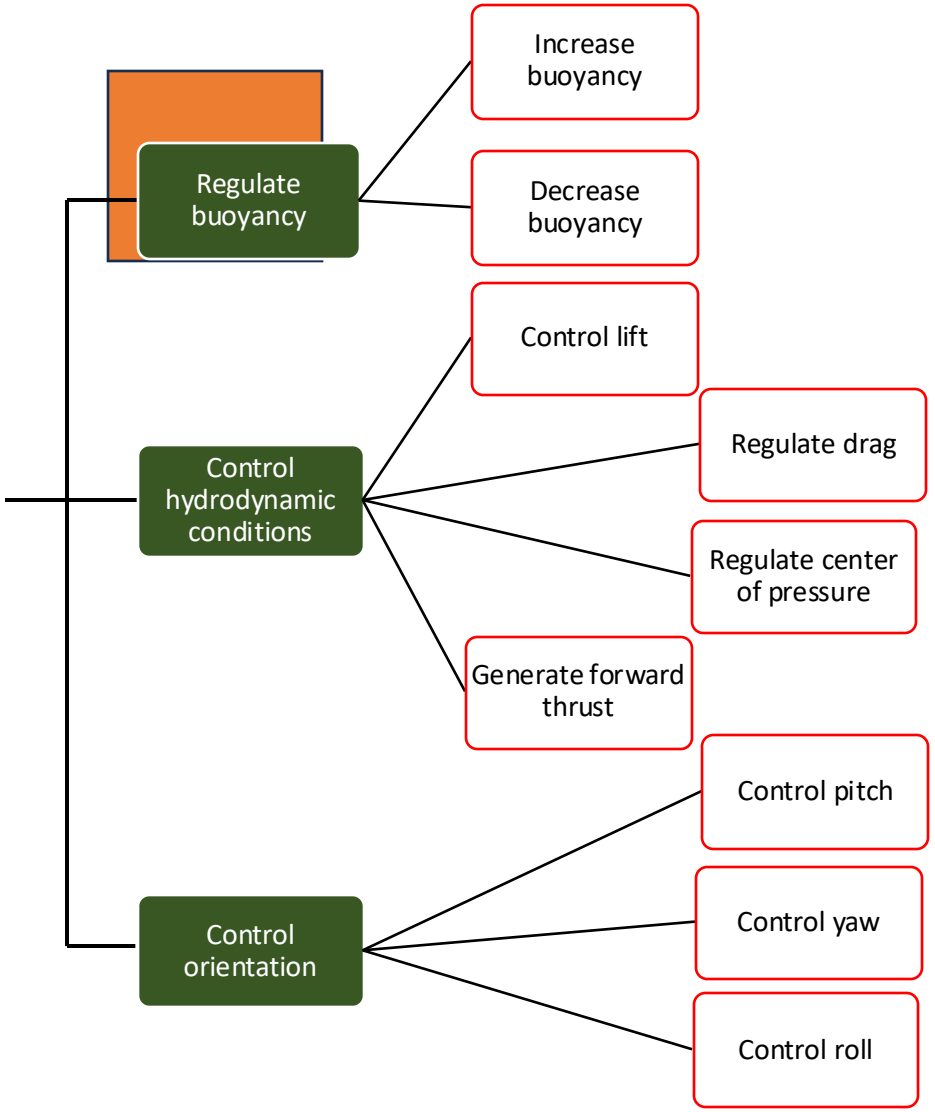
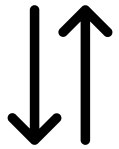
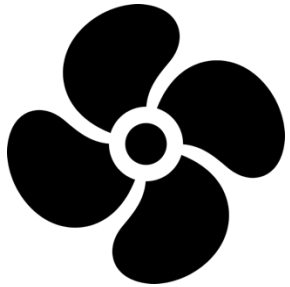
Functional Decomposition







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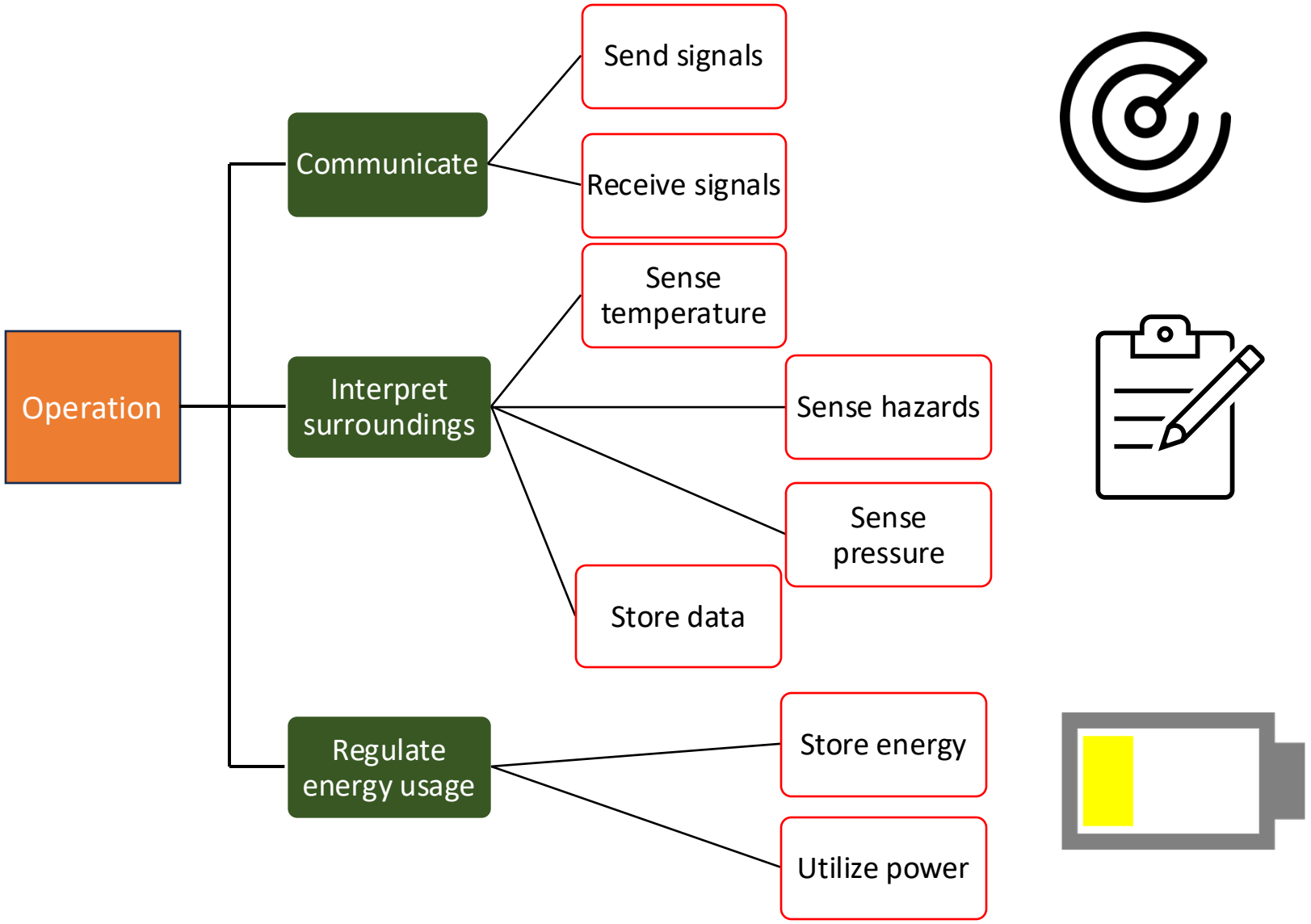
Functional Decomposition



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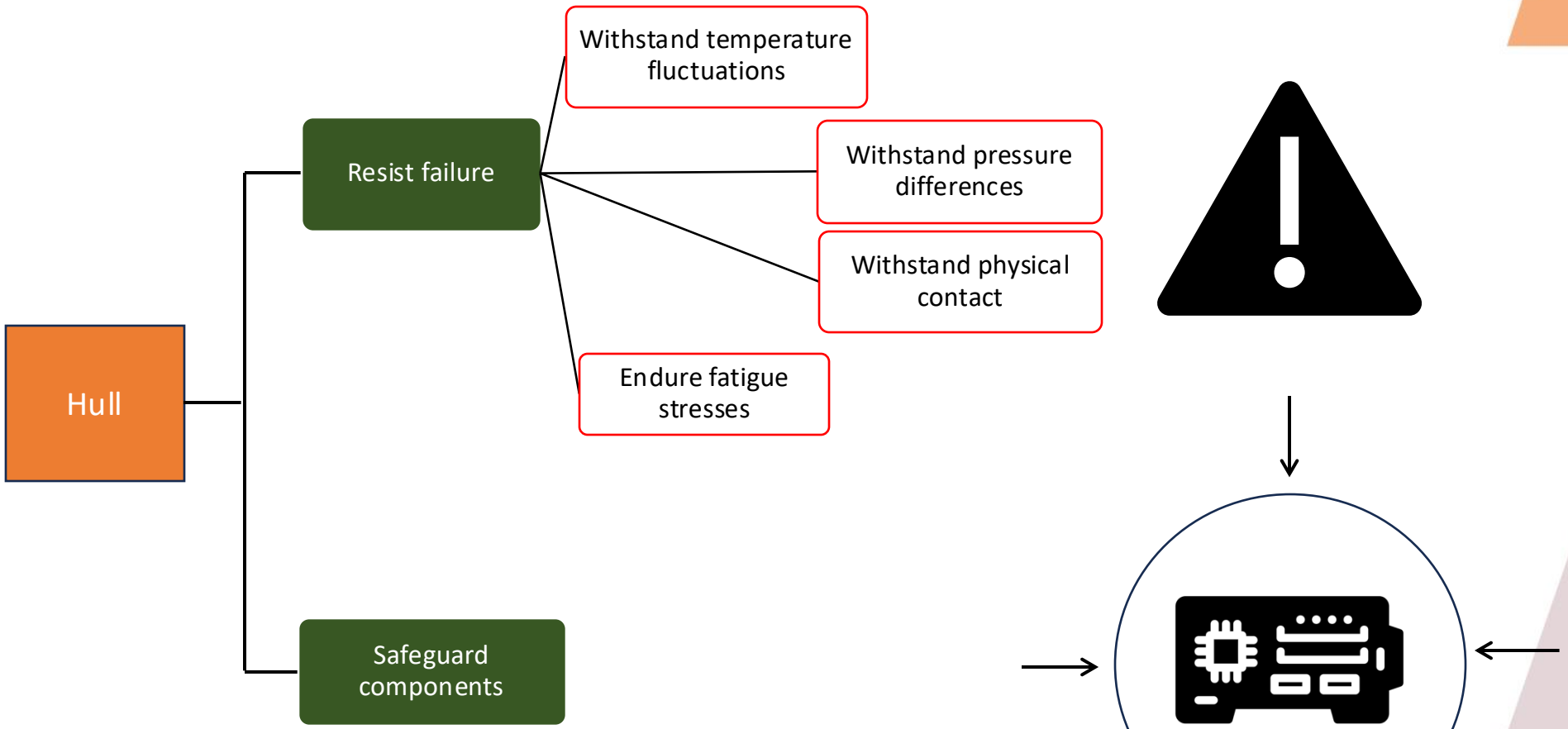

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Future Work

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Targets and Metrics
Define physical targets and metrics for the glider.

Concept Generation
Generate ideas that solve customer needs and targets and metrics.

Contact Manufacturer
Communicate ideas with possible manufacturer.

Prototype
Create prototypes based on high-fidelity concepts as well as manufacturer input.

Bill of Materials
List all materials needed for final prototype.

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Contact Us on LinkedIn

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Tristan Hardy

Nicolas Lorin

Justin Sepulveda

Martin White

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