FAMU-FSU College of Engineering

NSWC - RoboBoat
Team 521

October 19, 2023 | Virtual Design Review 1

Team Introductions (ME)

Ivanna Caballero
Materials Engineer

Andly Jean
Mechatronic Engineer

Nicholas Norwood
Mechanical Systems Engineer

Makenzie Wiggins
Design Engineer

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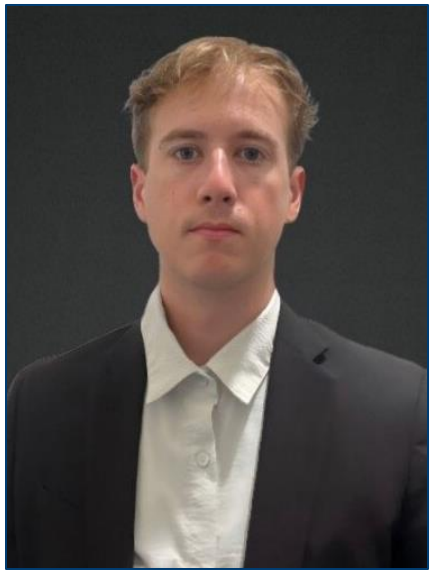
Team Introductions (EE)

Sophia Barron
Electrical Systems Engineer

Michael Fitzsimmons
Electronics Engineer



Lucca Meyer
Test Engineer

Sponsor and Advisor

Engineering Mentor/Sponsor
Dr. Damion Dunlap
Navy Surface Warfare Center

Academic Advisor
Dr. Shayne McConomy
Senior Design Coordinator

Makenzie
Wiggins

Background

RoboBoat

- Program at RoboNation
- An international student competition
- Design autonomous, robotic boats to navigate through a challenge course
- Tackle tasks that mimic real-world challenges

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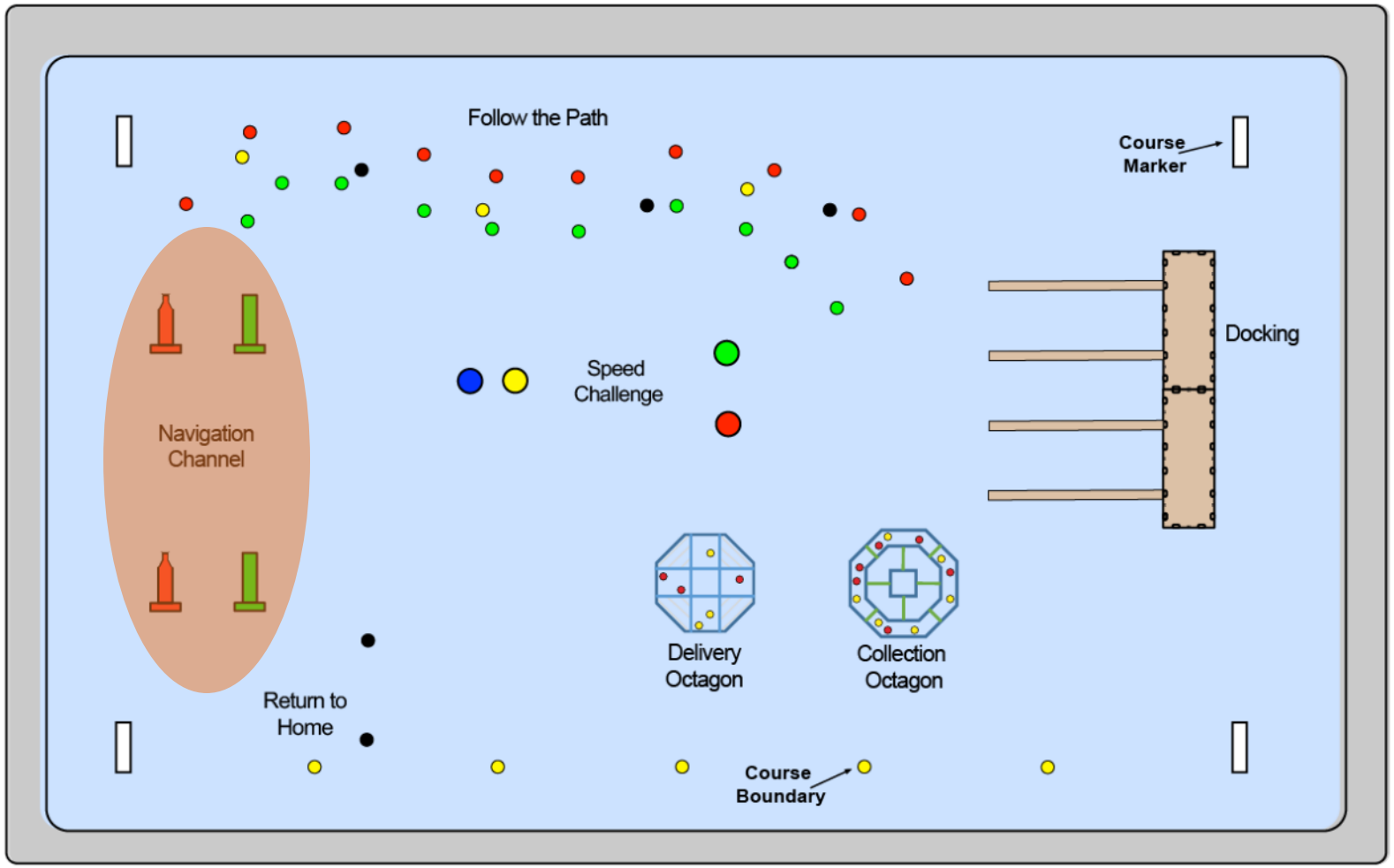
RoboBoat 2024 Course



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Task 8:
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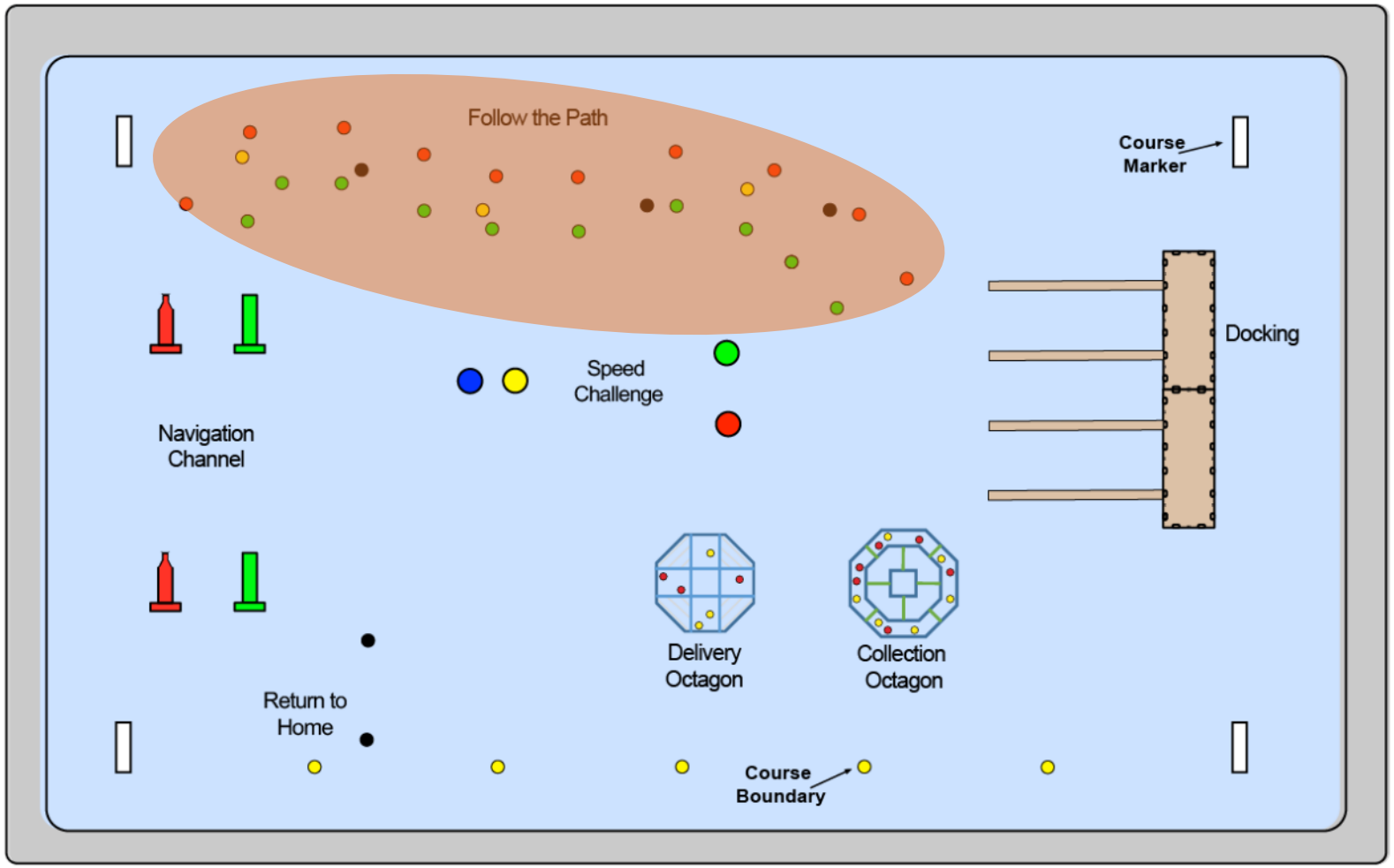

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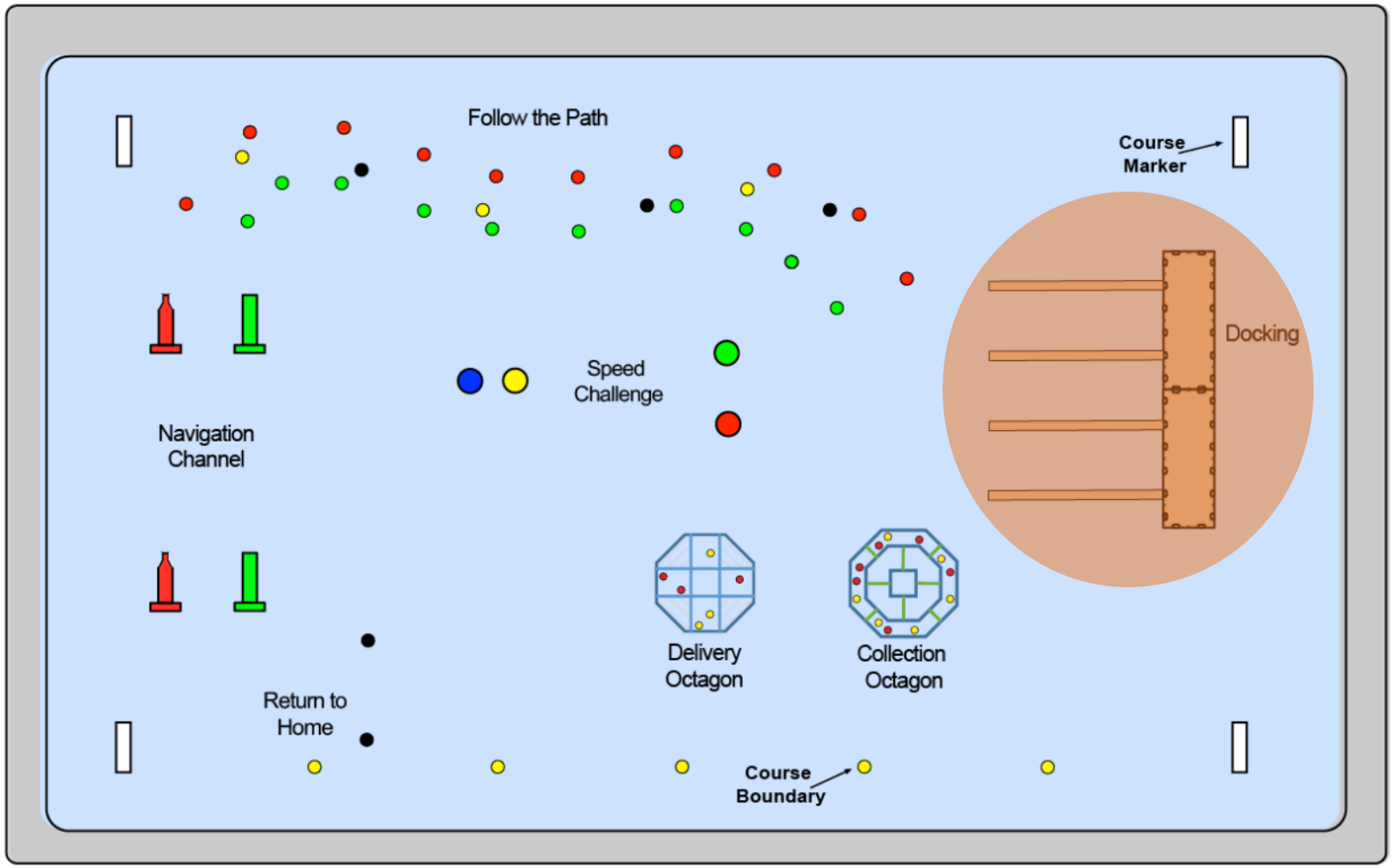

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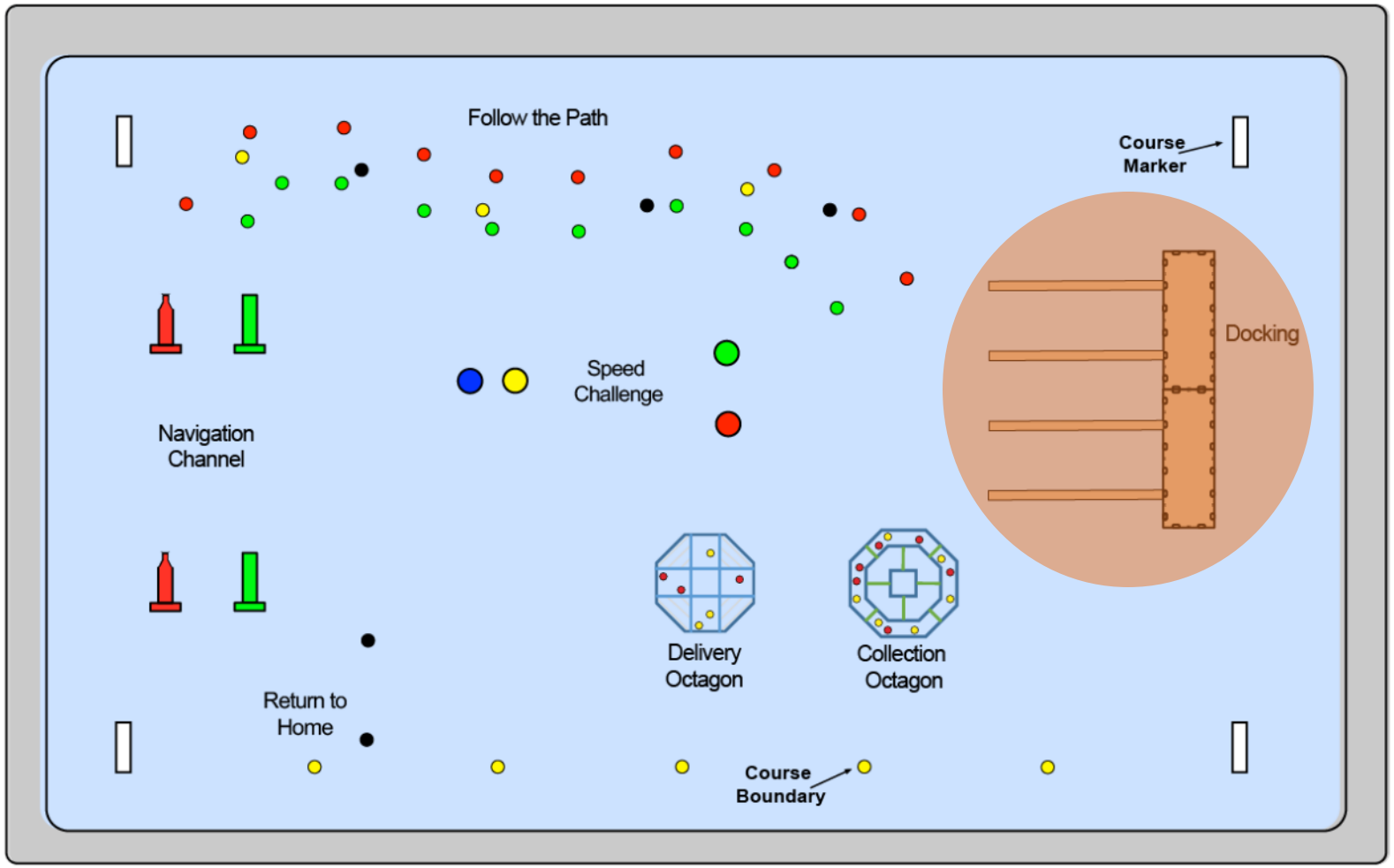

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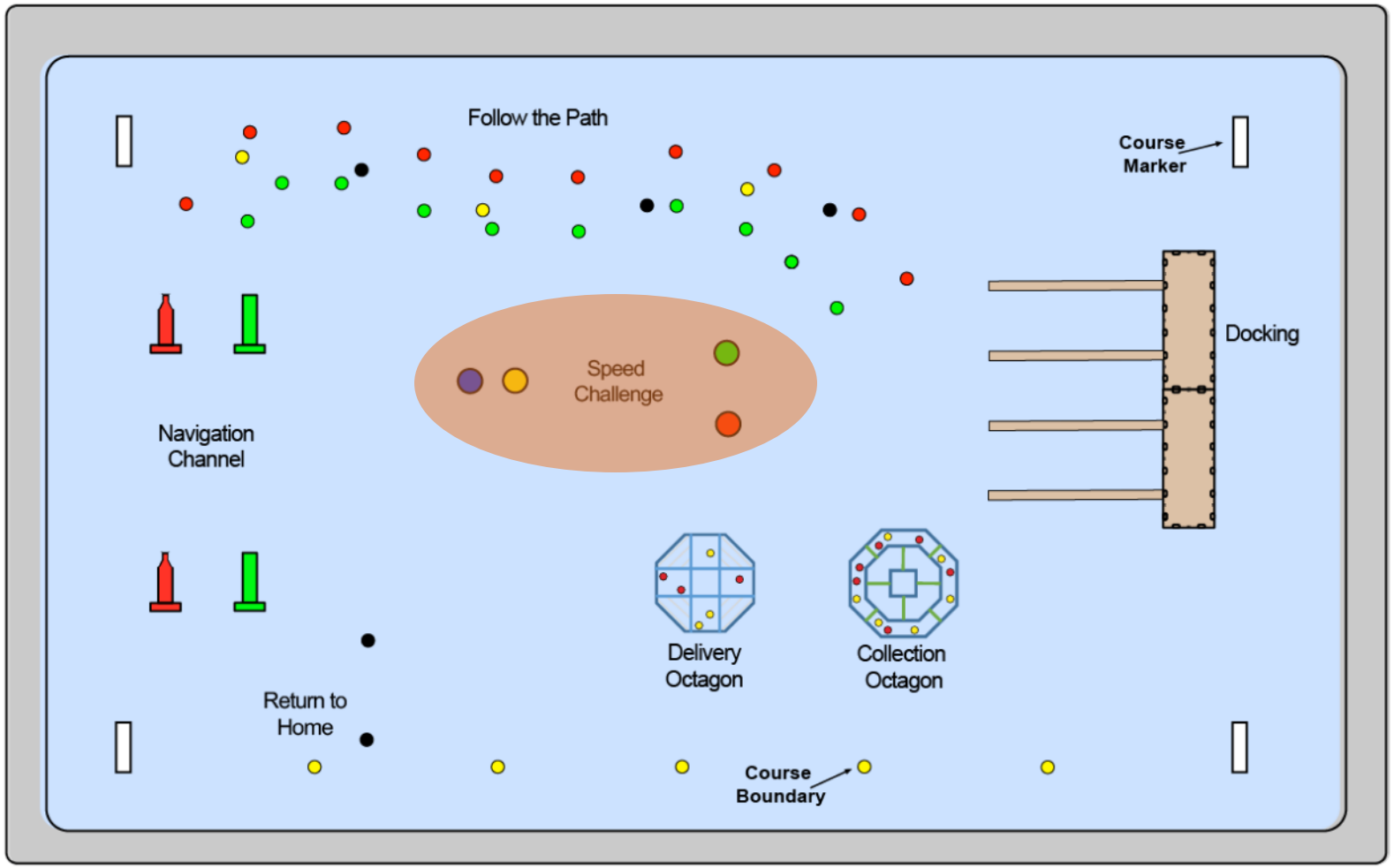

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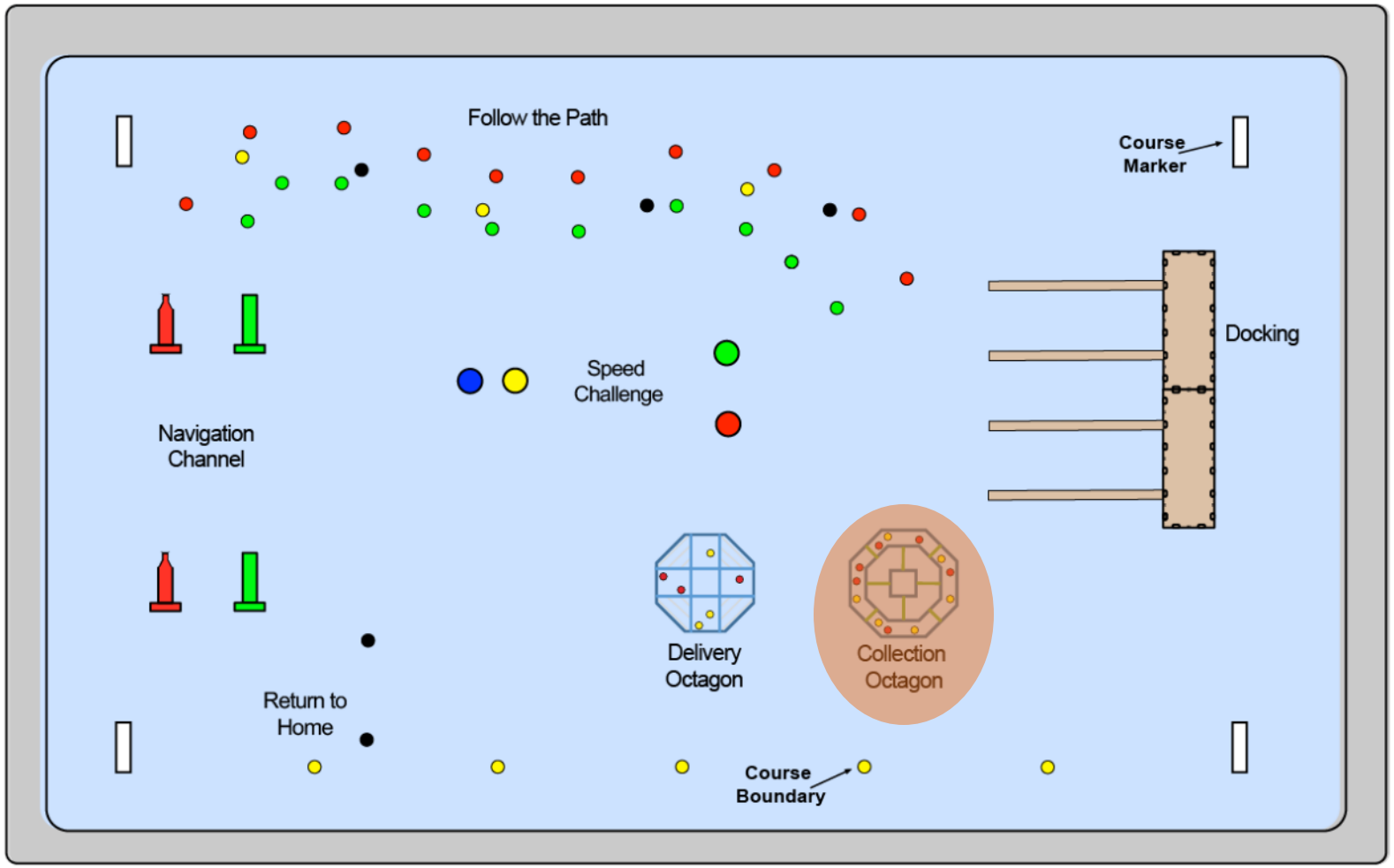

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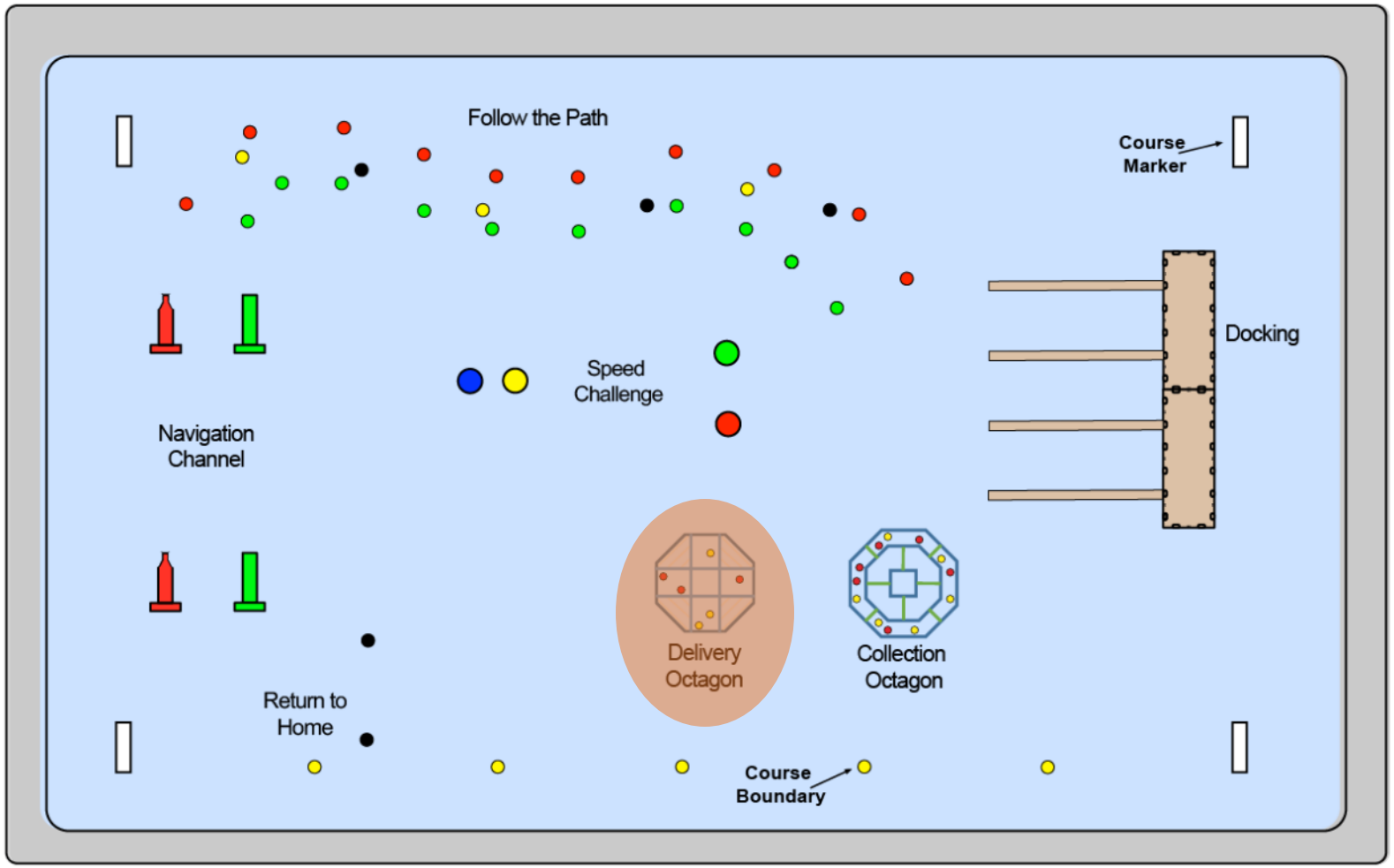

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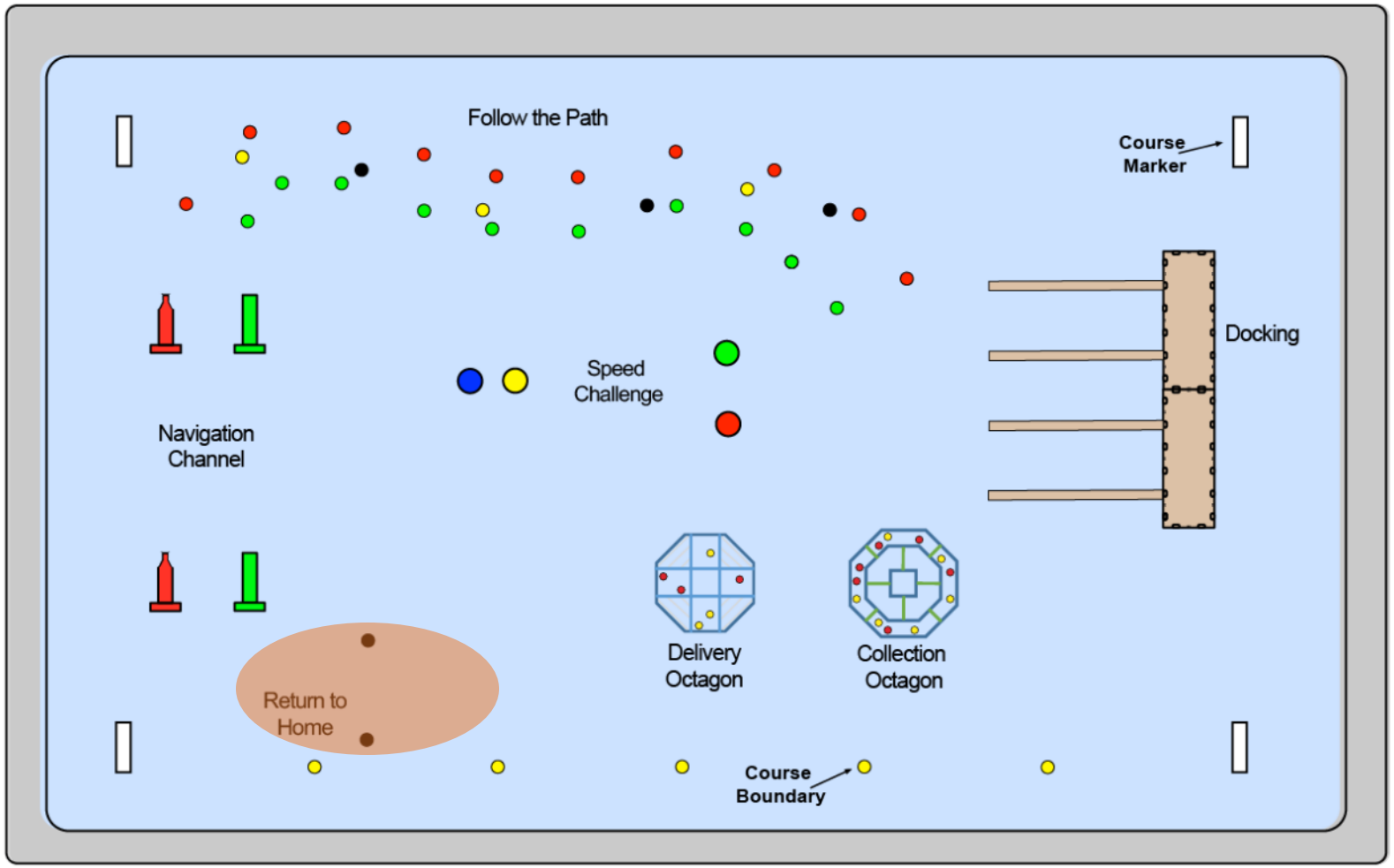

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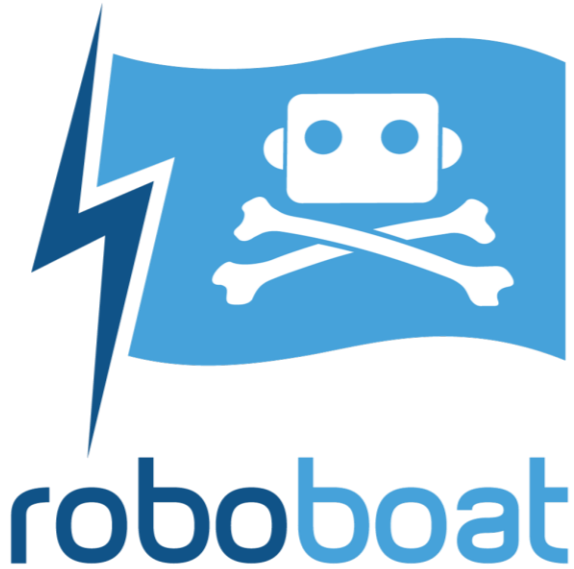
Project Objective

The objective of this project is to design, build and program an autonomous surface vehicle capable of completing several tasks in the following categories:

- Navigation
- Detection
- Object delivery
- Object avoidance
- Station keeping
- Conduct two-step behavior



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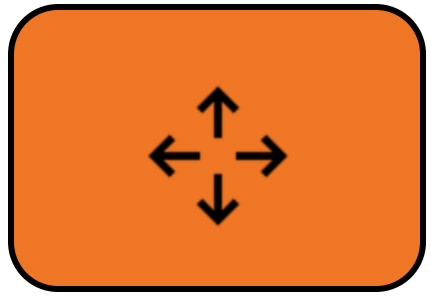
Key Goals

Safety

Navigation

Detection



Station Keeping

Object Delivery

Object Avoidance

Two-Step Behaviors

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Primary Markets

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Caballero

Secondary Markets

INSANE BOATS

BOSTON WHALER ®

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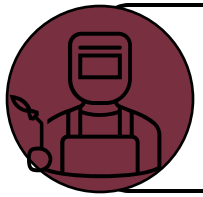
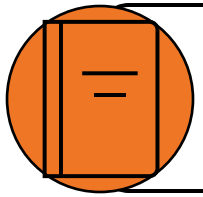
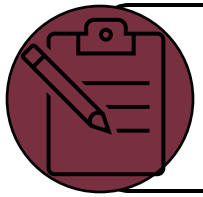
Assumptions



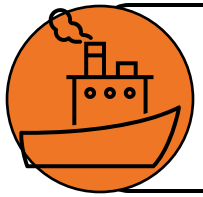
Access to Senior Design Lab/Machine Shop



ASV will comply with RoboBoat Rulebook



Access to previous Technical Reports



Competition will be in February 2024

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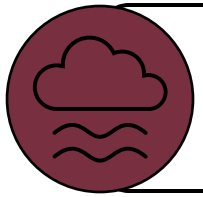
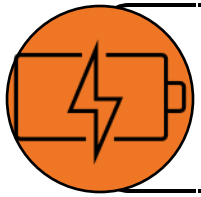
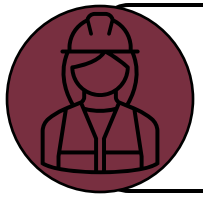
Assumptions



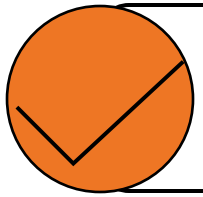
Weather is beyond our control



Battery will have full charge prior to start



Safety Inspection



One task required to Compete

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Stakeholders

NAVSEA
NAVAL SEA SYSTEMS COMMAND

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Customer Needs

- Navigation System
- Safety System
- Power/Battery System
- Weight/Size Restraint
- One Major Task

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Sophia
Barron

Functional Decomposition

Locomotion

Navigation

Structure

Power Systems

Safety

Object Retrieval

Water Spraying

Object Detection

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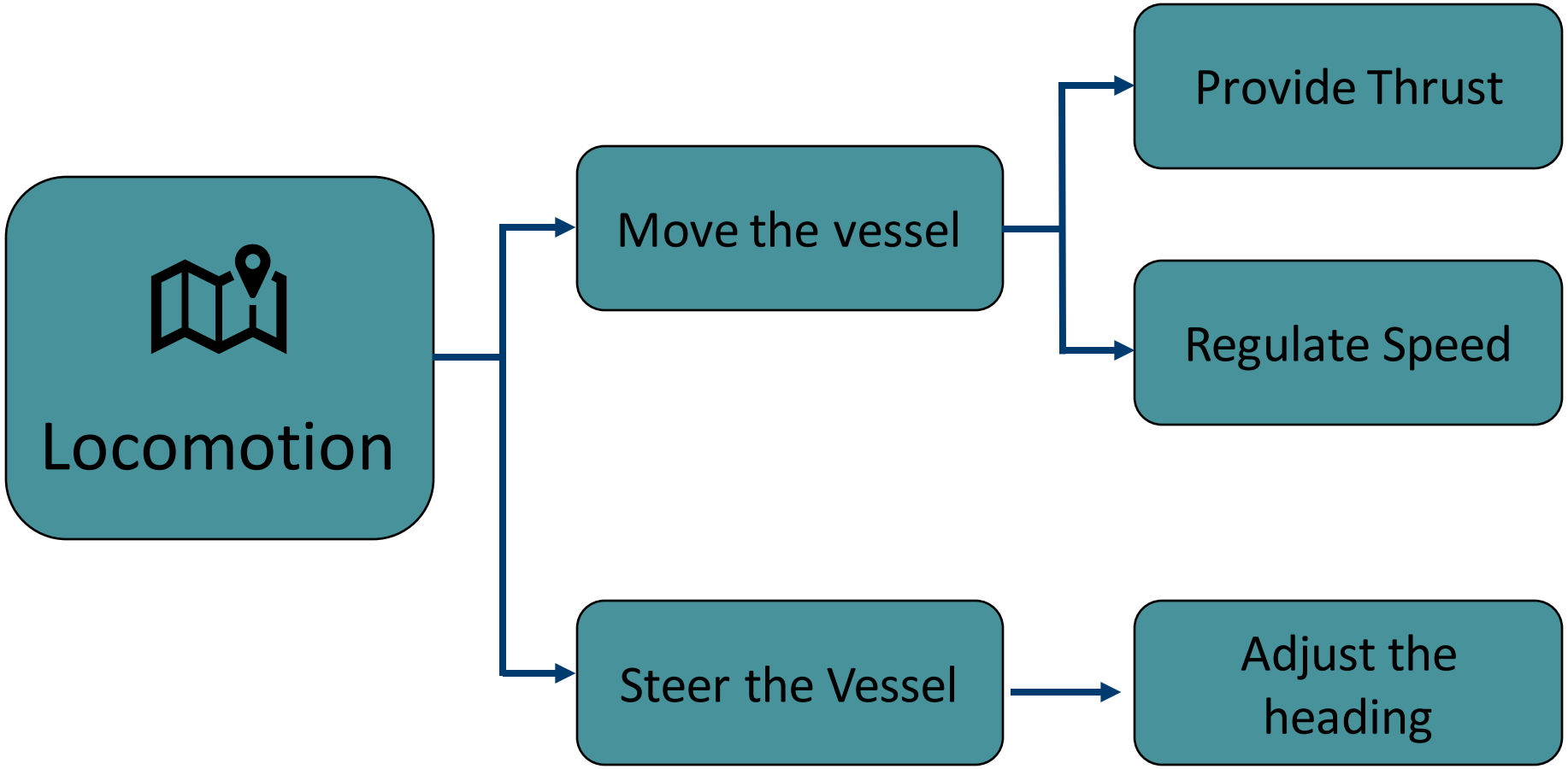
Functional Decomposition



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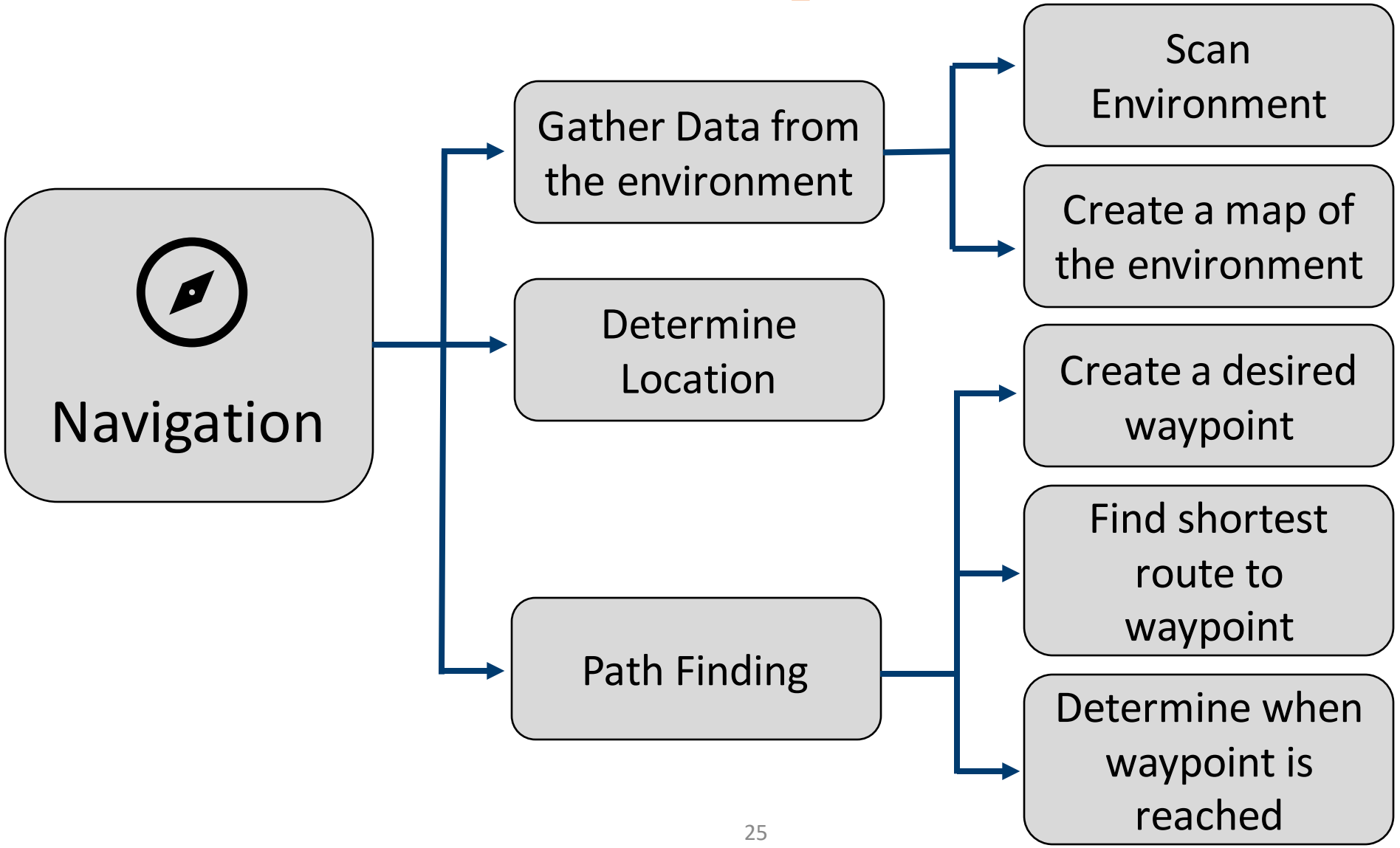

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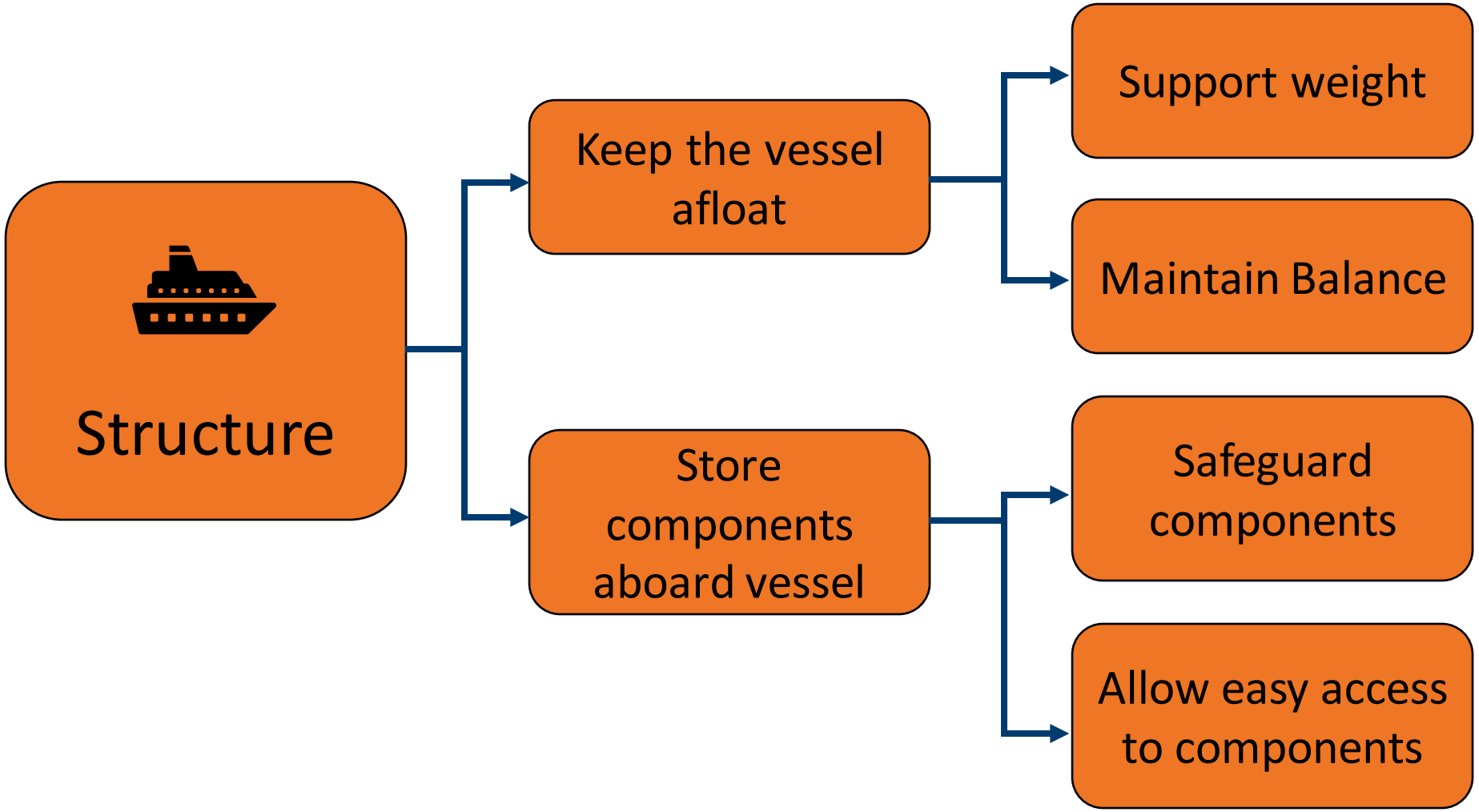

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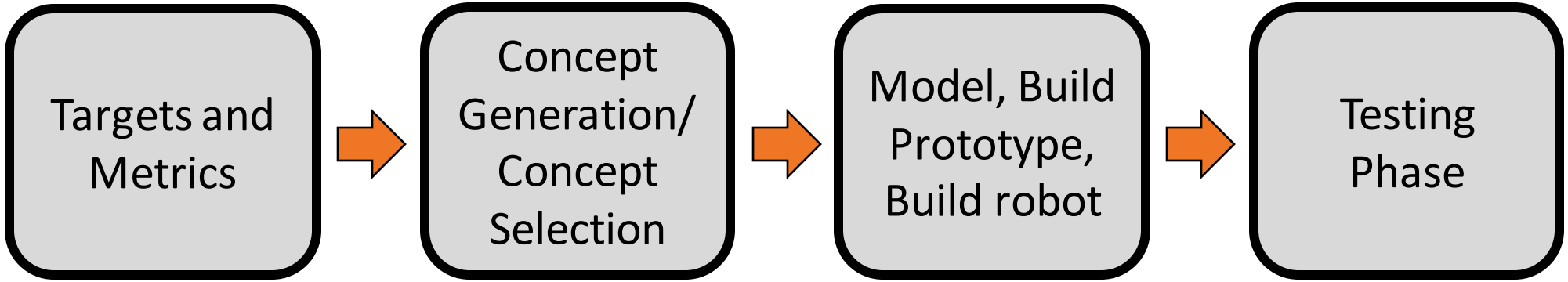
Future Work



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References

About. RoboBoat. (2021, March 13).
https://roboboat.org/about/

Past programs. RoboBoat. (2019, September 27).
https://roboboat.org/past-programs/

RoboBoat 2024. RoboBoat. (2023, October 13).
https://roboboat.org/programs/2024/

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Barron

Thank You

Sophia
Barron

Thank You

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Backup Slides

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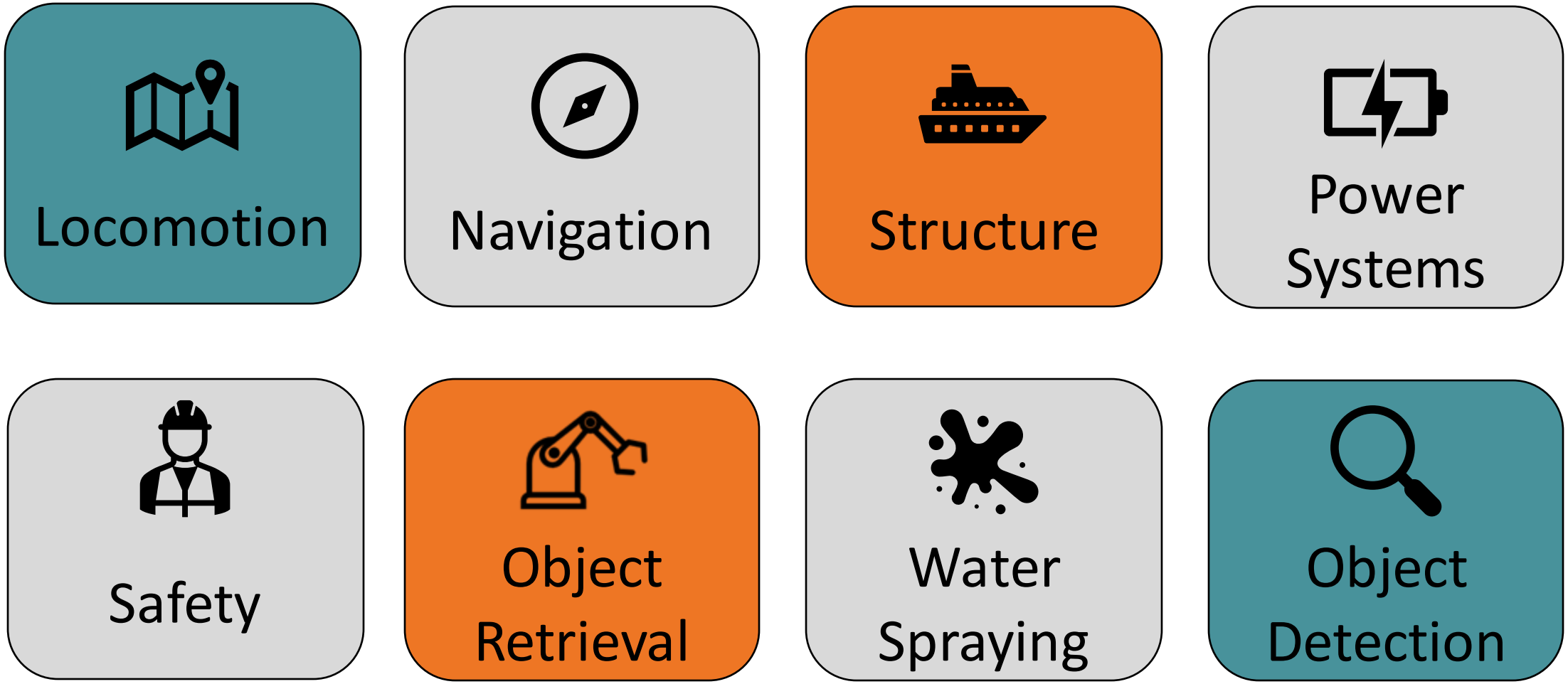
Functional Decomposition



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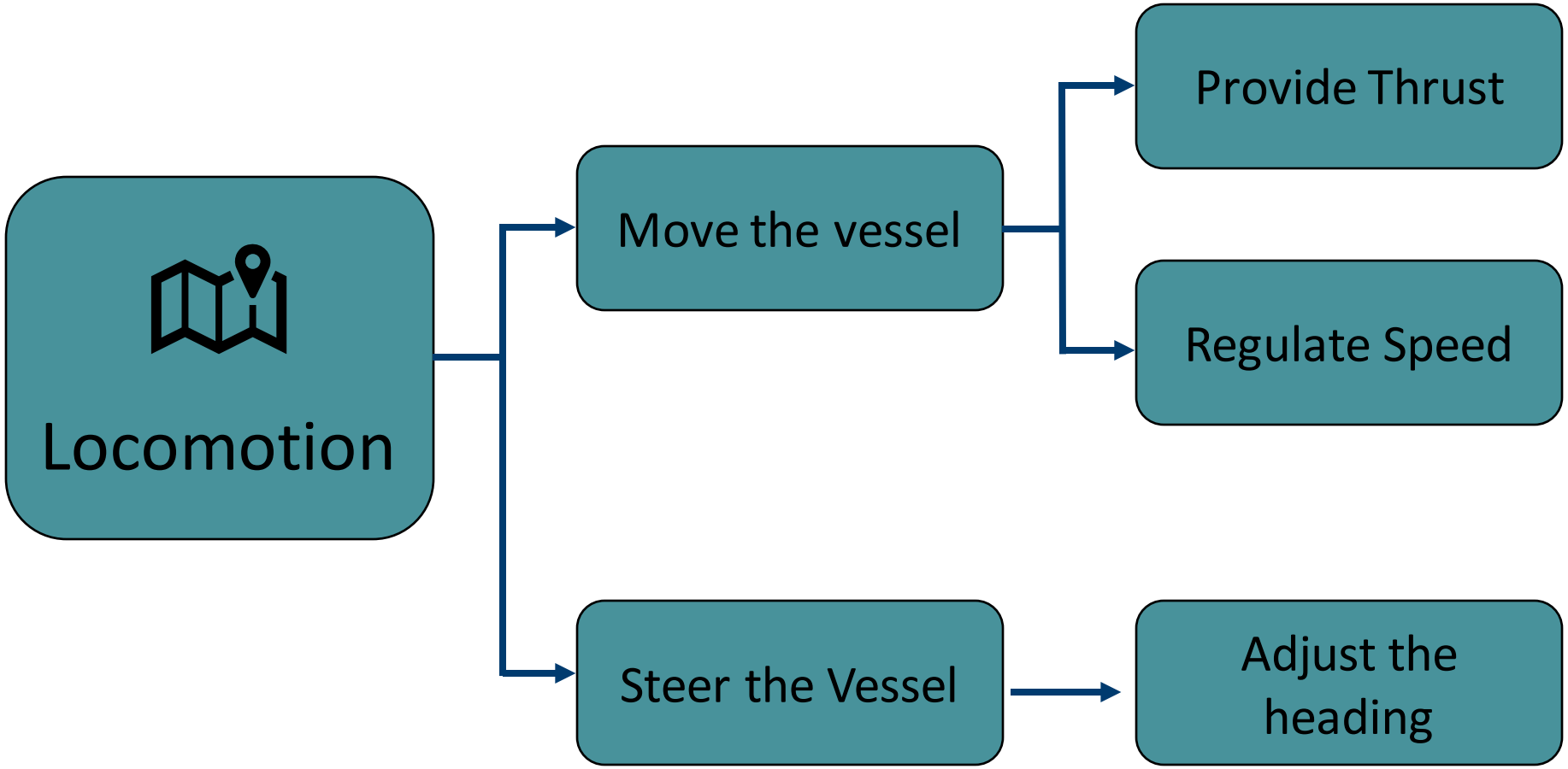

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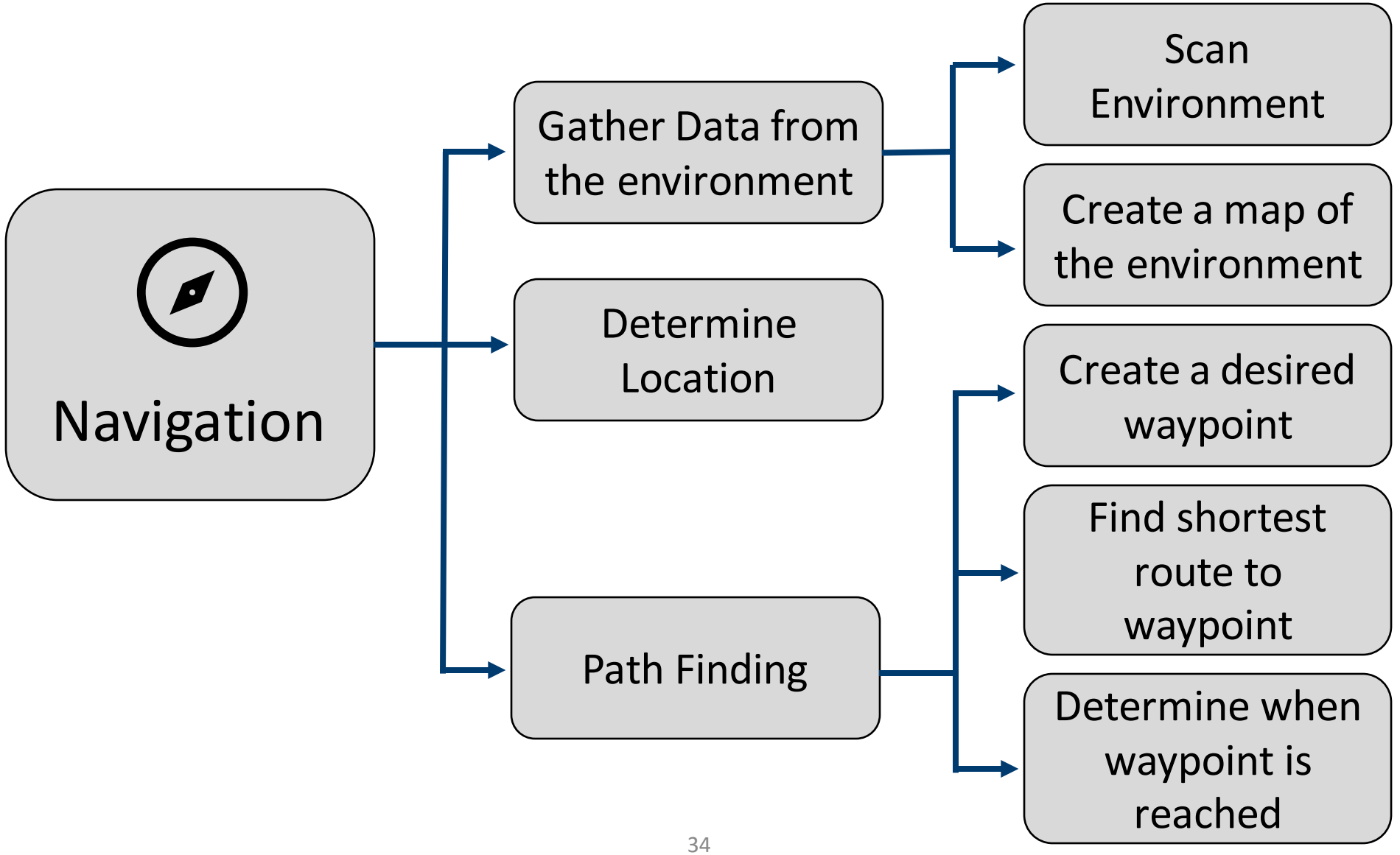

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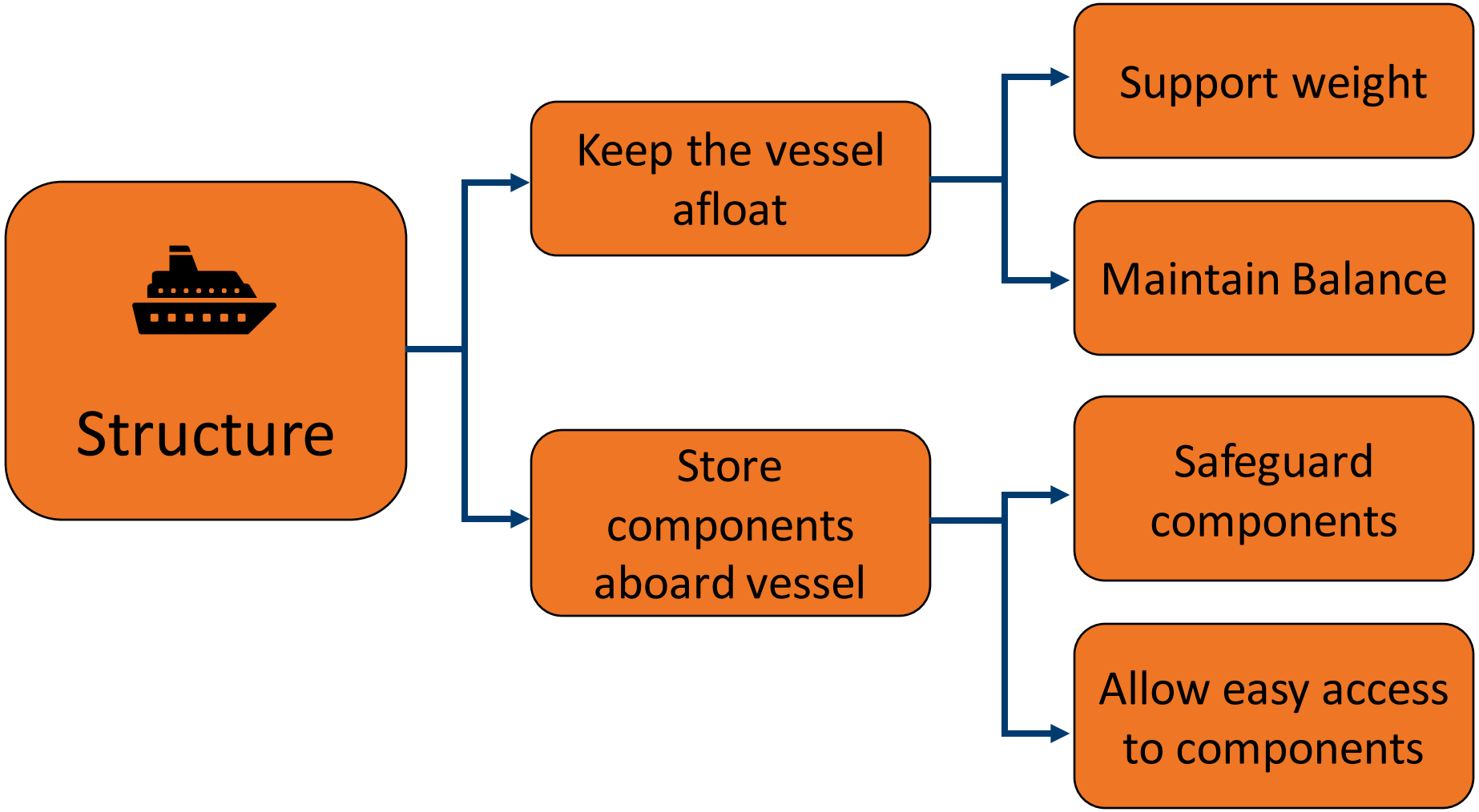

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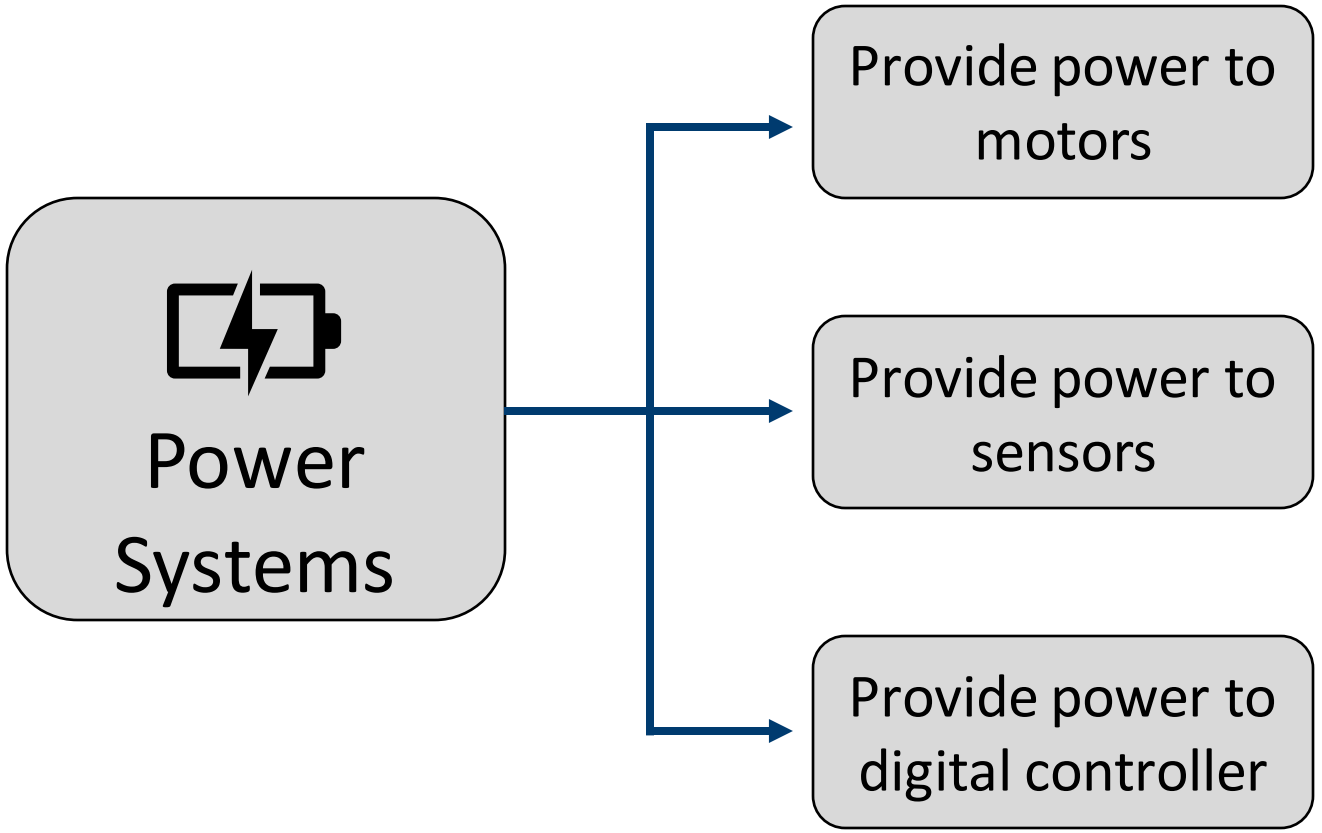

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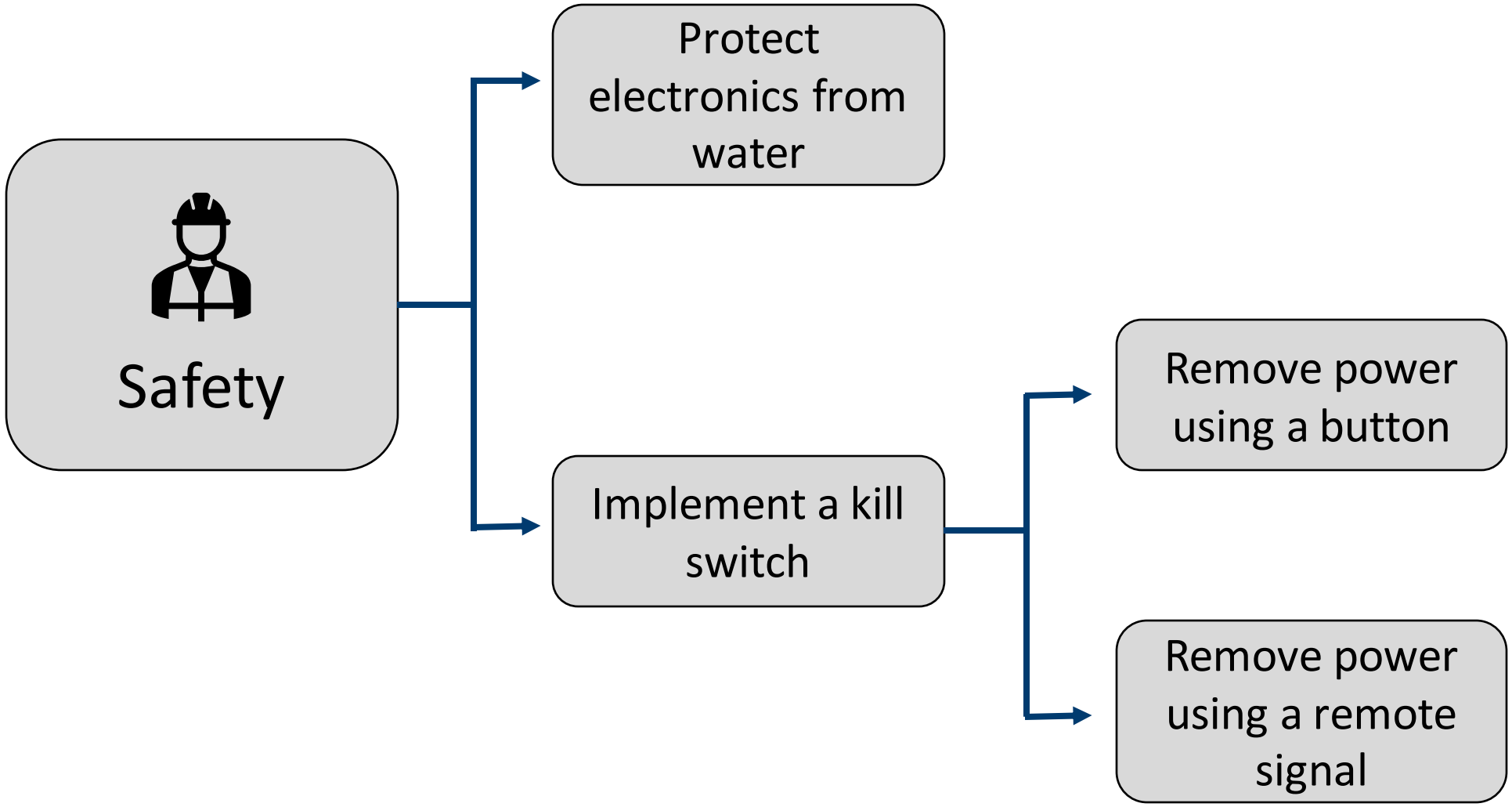

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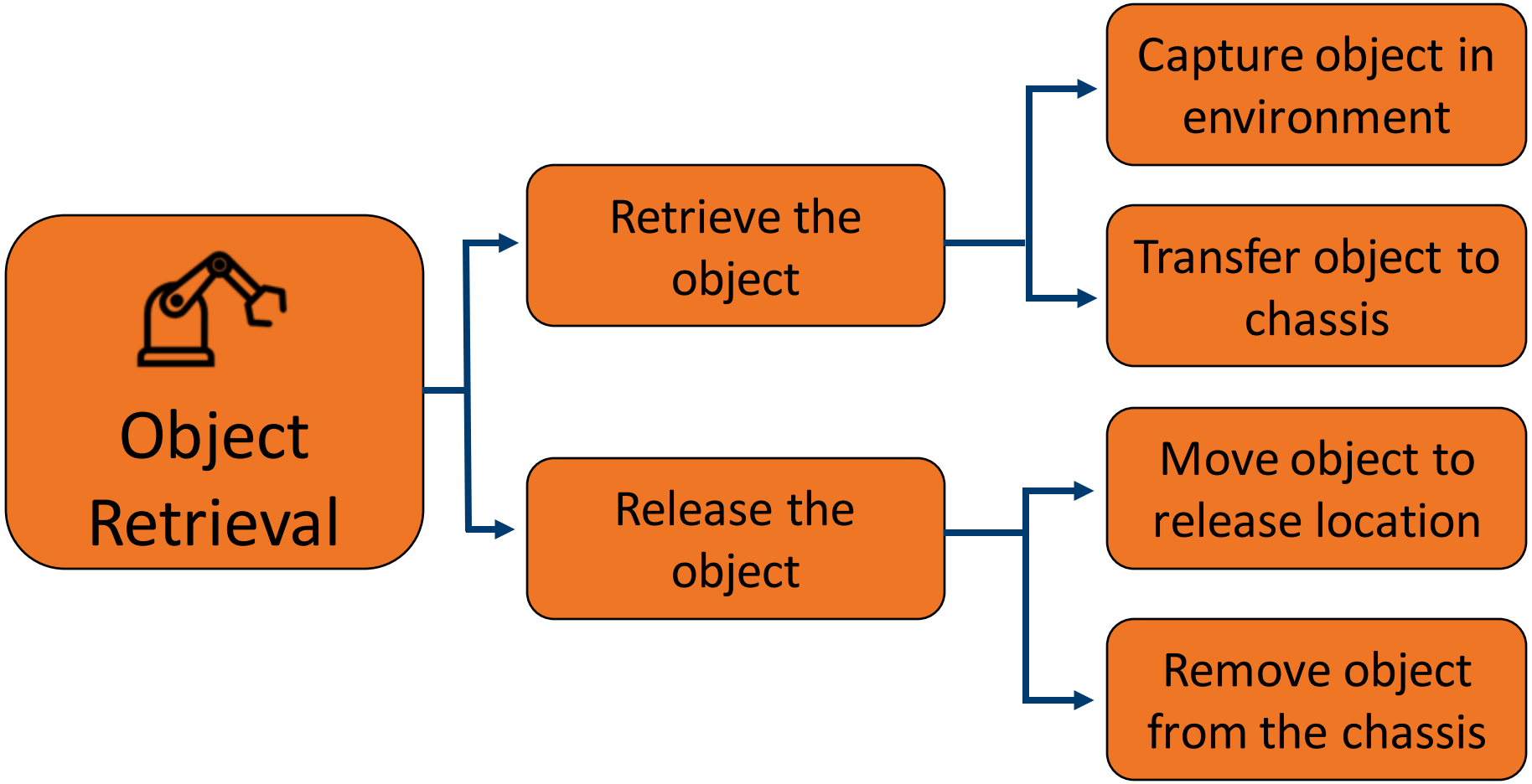

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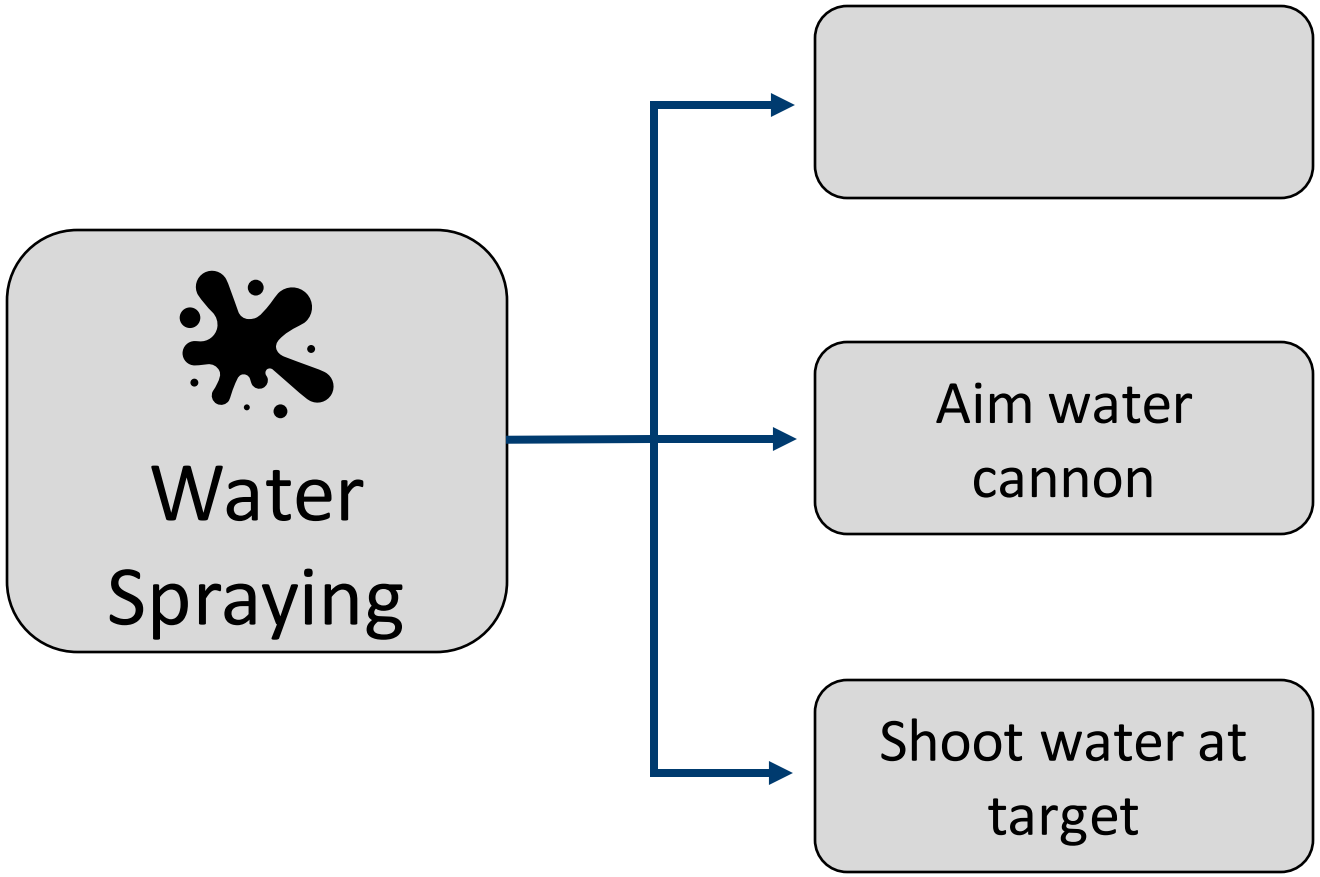

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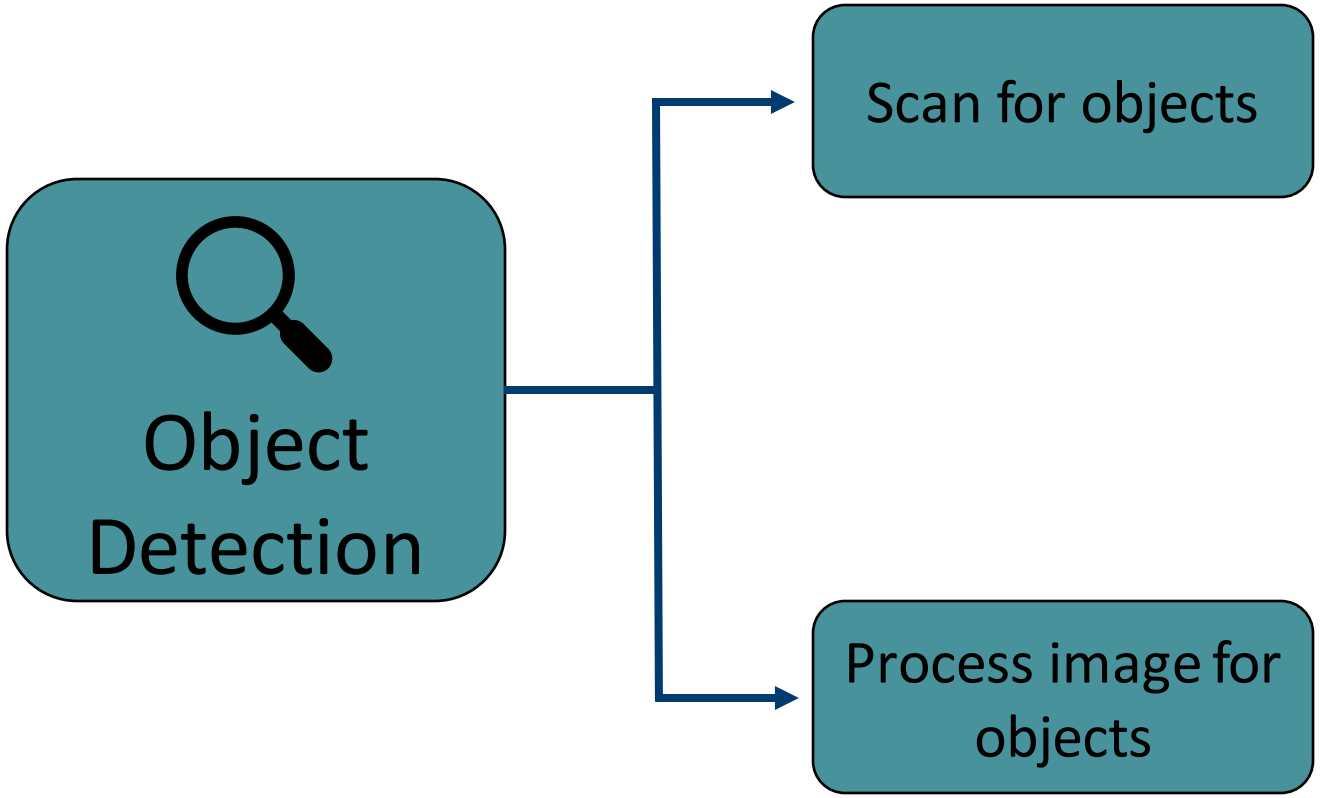

Near Future Work

- Start working on robot localization
  - Test different GPS module (found in Senior design room)
  - Draft navigation code diagram
  - Test different obstacle aversion methods on prototype
- Test given thrusters (PCB Campus)
- Set target and metrics
- Draft different concept ideas
  - Boat hull designs
  - Thruster design and placement
  - Drive Modes
  - Etc.
- Start drafting and testing kill switches
  - Remote with RC transmitter
  - Physical with push button

Future Work

- Select a concept
- Start working on materializing chosen structural design
- Start working on camera object detection
  - Geometric segmentation: Recognizing shapes
  - Semantic segmentation: Object class (Ducks, buoy, etc)
- Integrate different functional systems
  - I.e navigation w/ locomotion and object detection
- Preliminary electrical calculations/schematics
  - Power supply calculations
  - Overall block diagrams
- Finalize first draft of test code for the Autonomous navigation portion of ASV

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- This is 15–point Times
- This is 20–point
- This is 25–point
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- This is 50–point
- This is 60–point

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