Autonomous System
Floating Vessel

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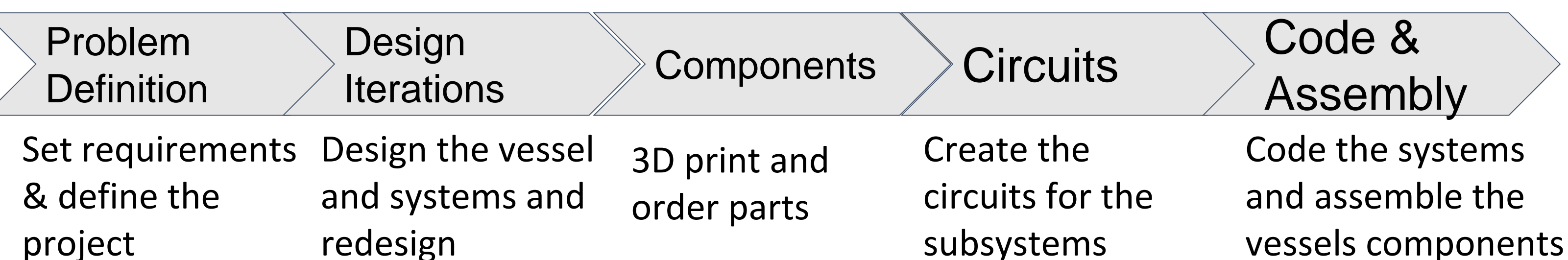- Prof. Zak M.Kassas <zkassas@uci.edu>

What is Autonomous System: Floating Vessel

As part of the UC Irvine Autonomous System, students will be in charge of designing and testing a floating vessel that will be able to autonomously navigate through the sea. The object is unmanned sea, which is to get new cyber patches to new treats, the vehicle has to come back to shore and manually connect to a high-bandwidth port to upload new security cyber patches and new directions.

Goals and Objectives

- Design a floating vessel based on requirements
- Assembly, fabrication, testing and analysis
- Automate the navigation and steering of the vessel
- The vessel autonomously locates a buoy and inserts a data transfer cable into it.

Timeline

Problem Definition	Design Iterations	Components	Circuits	Code & Assembly
Set requirements & define the project	Design the vessel and systems and redesign	3D print and order parts	Create the circuits for the subsystems	Code the systems and assemble the vessels components

Budget

- Electrical parts: battery, motors, breadboard, adaptor, connections..etc..
- Mechanical parts: frame, bearing, actuator, clams...
- Sensor: Arduino board, GPS, camera ..etc..
- Miscellaneous: propellers, grit paper, plastic sheet.

Est. Budget
- Sensors, $120
- Mechanical, $280
- Miscellaneous, $300
- Electrical, $350
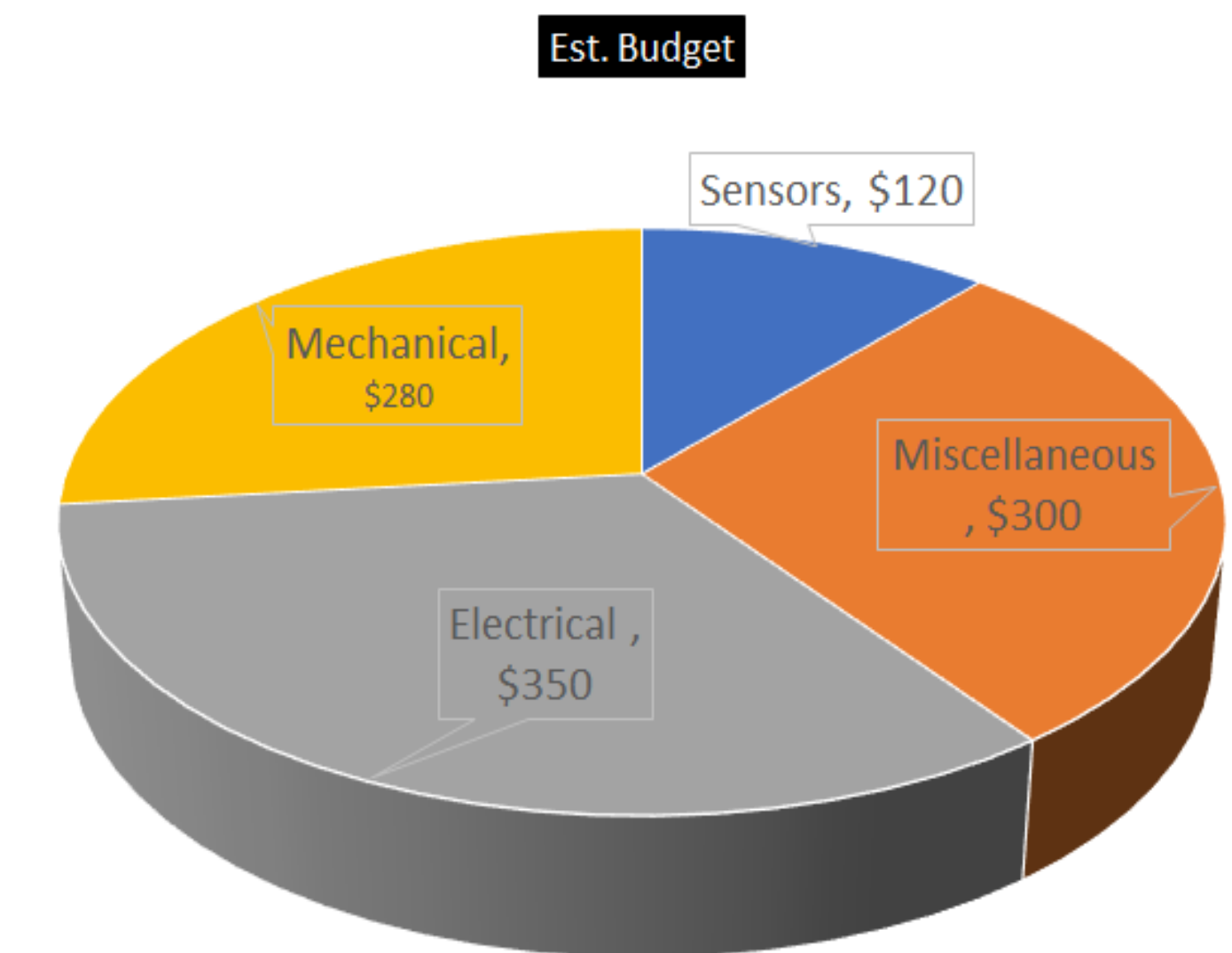
Components

Image detection
Camera detects cable port and fixes it at the center and continuously tracks it

Magnetometers
Two magnetometers are used as compasses, one is placed on the top of the boat the other on the camera.

3D Printed parts
A custom made cone and tip for the actuator are printed to reduce errors and align cable and port.

Linear Actuator
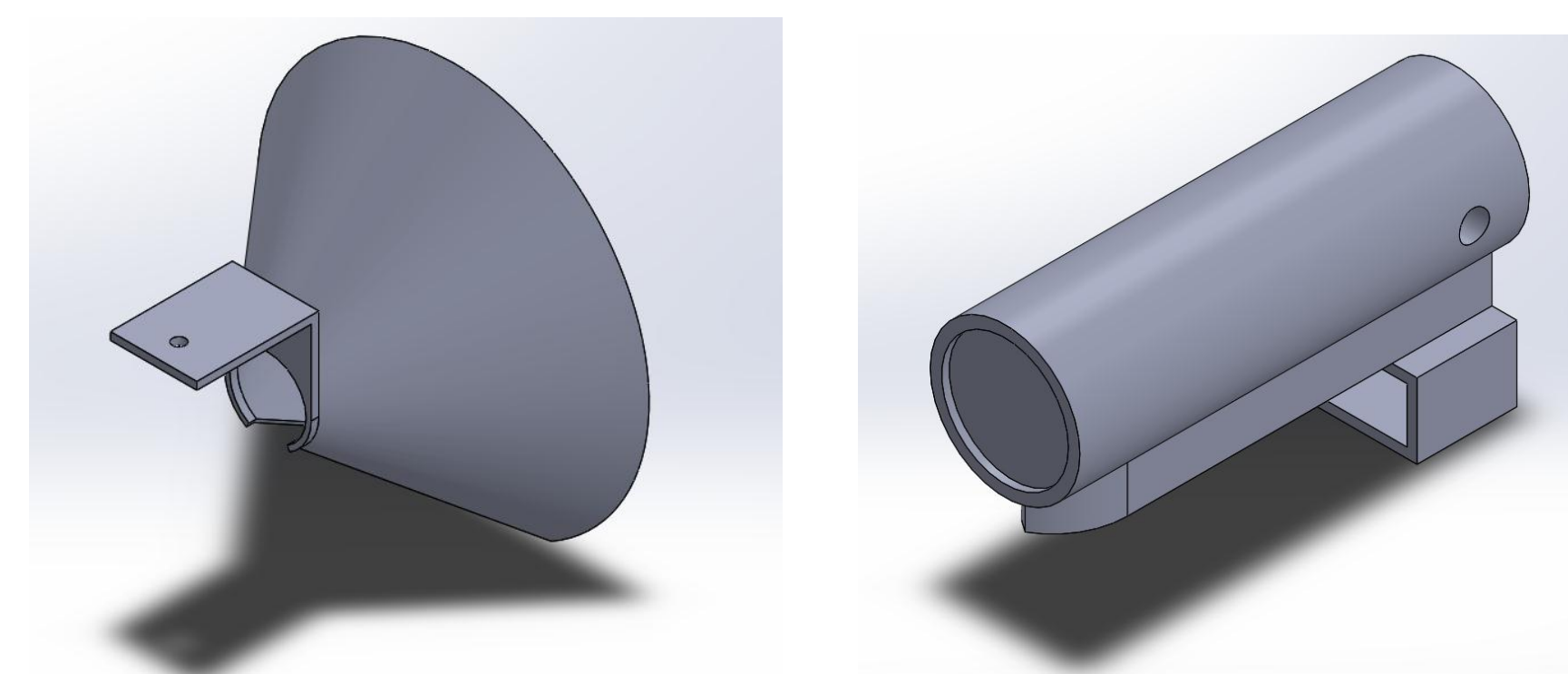Actuator is used to insert the cable into the buoy

Micro Controller
An Arduino board is used to control the vessel.

Motors
Two DC motors are used for propulsion and steering

Cable & Port Alignment

- Used a funnel for a lower chance of connection failure
- Linear actuator attachment inserts into funnel and is held in place with a magnet
- A magnetic USB C connector is housed under the attachment

Camera — Magnetometer — Linear Actuator — Magnetometer — Motor Driver — DC motor — DC motor — Power Supply