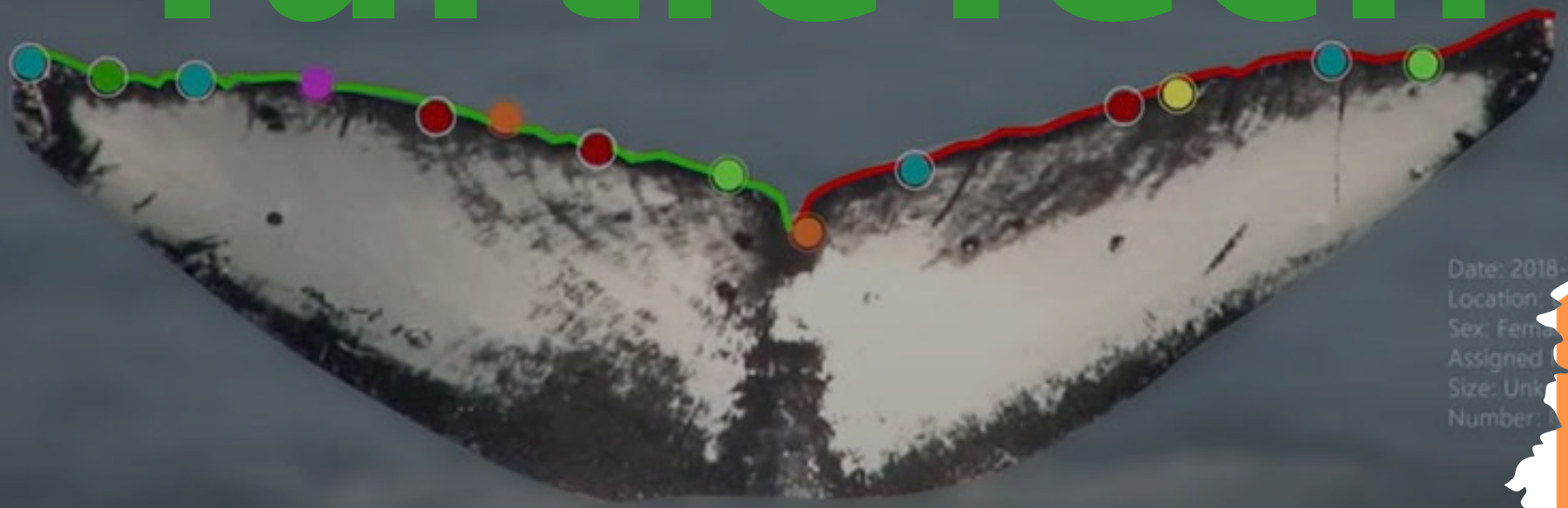
TurtleTech



SPRINT 2

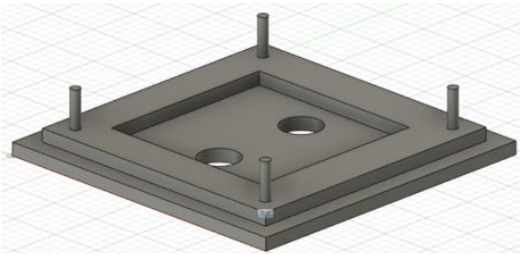
Vision

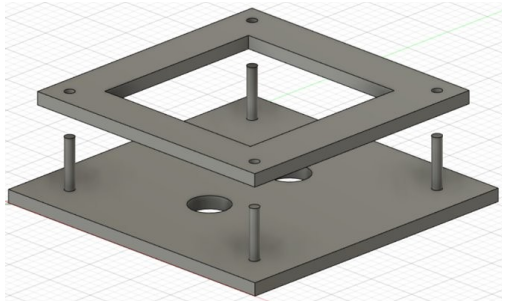
Our goal is to maintain functionality of the neural network software and hardware payload, while creating a framework and instructions to transition the payload between several UAVs to increase the ease of deployment of the system.

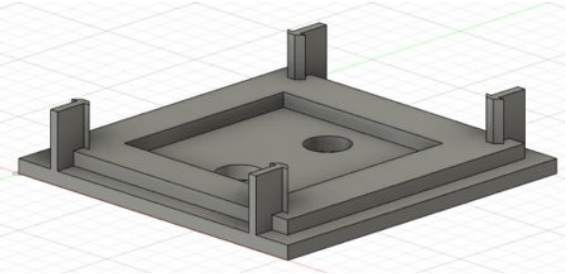
Retrospective

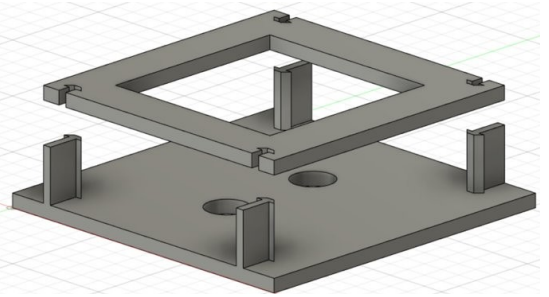
Created documentation on on how to power on the jetson

Brainstormed and drew mounting concepts in CAD









Sprint Outlook

Whale AI detection

Learn about the current TurtleTech neural network

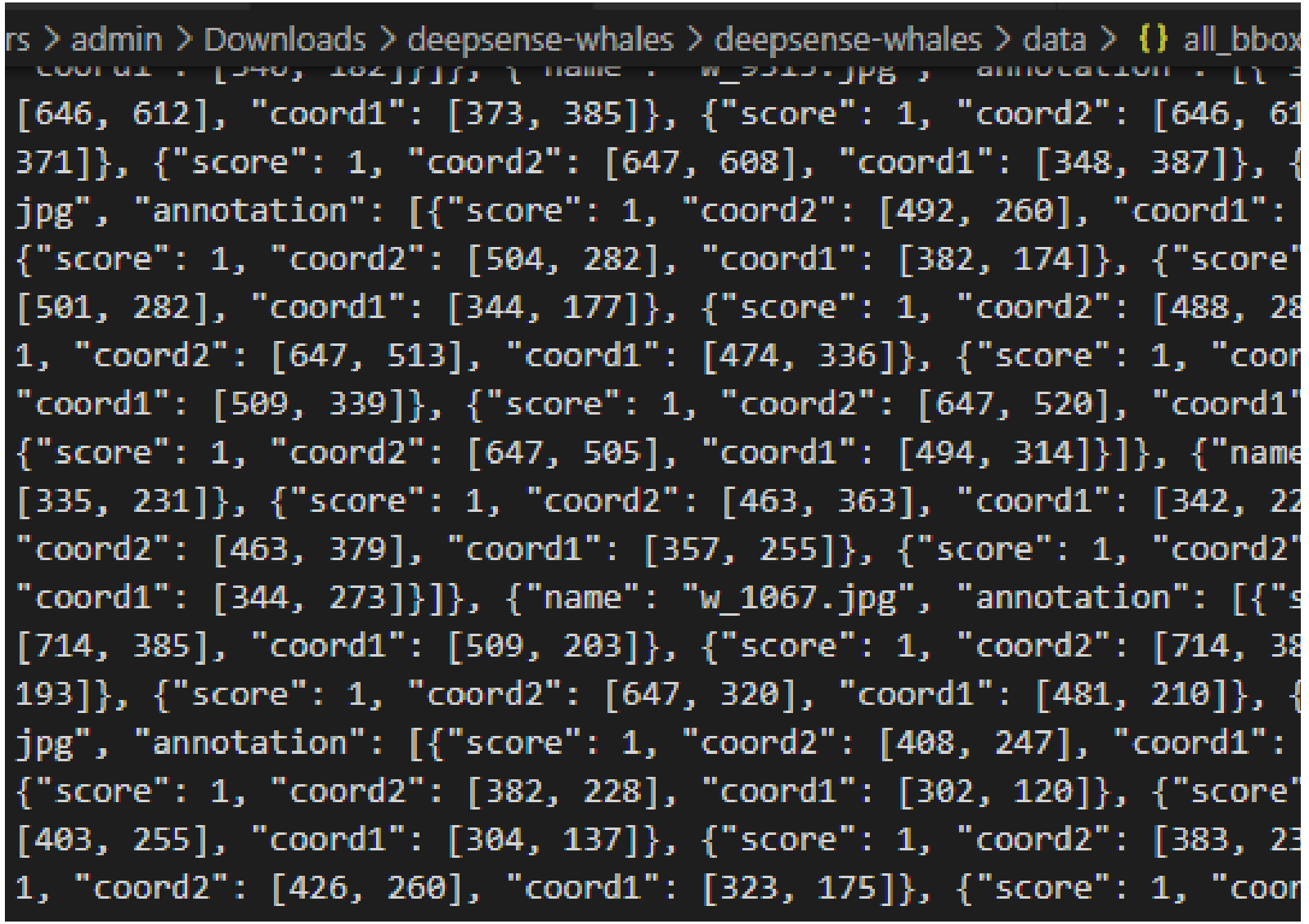
Video Walkthrough

Collaboration with the hardware team

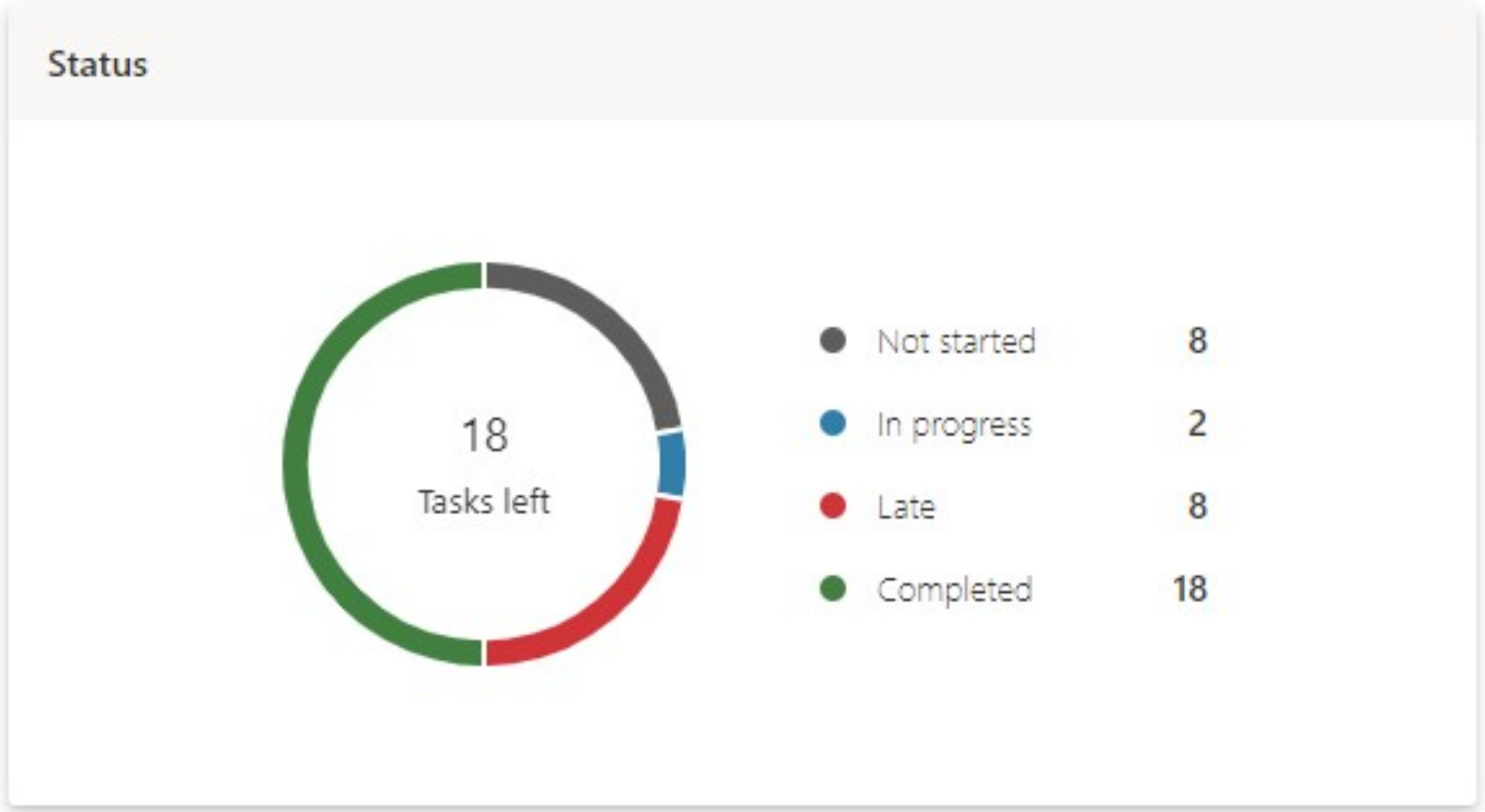
CAD design

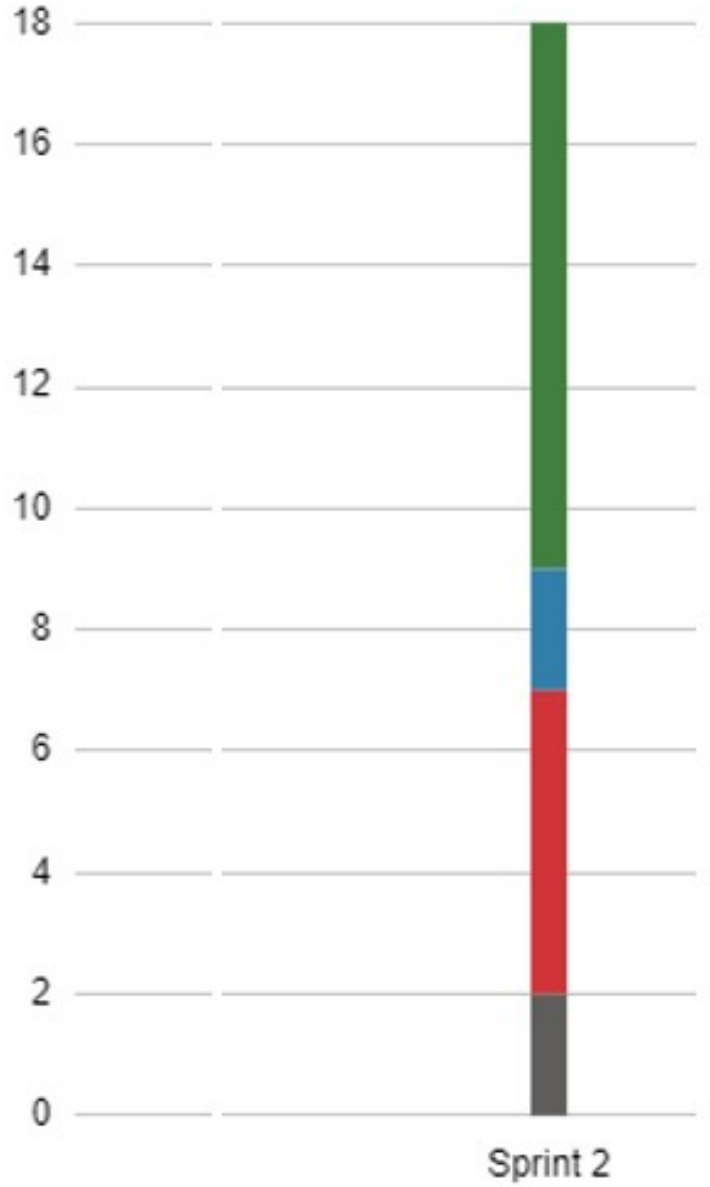
Accomplishments

- Whale Ai Prototype
- designs for payload
- Video



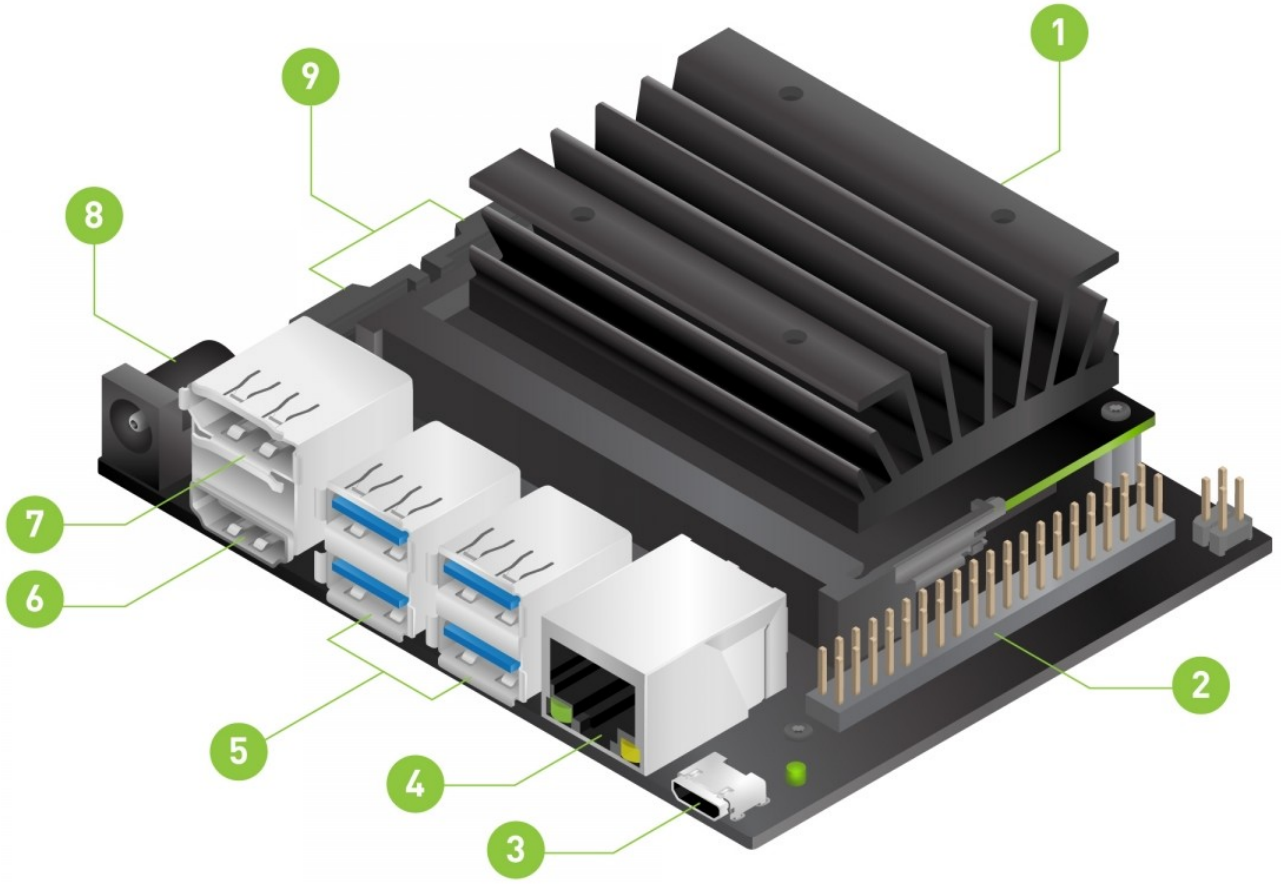
Burndown Chart

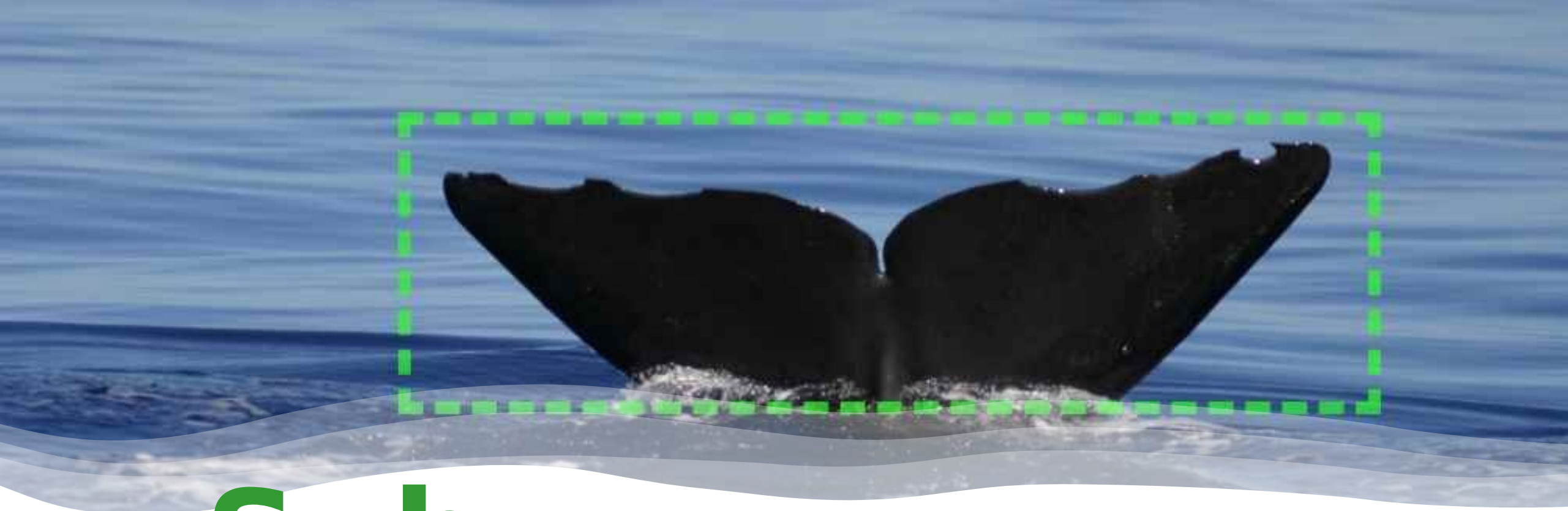




Aspects of System Design

- Ability of operators to easily start and run the Jetson
- Applicability of current program; can run other AI on the hardware
- Mobility between systems; ease of working with the physical payload





Sub-Systems Overview

Jetson Directives

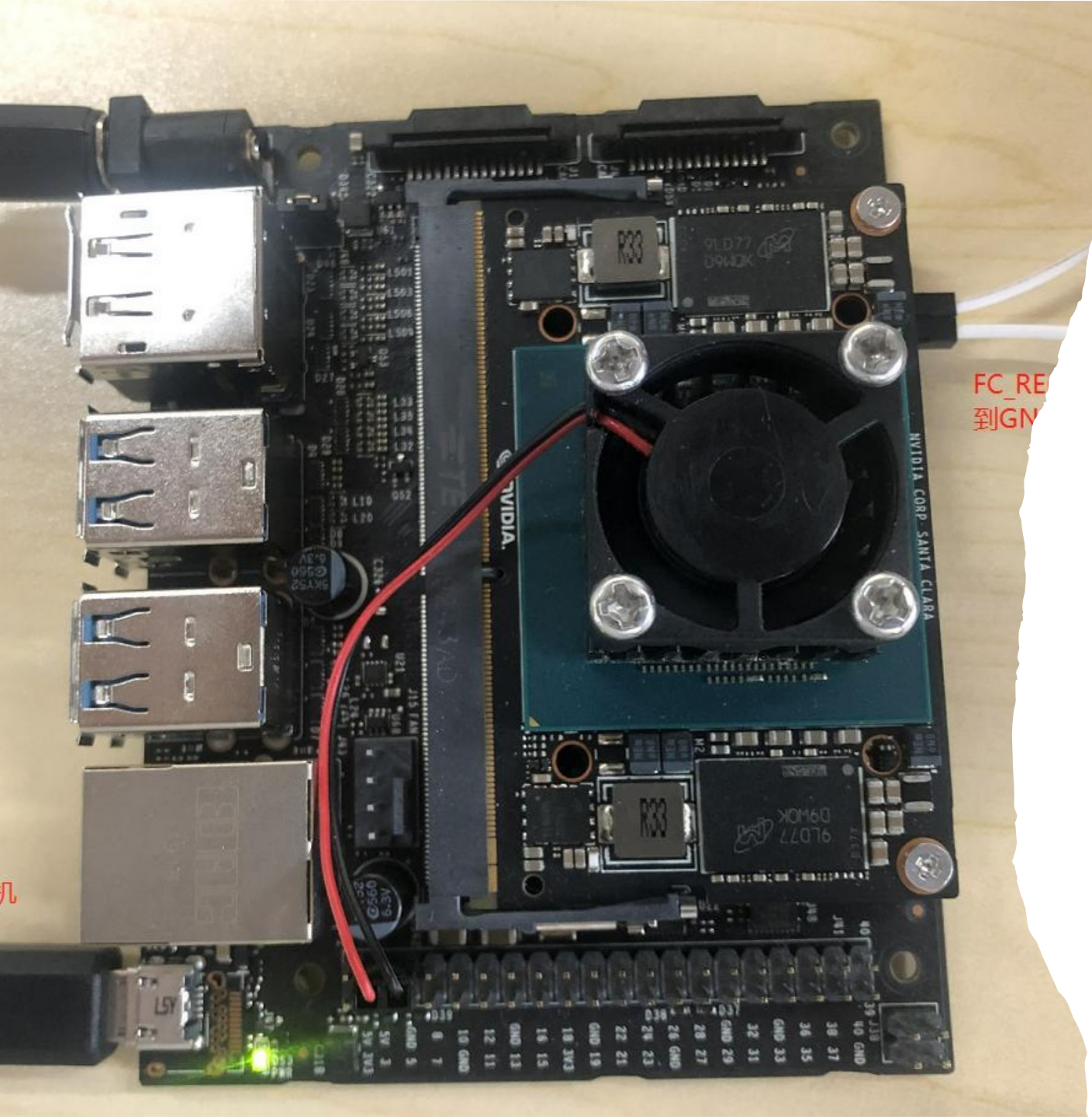
- Detailed instructions to make system understandable, even to a layperson

Whale Ai

- Focused on Whales – a transition to a different animal to identify, using new AI

Payload Framework

- 3D Model for ease of handing hardware and swapping important equipment



Subsystem- Jetson Directives

- Video tutorial of starting and running the Jetson with its current program
- Learned more about the current neural network operations and the file system setup

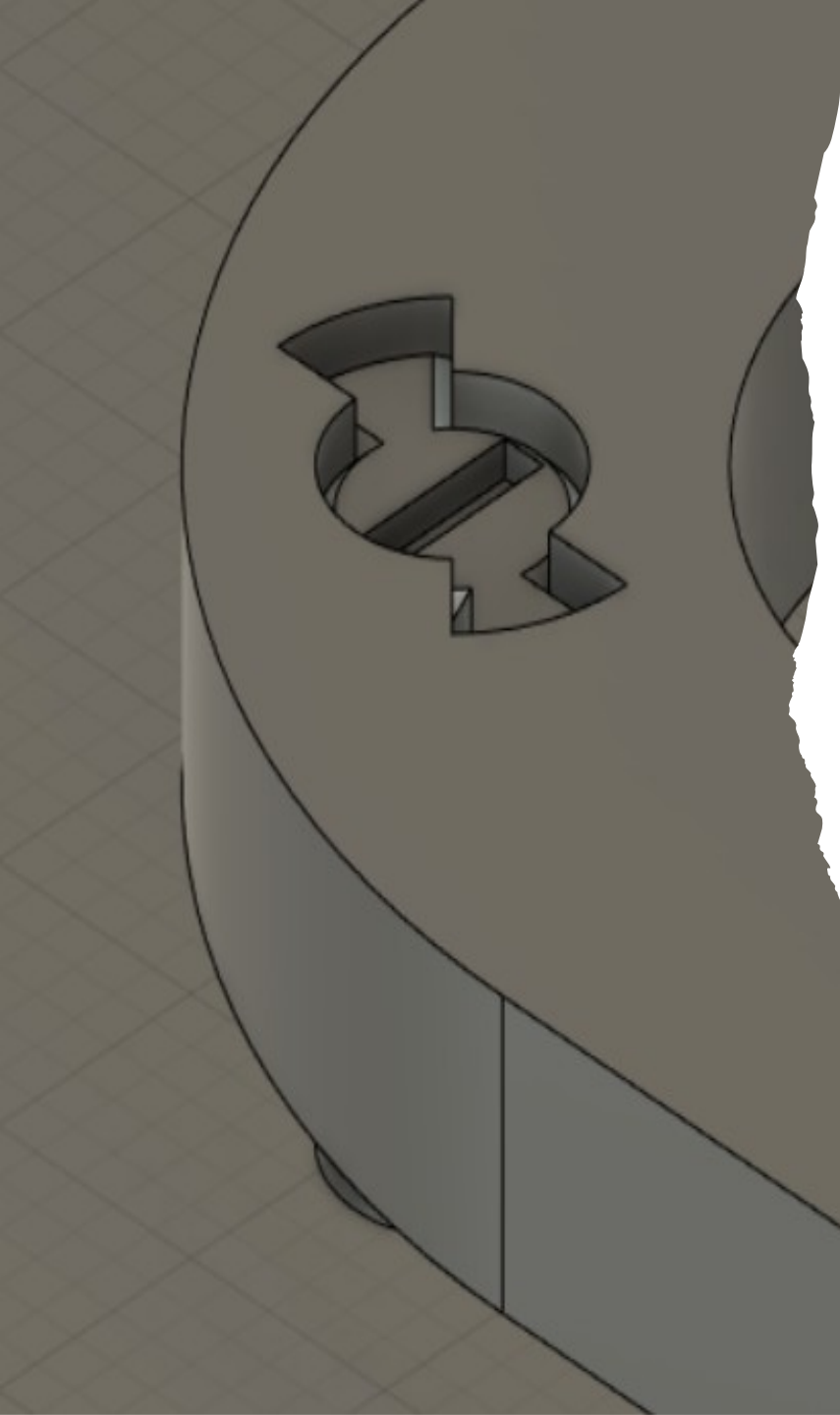
```
269
270     def handle_begin(self):
271         self._start_new_mb()
272
273     def handle_result(self, res):
274         self.current_batch.append(res)
275
276         if 'x' in res:
277             #print 'chu', self.current_mb_size, self.mb_size
278             self.mb_x[self.current_mb_size] = res.x
279
280         if 'y' in res:
281             self.mb_y[self.current_mb_size] = res.y
282
283         self.current_mb_size += 1
284
285         if self.current_mb_size == self.mb_size:
286             res = self._get_res()
287             self._start_new_mb()
288             return res
289         else:
290             return None
291
292     def handle_end(self):
293         print 'handle_end'
294         if self.output_partial_batches:
295             print 'OK', self.current_mb_size
296             if len(self.current_batch) != 0:
```

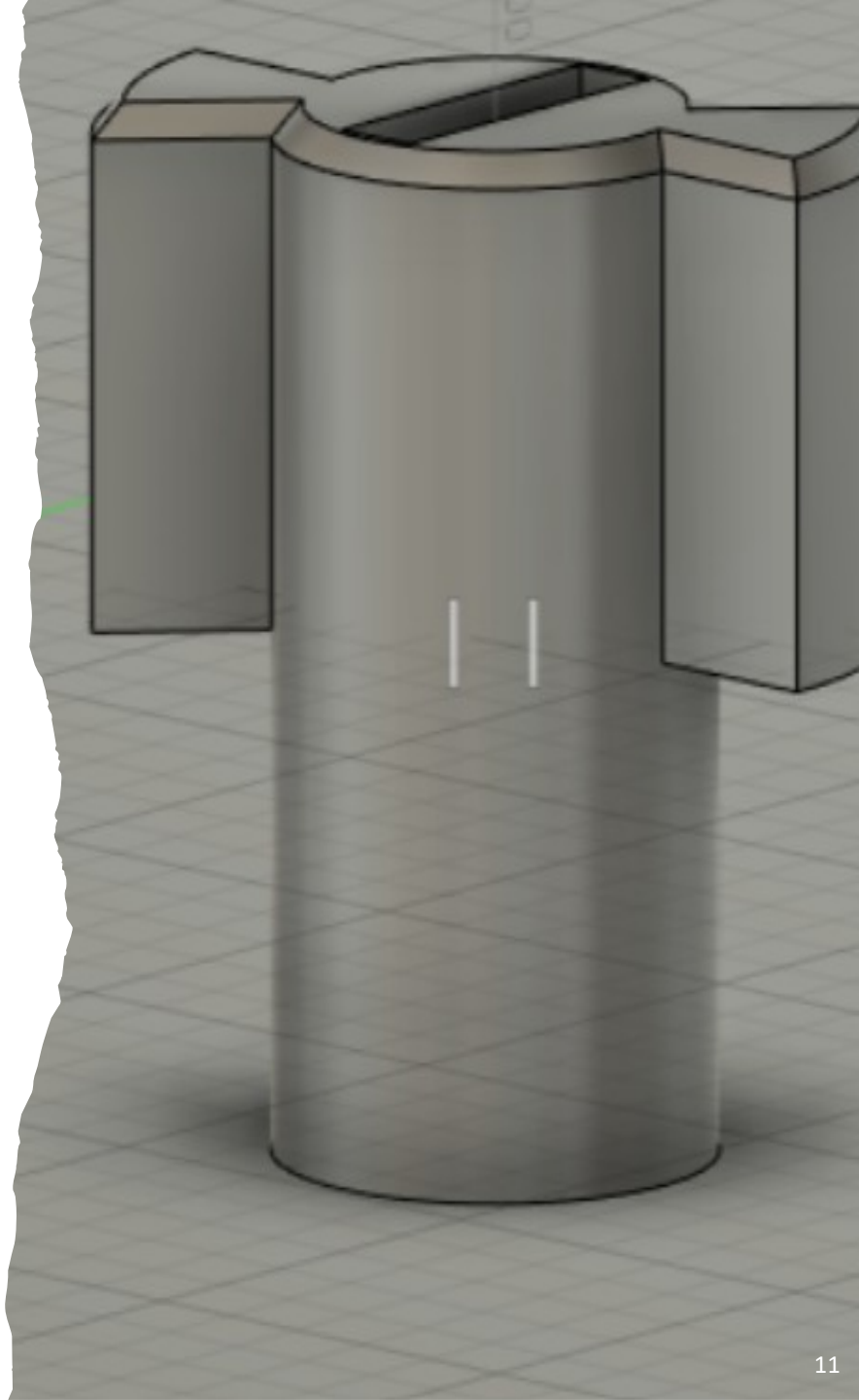
Subsystem - Modified Whale AI

- **Using WildMe.ai and Deepsense.ai**
- **Dependencies on OpenCV, Keras, Python, and TensorFlow**
- **Currently outputting text-form bounds and weights**
- **Plan to use TensorFlow Lite to transfer to Jetson to avoid memory constraints**

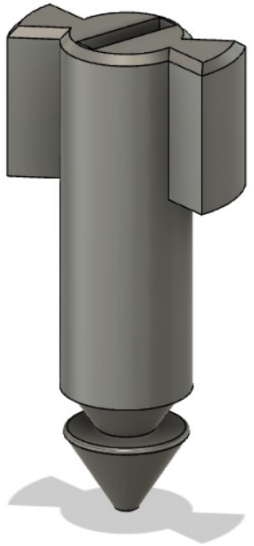
Subsystem- Payload Swap Framework

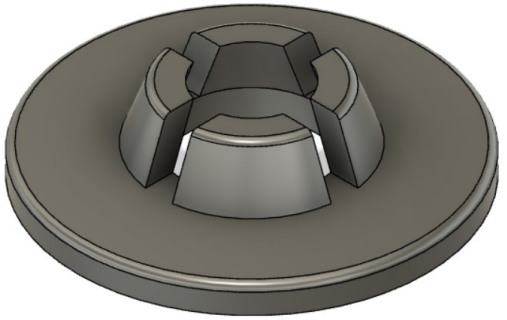
- The payload framework needs to hold the Jetson with the USB port available, while maintaining the correct angle for the cameras
- Durability and ease of use
- Partnership with the hardware to ensure design meets all standards for aircraft
- Using Fusion 360 Software





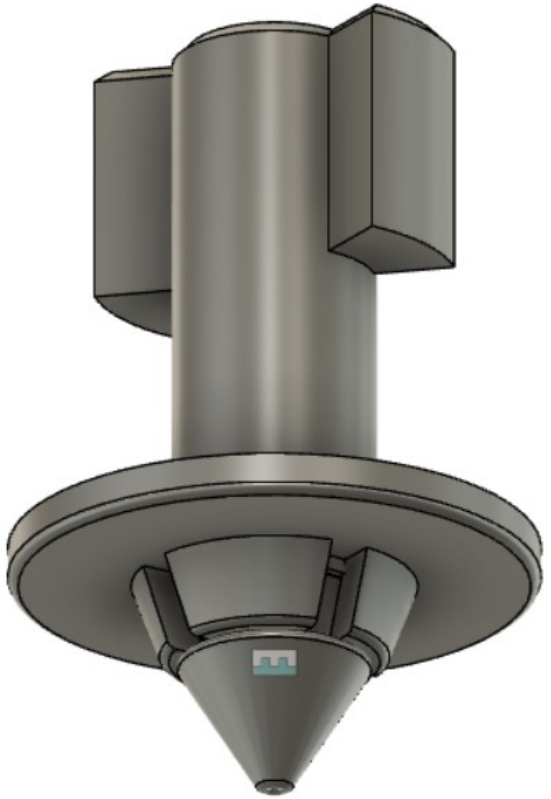
Mounting System Design



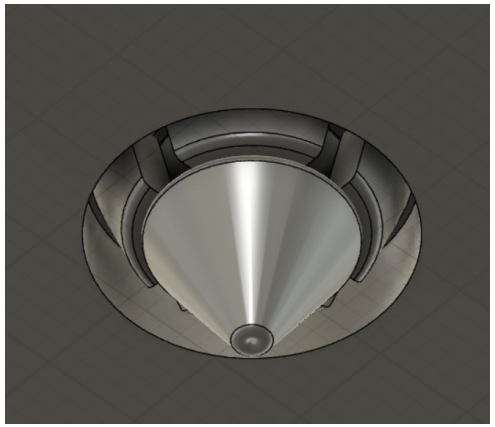


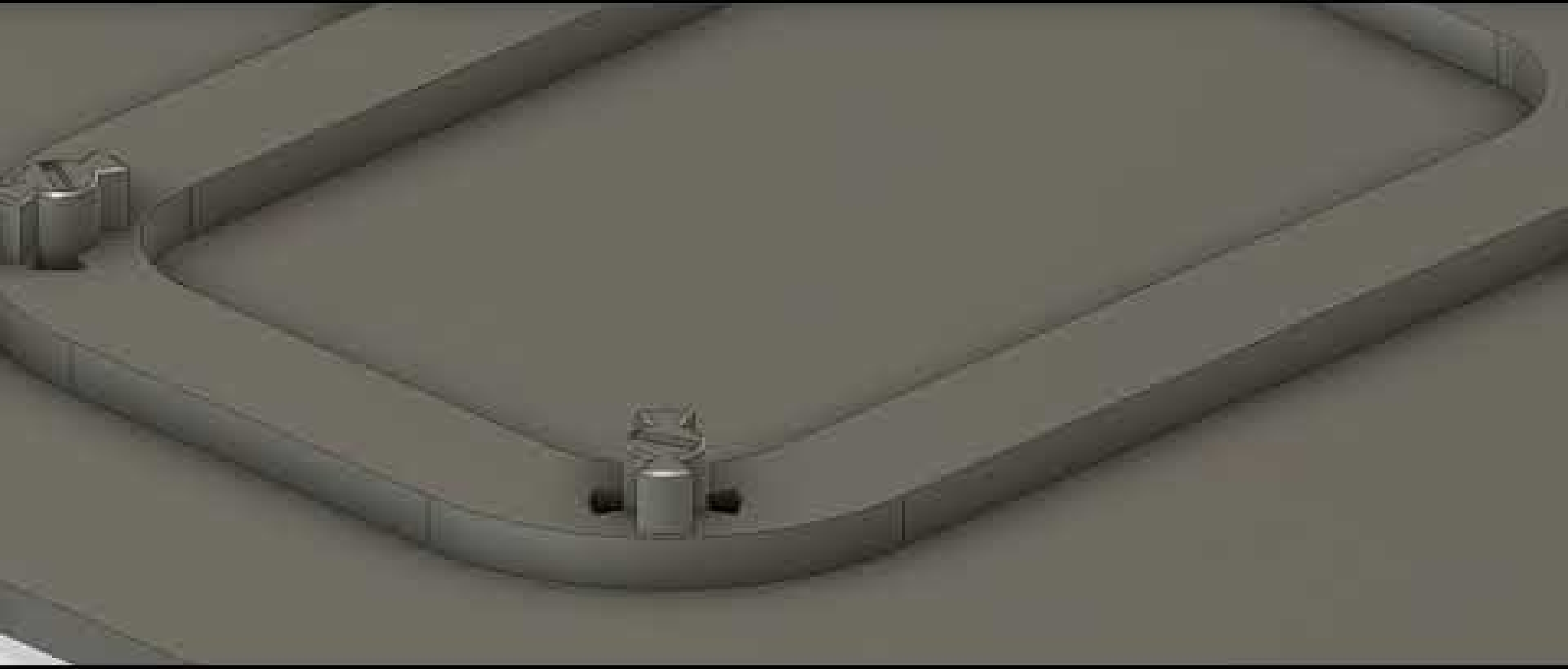
Accessible in tight spaces

Pin style locking

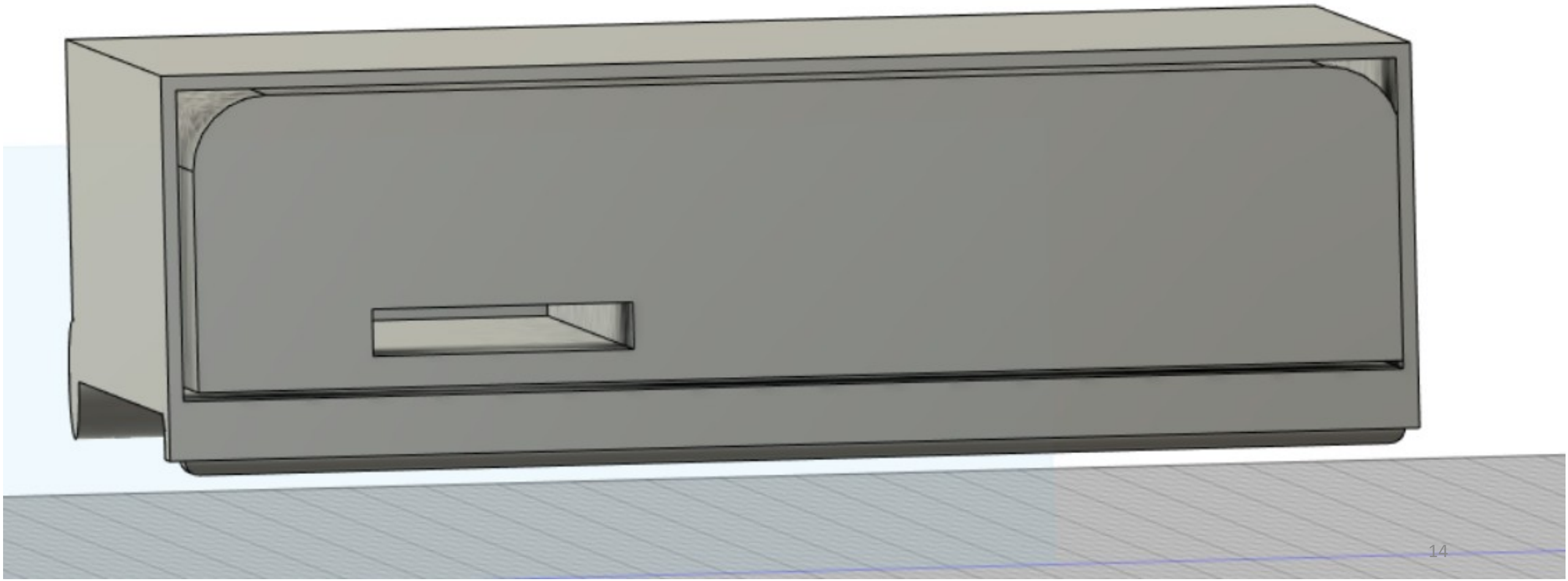


Durability





Pivoting Battery Case Holder



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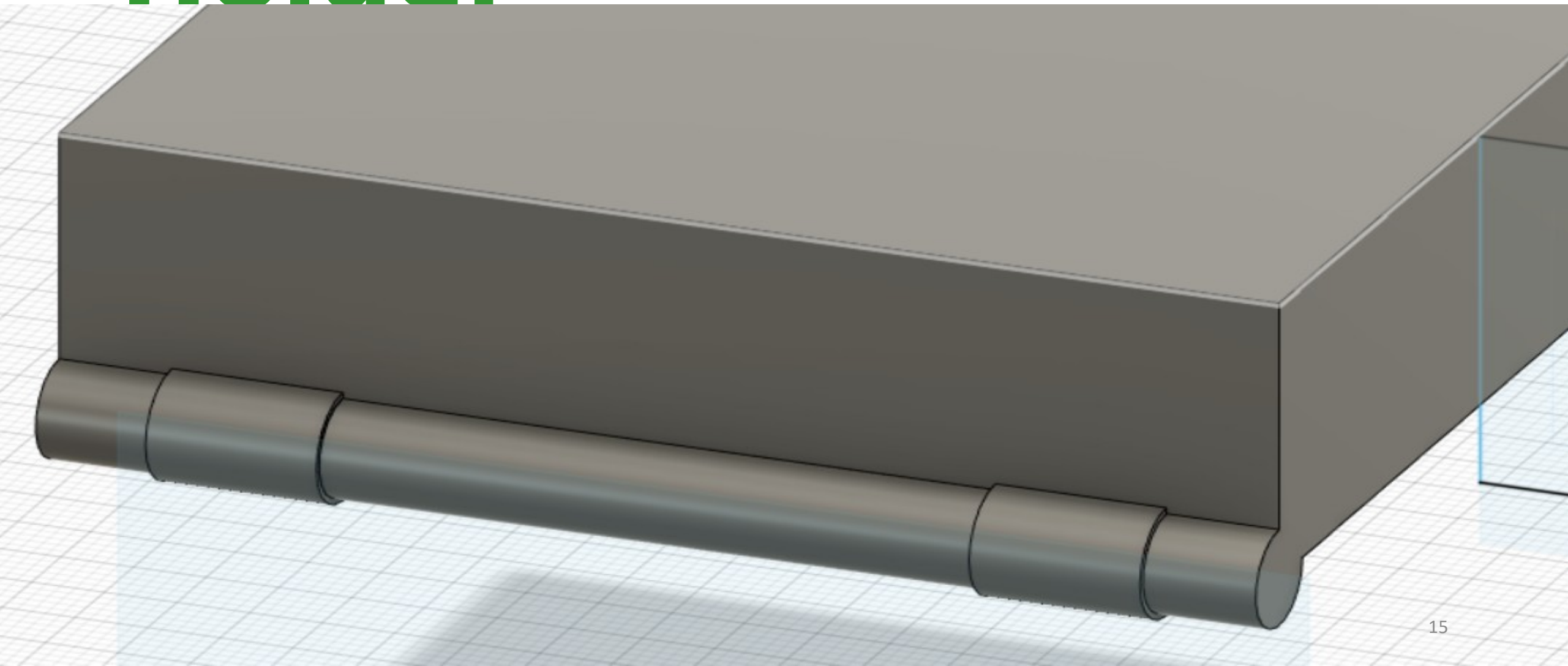
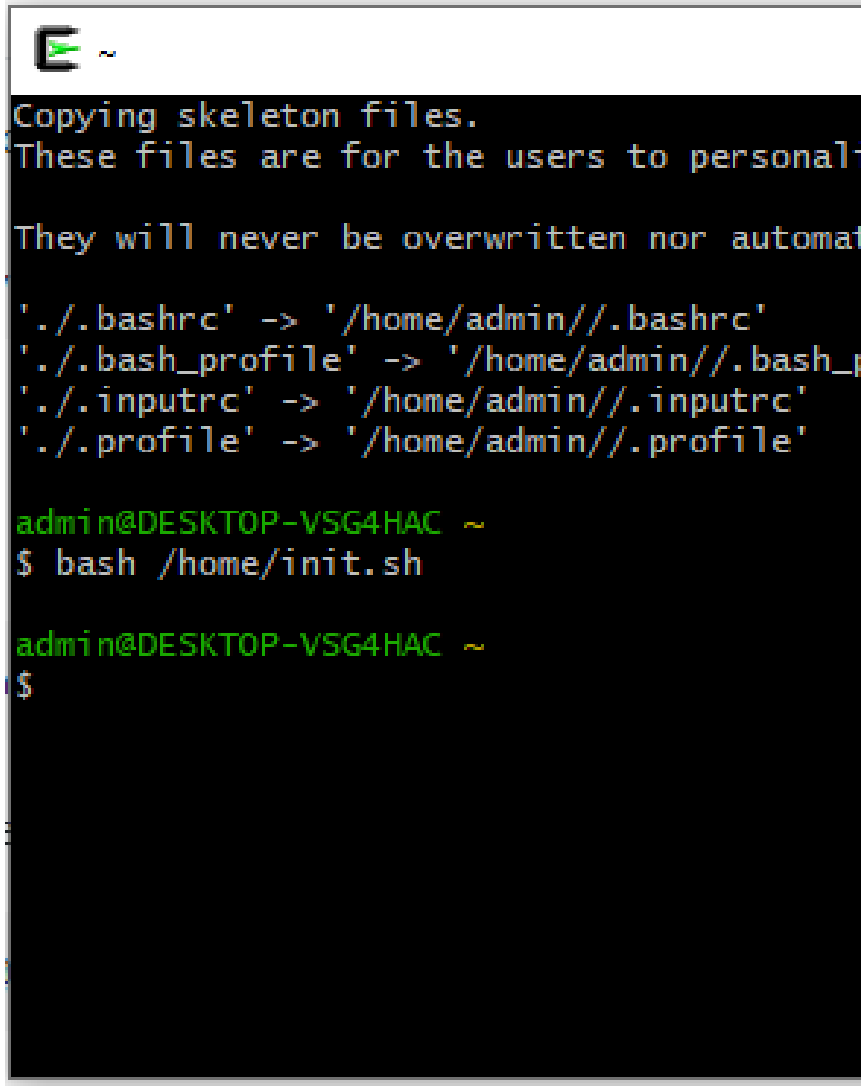


Interface & Exports

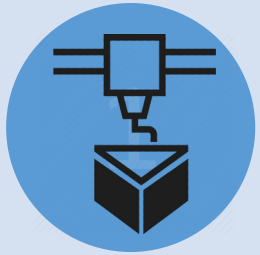
- **Interface on software side is currently shell scripts running python files**
- **Taking in image files and outputting data of bounding boxes and weighting of whale likelihood, exporting that data to .csv file**
- **Currently trying to get image output instead for easy checking**
- **Hardware side, inputs are components to mount; Jetson, Cameras, battery, potential on/off switch**
- **Output is a printed plastic case for containing mounted items**

Lessons Learned



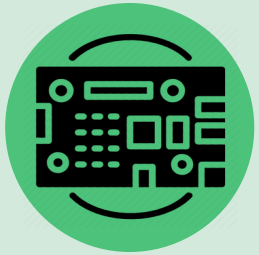
- Jetson has very low memory and no MicroSD slot, so any programs loaded onto it are limited
- Overtightening screws on payload case can lead to plastic cracking under stress
- Ensure people are aware of team deadlines and not just syllabus deadlines
- Bad idea to try to use an API call to a preset AI (especially for us trying to get the setup running on a Jetson)

Next Steps



Print to-scale model of single peg mounting for proof of concept

Get images outputting from the whale AI



Attempt to move Whale AI to Jetson

Trial run of having someone else run the Jetson during a flight test


Questio
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