TurtleTech

Sprint 2 Demo

By: Christopher Angland, Laurel Dodson, Parker Brown, RoseEllen Hoke, William Wiemann

Goals of TurtleTech

Sprint 1

•Create first drafts of all documentation
•Get a basic understanding of the Nvidia Jetson Nano
•Power on the Jetson Nano and accomplish initial steps for communication.
•See a test flight

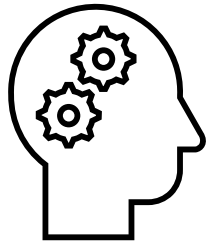
Sprint 2

- Improve the current neural network
- Get the neural network working on the Jetson
- Troubleshoot the powering off issue
- Turtle Track images

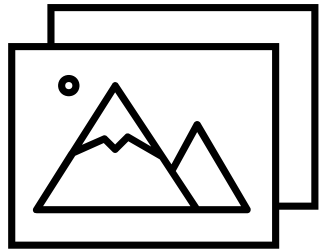
Sprint 3

•Produce a functioning neural network system on a Nvidia Jetson device that identifies aerial turtle images against non-turtle images in real-time.

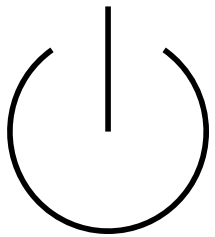
What Have We Done This Sprint?



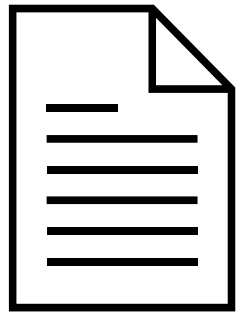
Neural Network



Turtle Track Images

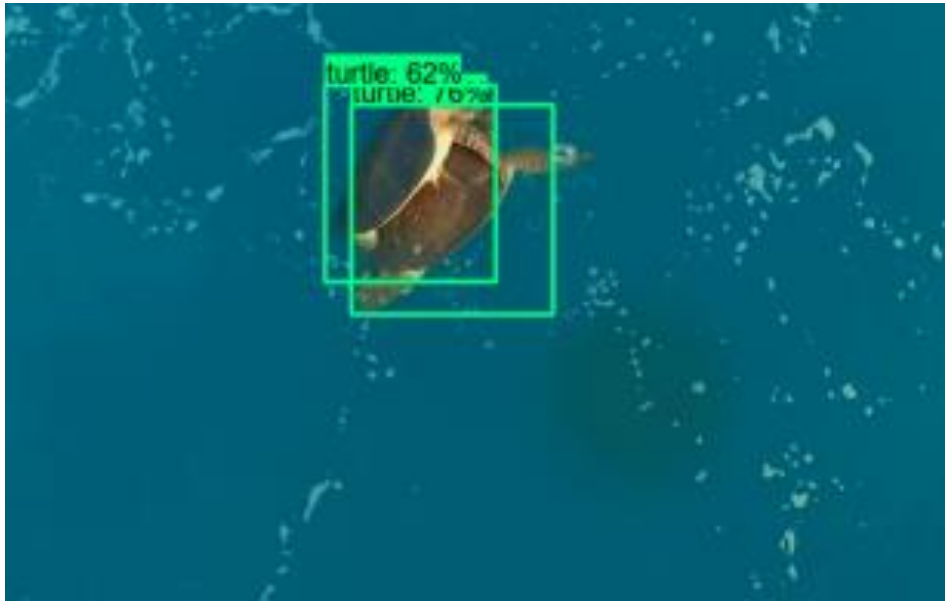


Troubleshooted the Drone Powering Off



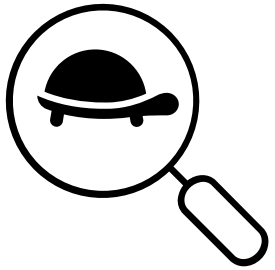
Documentation

Milestones

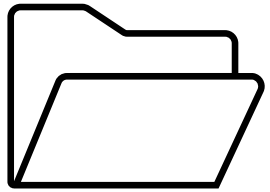


General Constraints and Design considerations

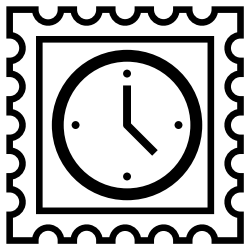
Improve precision



Hardware file size limitations

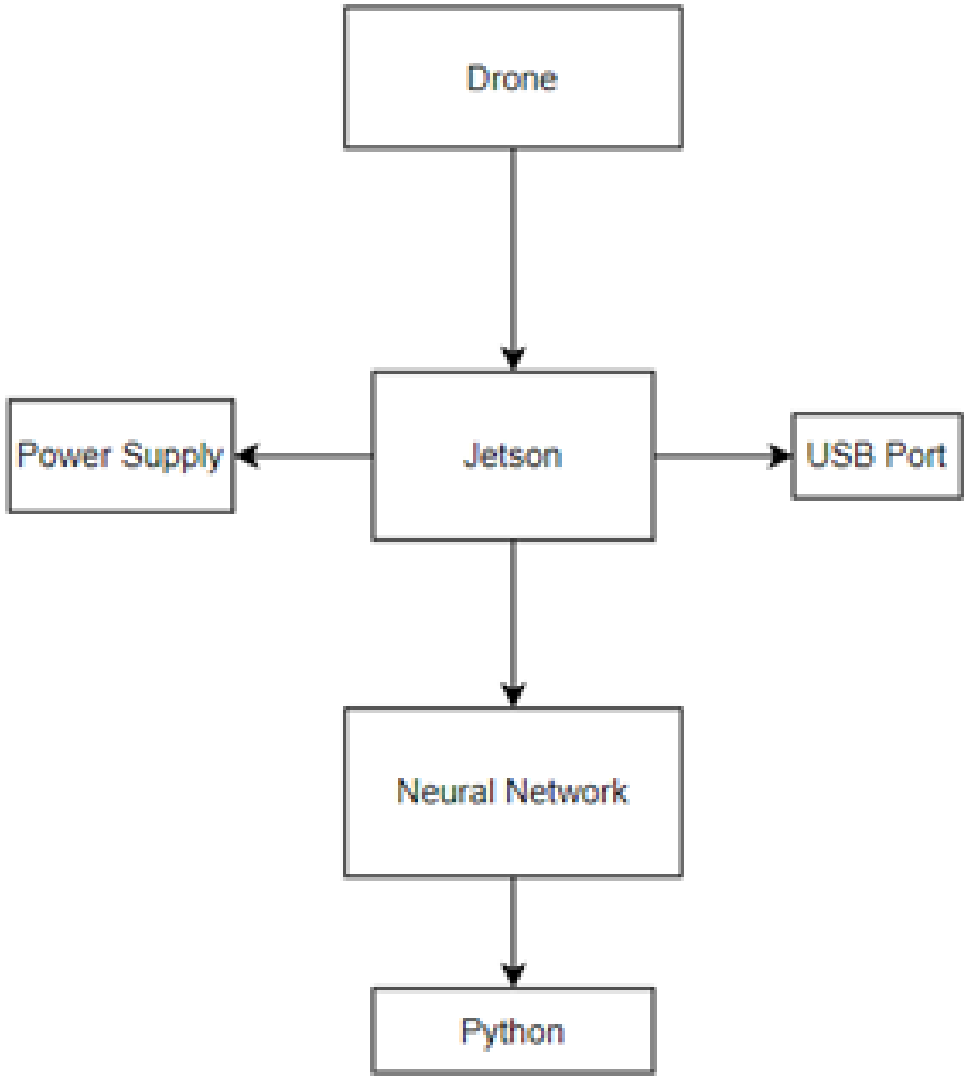


Embedded timestamps

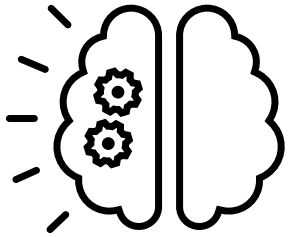


System Architecture

- Connections between the drone and Jetson, and Power Supply and Jetson, provide external ability to accomplish tasks
- Internal Connections between the Jeston and Neural Network allow for ability to quantify gathered data

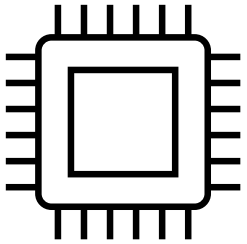


Sub-System



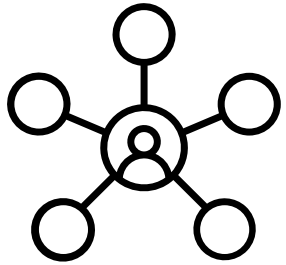
Neural Network

- TensorFlow Framework
- Recognition Model
- Labeling Application



Hardware

- Image Capturing Camera
- Power Supply (New)
- Jetson Board

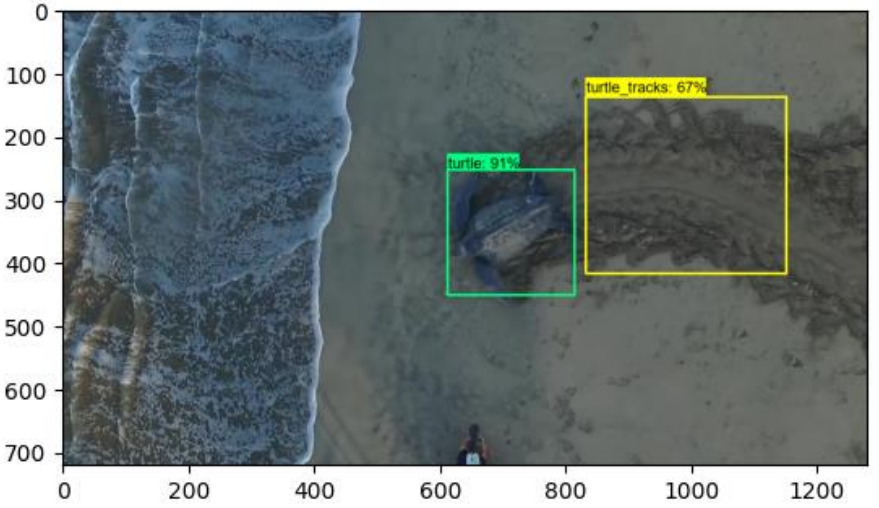


Communication

- VM for simulation of Unix System
- Jetson Image SD Card
-Generated Images (Modified)

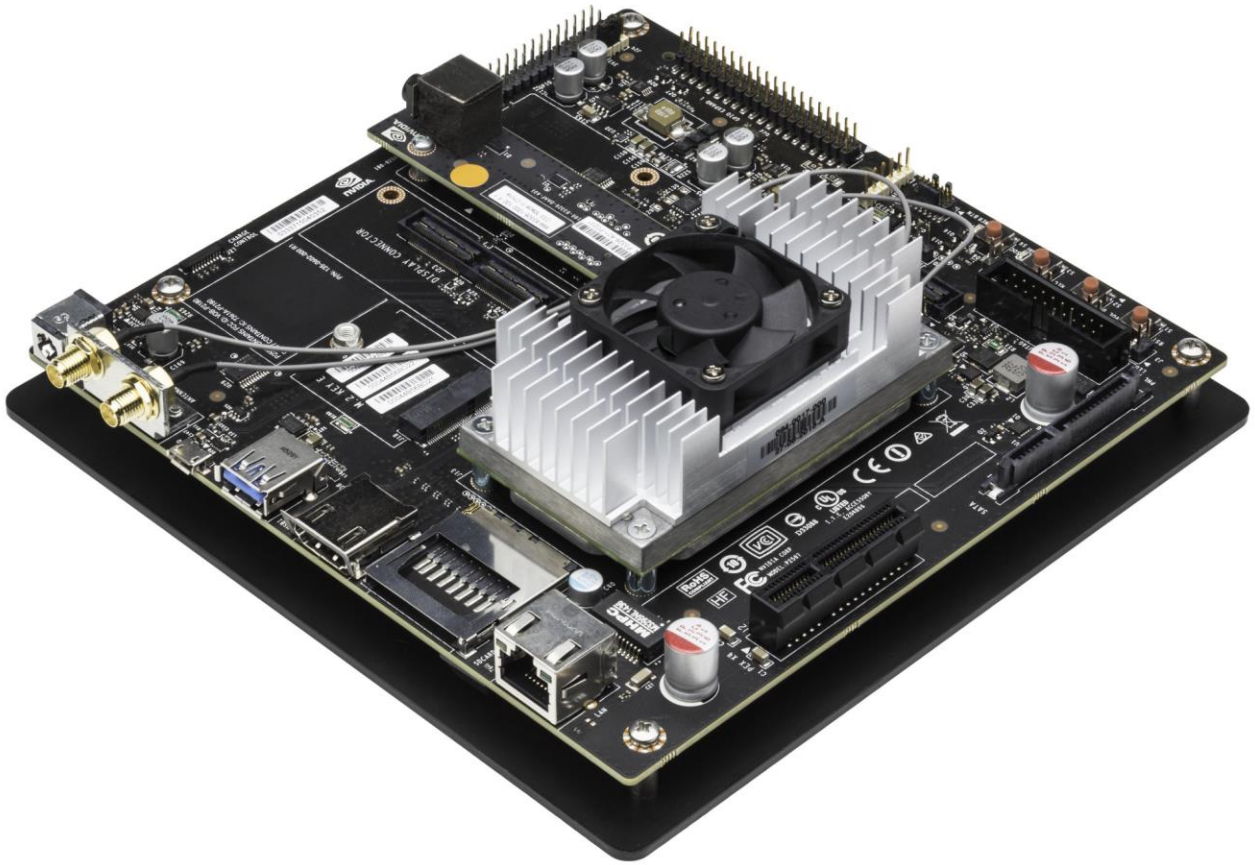
Current State – Neural Network

- Using prebuild model from TensorFlow 2 Detection Model Zoo
  - ssd_mobilenet_v2_fpnlite_640x640_coco17_tpu-8
- Pre-trained on the COCO 2017 dataset
  - Altered to fit our needs
- Started training at 10000 epochs
  - 8500 – ideal
- mAP (mean average precision)
  - 58%



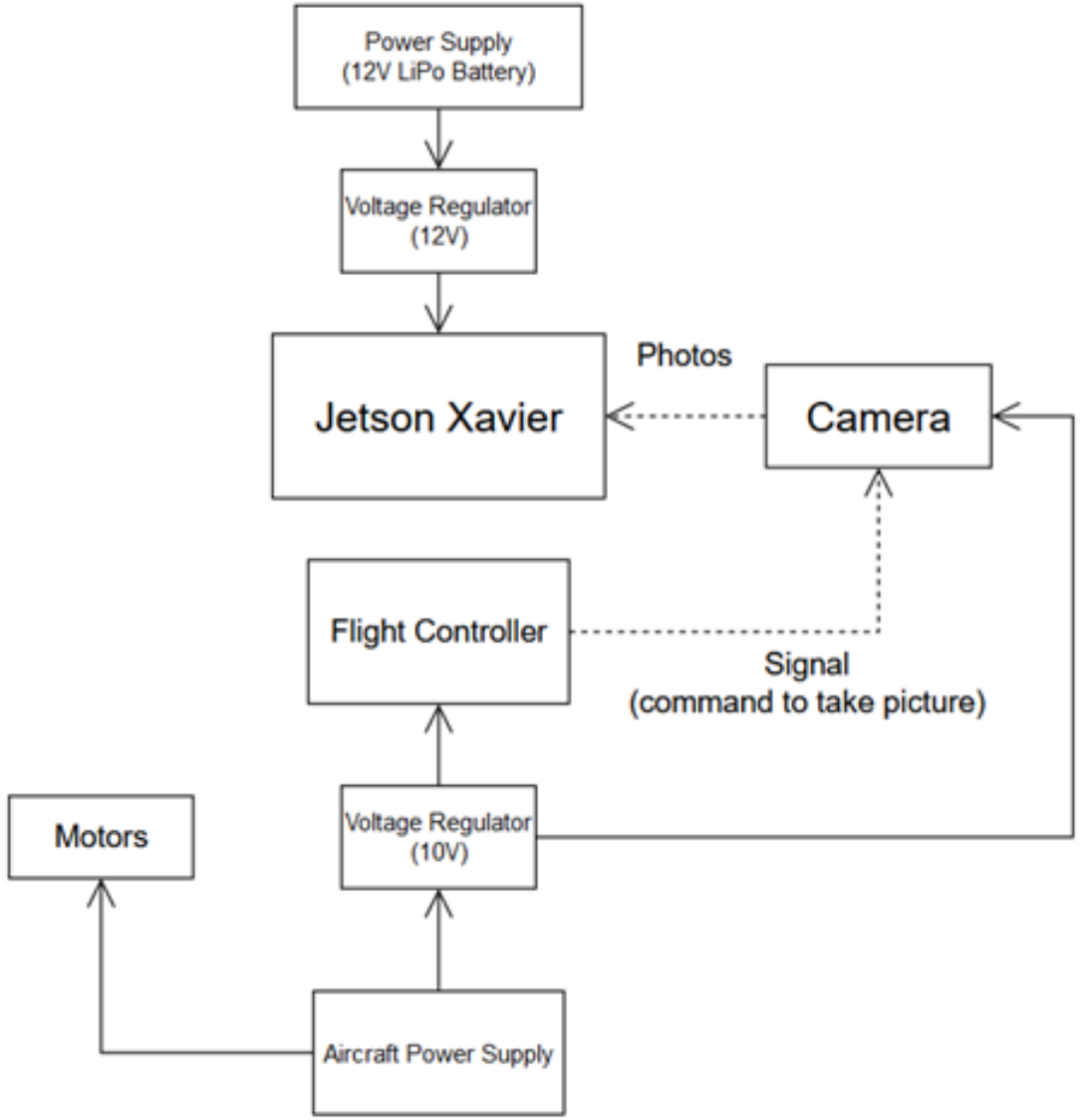
Current State of Deploying NN

- The test environment (Jetson nano) has:
  - All dependencies installed
  - Most Recently trained NN chkpt
  - Code to test images
- Current Issues:
  - Crashing

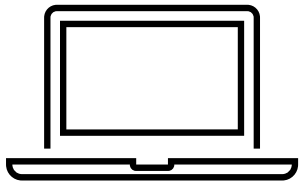


Sub System Design - Hardware

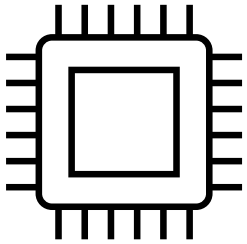
- No longer relies on aircraft power supply
- Flight test with new system to be conducted in near future



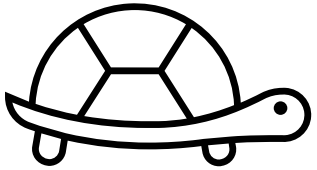
Interface / Exports



Current interface is run on Windows laptops using a virtual machine



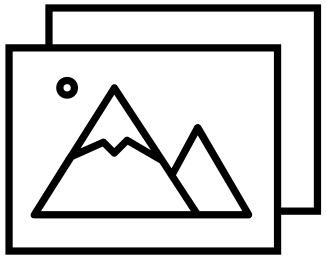
Able to run software on Jetson (dev kit)



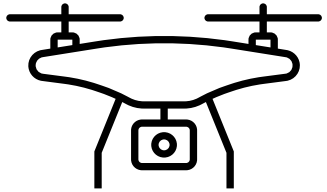
Exports modified image with overlay of detected turtle location and confidence

Lessons Learned

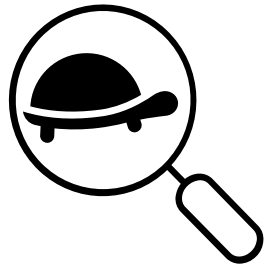
Quantity of images



Weather & Aircraft Delays

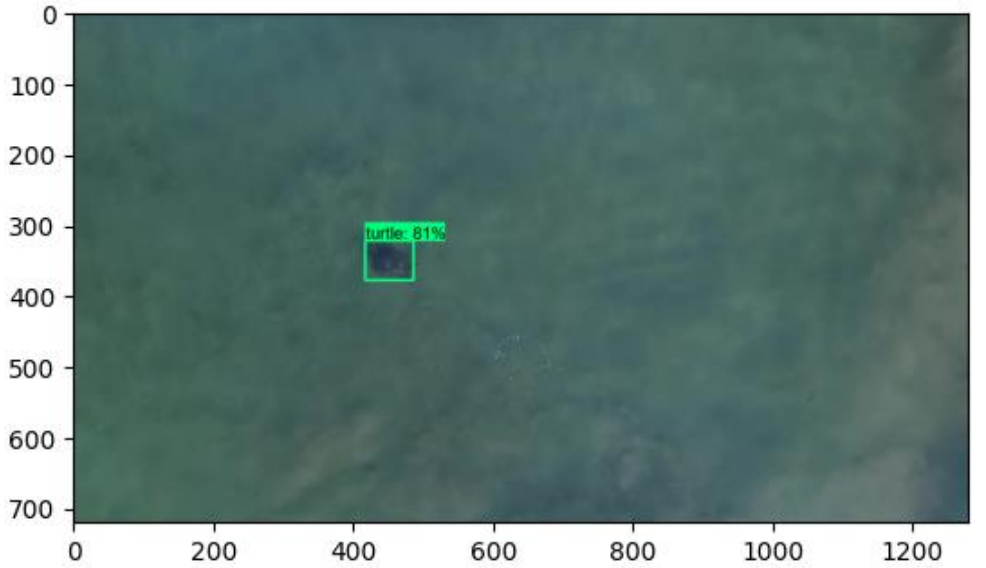


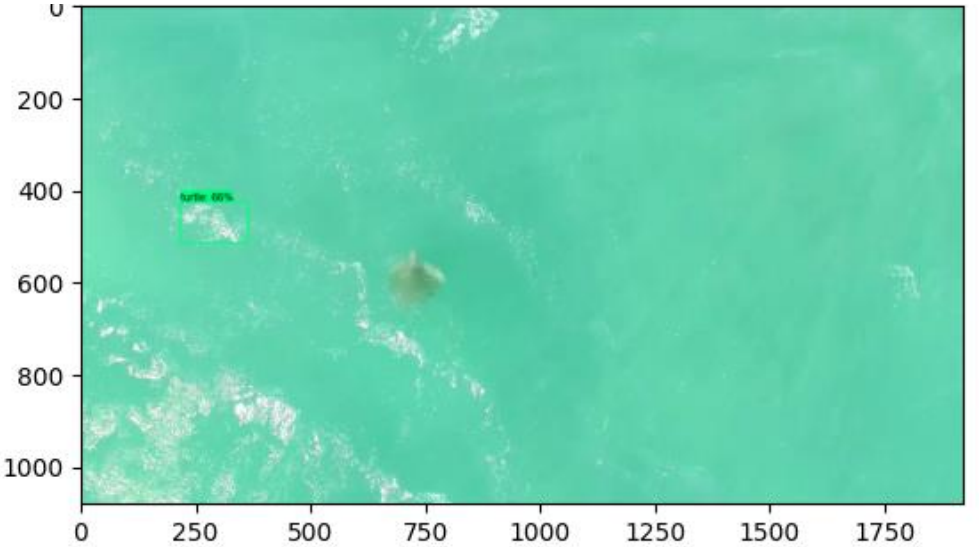
Precision



Next Steps

- Increase dataset (focus on turtle tracks)
- Image preprocessing techniques:
  - Filtering out blue color from images
    - May be using water color as a parameter
  - Rotating images to increase dataset
- Troubleshoot Jetson Nano






Questions?