Paraglider Control Software Con-Ops:

Machine Vision:

Concept: One of the inputs of parafoil control theory. Detects collapse and position of wing relative to ATV/camera.

Current State:

- 07/27: The MV software currently consists of paraglider segmentation through Hue/Saturation/Value (HSV) thresholding. The segmentation can capture the three segments of the parafoil: leading edge, body, trailing edge. The software has not been tested for high saturation values, which is expected during flight operations. Our MV software is also capable of capturing live footage directly from the ArduCam in the Nvidia Jetson Nano. A high frame rate is essential for decision making during flight and the current software is capable of achieving this by reducing the resolution of the captured live footage. There is no operational test stand yet to understand other conflicts that can arise in the software/hardware utilized for the MV project.

Goals:

- [x] ~~Procure Jetson and Camera Hardware~~
- [ ] Setting up a parafoil inflation test
    - [ ] Fix Parafoil Wing
    - [ ] Look into setting up a parfoil test stand
- [x] ~~Apply Hassan's MV software to paraglider project~~
- [ ] Include paraglider's centroid detection into MV software

Linear Actuator Control:

Concept: Response/control mechanism of parafoil

Current State:

- 07/27: Picking up where Capstone Project left off, looking to see if there is any code that could be utilized. Starting with.

Goals:

- [ ] Acquire raspberry pi for linear actuator control
    - [x] ~~Become familiar with raspberry pi to linear actuator connection~~
        - [ ] linear actuator + raspberry pi setup
    - [ ] Test move_actuator.py
- [ ] Get one side of the linear actuators moving via written code (or with move_actuator.py)

- [ ] Get the other linear actuator to mirror each other's movements
    - [ ] Get the linear actuators to move opposite to each other
- [ ]

Github-Repositories:

- Ascend: https://github.com/mcreyes14/Ascend-Software-Paraglider-Control
- Capstone Team Linear Actuator: https://github.com/alexaizq/Paraglider
- Linear Actuators Orca: https://github.com/IrisDynamics/orcaSDK?tab=readme-ov-file#setting-up-hardware-and-testing-your-motor

Jetson Nano SetUp:

- https://developer.nvidia.com/embedded/learn/get-started-jetson-orin-nano-devkit
- https://www.youtube.com/watch?v=BaRdpSXU6EM&t=787s
- Out Of The Box: https://www.youtube.com/watch?v=7-U_zGUwAPQ&t=718s
- https://dronebotworkshop.com/jetson-orin-nano/
  -https://www.jetson-ai-lab.com/initial_setup_jon.html#2-boot-with-jetpack-513-sd-card-to-schedule-firmware-update
- https://developer.nvidia.com/embedded/jetpack-sdk-513

Image CSI CODE

- **(Vid How to Use openCV with CSI Camera)**
- **(Git hub for openCV with CSI Camera code)**
- **(openCV Libraries - Jetson Zoo)**

MV Paraglider Collapse Detection

- Development of a Paraglide Control System for Automatic Pitch Stabilization to Increase the Passive Safety (**LINK**)
- Possible Tracking Algorithms for Paraglider Collapse Detection (**Kalman Filtering**) (**Intro to Kalman**)
- Read model of

https://github.com/JetsonHacksNano/CSI-Camera