RED Delivery System
(Recovery and Deployment System)

Team Members:
Andrea Swanson - aswanson2016@my.fit.edu
Marley Scott - mscott2016@my.fit.edu
Miguel Colmenares - mcolmenares2017@my.fit.edu
Basilio Caruso - bcaruso2016@my.fit.edu
Murtaza Fatakdawala - mfatakdawala2016@my.fit.edu
Akshata Patil - apatil2016@my.fit.edu
Syed Faique Al Hussain - salhussain2016@my.fit.edu
George Chen - gchen2016@my.fit.edu
Michael Heath - mheath2017@my.fit.edu
Nishant Sriram Narayanan - nnarayanan2016@my.fit.edu
Joao Nene - jnene2016@my.fit.edu

Faculty Advisor:
Siddhartha (Sid) Bhattacharyya sbhattacharyya@fit.edu

Client:
Markus Wilde - mwilde@fit.edu

Milestone Project Matrix:

Task	Completion %	Andrea	Miguel	Marley	To do
Select Object Detection Tool	100%	33%	33%	33%	none
Select Object Detection Hardware	100%	33%	33%	33%	none
Select Object Detection Algorithm	100%	33%	33%	33%	none

Faculty Sponsor Meetings:
Mondays at 11:00am

Client Meetings:
Friday's at 4:00 pm

Discussion (Tasks):

- **Select Object Detection Tool: B**ased on the sample detection programs run for multiple tools, it was decided that Tensor flow was the most applicable to the object detection goals for our system.
- **Select Object Detection Hardware:** In order to optimize the object detection of the object detection, we decided a stereo vision camera compatible with raspberry pi was best for the requirements of our project so that depth and distance can be determined. The object that will be detected will be the docking mechanism itself, that lies below the mothership. It will be painted a color that will not otherwise be found in the sky (likely red). There will be a secondary 2-D pattern of recognition on the precise area of that docking mechanism so that the drone will move into the correct portion of the docking mechanism.
- **Select Object Detection Algorithm:** The decision to use TensorFlow was largely based on the ability of the TensorFlow API's ability to customize object detection. We have decided to utilize the API to train our custom data, which will use the TensorFlow object detection software to detect the images.

Discussion (Contributions):

- **Select Object Detection Tool:** Marley and Andrea cloned the repositories for multiple object detection tools to use the samples in order to gauge which tool aligned most with our goals of detection. The decision was made as a group.
- **Select Object Detection Hardware:** Marley and Andrea researched successful projects that used TensorFlow with object detection in a dynamic environment. The decision was made as a group.
- **Select Object Detection Algorithm:** Marley and Andrea attempted to create the training data files by uploading images of a sample object from a variation of 10 degree angles. These photos were then uploaded and trained by using the TensorFlow API. Due to limitations in the team's expertise in object detection, it was decided that it was the most reliable to use the algorithms provided by the TensorFlow API to avoid conflict with the data.

Plan for the next milestone:

Task	Andrea	Miguel	Marley
Create and train custom TensorFlow modules for the docking mechanism	Put the training files onto the Raspberry Pi	Testing	Take and upload photos of object from all angles and train the module on the computer
Integrate the completed object detection system into the PreciseDocking state	Implement code in the state machine to correct flight path based on object detection	Testing	Determine the best flight commands for the correction of the flight path

Discussion (Milestone 5):

- **Object Detection:** Integrate object detection into the system to execute during the precise docking phase of the mission.
- **Autonomous Docking:** Provide a demonstration to display the drone's ability to use the integrated system to find the pattern and correct its flight path to reach the docking position. The demonstration will also show that once the docking position is reached, the drone will rise into the docking mechanism, which will guide it into a latch for successful docking.

Feedback from Faculty Sponsor on each task for the current Milestone:

- **Select Object Detection Tool:**

- **Select Object Detection Hardware:**

- **Select Object Detection Algorithm:**

Faculty Sponsor Signature: _____ Date: _____

Faculty Sponsor Evaluation

Faculty Sponsor: detach and return this page to Dr. Chan (HC 322)

Score (0-10) for each member: circle a score (or circle two adjacent scores for .25 or write down a real number between 0 and 10)

NOTE: Although the three students are considered to be computer science additions to the group, Andrea is the only student listed as a student enrolled in Dr. Chan's class.

Andrea Swanson	0	1	2	3	4	5	5.5	6	6.5	7	7.5	8	8.5	9	9.5	10
Miguel Colmenares	0	1	2	3	4	5	5.5	6	6.5	7	7.5	8	8.5	9	9.5	10
Marley Scott	0	1	2	3	4	5	5.5	6	6.5	7	7.5	8	8.5	9	9.5	10

Faculty Sponsor Signature: _____ Date: _____