Requirements Definition Ideas - Justin

**Requirement Classifications**

1. **Generic Statement:** The Aircraft Design Team and project program managers want a mounted zoom camera that is located near the middle of the vehicle to minimize reduction in structural/flight performance of the aircraft. It should be able to continuously capture video footage of the AOI during the Search phase of motion.
2. **Subjective Technical Requirements**

* Camera satisfies aircraft weight requirement
* Position of camera at most, marginally impacts vehicle’s center of gravity
* Camera should have capabilities of capturing video feed with acceptable resolution from cruise altitude
* Video feed output should be of an acceptable file format (likely .mov) that can be interpreted by image processing software (likely OpenCV)
* Camera should be designed with two or more output ports (likely micro USB) for transmitting video feed to video transmitters in Ground Control and to OpenCV software in Raspberry Pi

1. **Quantitative Requirements**

* Quantitative weight range?? (Communicate with Aircraft Design Team)
* Quantifiable restrictions to in-flight mounted position of camera and location of aircraft’s center of gravity?
* Operating range of altitude for camera to capture video feed of desirable resolution (>200 ft)?

1. **Generic Statement:** The Aircraft Design Team and project program managers want an automated target recognition system to be able to use the video feed to classify TOI in images captured by the camera. It is necessary for these images to be stored with their GPS locations, and transmitted to the Mission Planner software and Payload Drop Team so that the aircraft can successfully navigate to affected areas and drop ADP during the Surveillance phase of motion.
2. **Subjective Technical Requirements**

* Automated target recognition system (likely OpenCV) should be designed to read in video data of format output by mounted zoom camera (.mov)
* The ATR system should be able to read input from GPS module to tag images with their associated GPS locations
* ATR system should be able to extract individual image frames from continuous video files and temporarily store images in a job queue (database) to await processing
* ATR system should be able to pull from job queue to process each image individually
* ATR system should be loaded onto an in-flight mounted co-processor (Raspberry Pi) to optimize transmission of information from camera through to the algorithm used by Payload Drop Team according to time
* What file formats should the GPS coordinates and generated map be stored in?

1. **Quantitative Requirements**

* Need information on what the image processing algorithms will look like. How much local memory they will consume when executed, and limitations associated with having image processing algorithms and algorithms for generating map and for use by Payload Drop Team on same co-processor
* Are there restrictions to the memory of the CPU on the Raspberry Pi?
* Can we quantify the size in which each video file should be broken down into image frames and what the processing rate of these images should be?
* Can we quantify the physical dimensions of the Raspberry Pi, GPS module, and desirable distances between Raspberry Pi - GPS module, Pixhawk Autopilot-GPS module, and Raspberry Pi - Pixhawk Autopilot?

**Design Compromise Schematic**





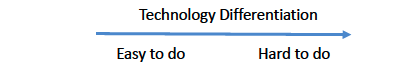


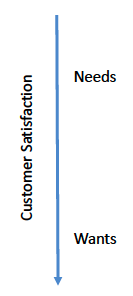






**Decision Matrix**





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**Product Engineering Specification Request**