IPRO 312: Unmanned Aerial Systems
towards an autonomous future

Mid Term Presentation

12th October, 2010

Why a UAS?

Primary Functions:

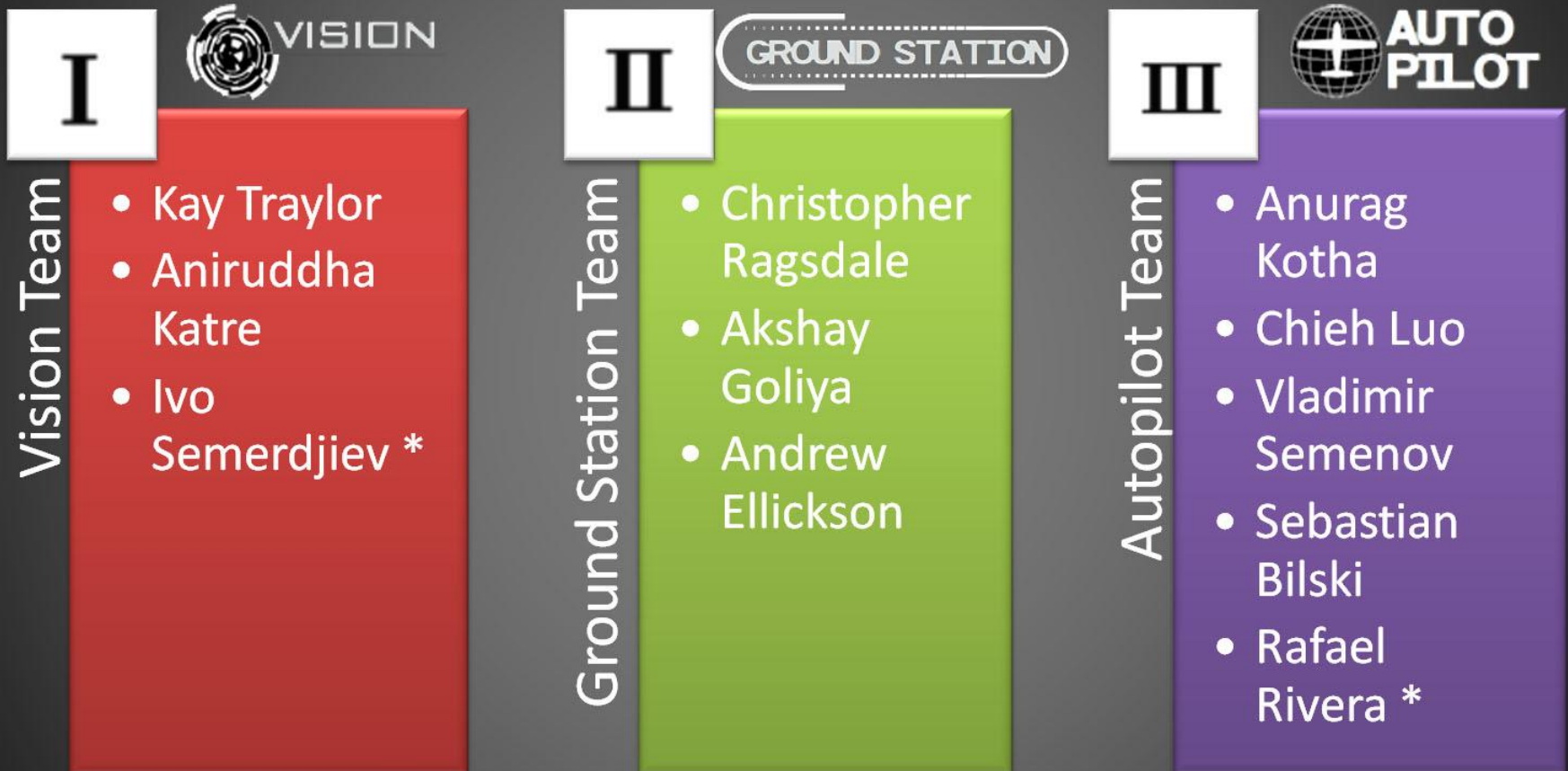- Long Duration Flights
- Repetitive Tasks
- Hazardous Conditions

Interested Organizations:

- Government Organizations
- Agriculture and City Planning
- Disaster Relief Efforts
- Aerial Cartography and Photography

Statement of Problem

- The goal of this IPRO is to develop an unmanned aircraft system that can recognize and track defined objects in real time.

- This system will consist of:

    - **Ground Station**

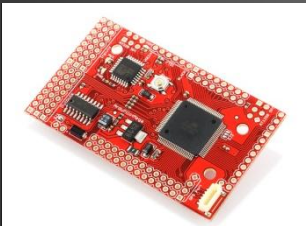   - **Aircraft**

    - **Image Processing**

Team Structure

Vision Team

I VISION

- Kay Traylor
- Aniruddha Katre
- Ivo Semerdjiev *

Ground Station Team

II GROUND STATION

- Christopher Ragsdale
- Akshay Goliya
- Andrew Ellickson

Autopilot Team

III AUTO PILOT

- Anurag Kotha
- Chieh Luo
- Vladimir Semenov
- Sebastian Bilski
- Rafael Rivera *

* Legal Team – Investigating legal implications and guidelines

Unmanned Aerial Vehicle
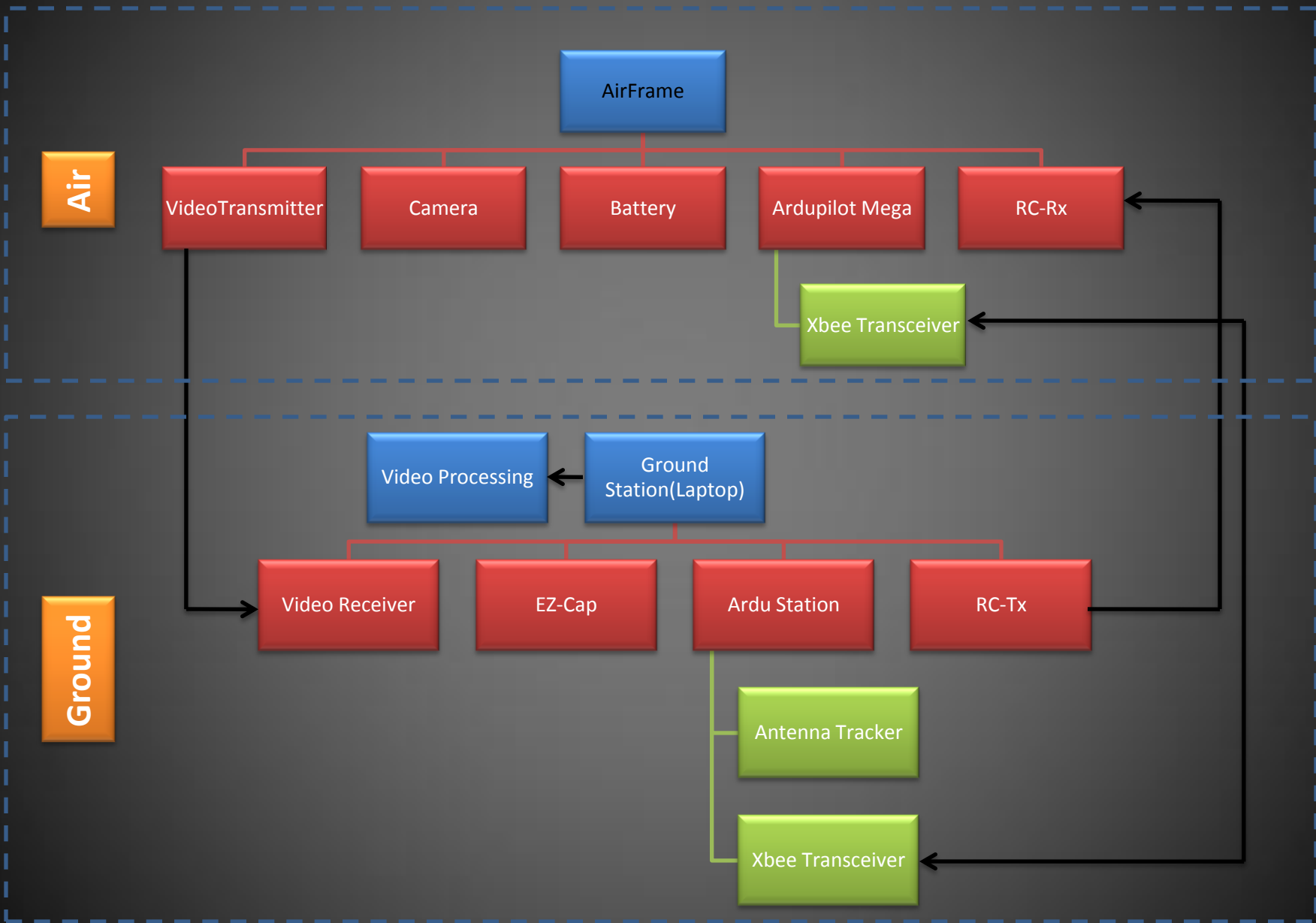
Auto Pilot Program

RC Plane

Image Processing

Goals

- Autopilot
  - Learn autopilot code and tune to aircraft dyanmics
  - Assemble electronics and control hardware
  - Sensor integration and verification
- Vision
  - Learn face detect code, haartraining cascade, create positive and negative sample images
  - Use sample images to train face detect code to detect defined targets instead of faces
  - Find camera with optimal resolution that can more effectively detect and track targets
- Ground Station
  - Create an information hub for unmanned aerial system
  - Maximize range of receivers and transmitters
  - Develop a graphical user interface for all UAS relevant information

Progress so far…

- Autopilot
  - Assembled ArduPilot, IMU shield, and Xbee adapters
  - Began integrating sensors into autopilot software
  - Assembling an EasyStar aircraft for system testing
  - Airframe is built
- Ground Station
  - Creating a user friendly interface for all flight information
  - Developing Antenna tracking system for constant signal acquisition
- Image processing software & test image targets
  - Creating sample images for the program and practice targets for practice video
  - Face detect program is working; it will be altered to detect targets, still need to train

Major challenges

- Selecting and ordering equipment/delays
  - Development platform, camera, antenna etc.
- New technologies to learn
  - Image Processing Code, autopilot software
- Systems Integration
  - Need to combine vision system and autopilot system into ground station and aircraft

Thank You

Questions?