AUVSI DESIGN COMPETITION

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Competition Overview

"The goal of this project is to design and build a fully autonomous aerial vehicle to compete in the AUVSI competition in the summer of 2015."

AUVSI- Association of Unmanned Aerial Vehicle System International

- Host an Annual competition for Unmanned Aerial Vehicles
- Stimulate interest in Drones

Competition is broken into separate parts:

- Two Primary Objectives (60%)
- Nine Secondary Objectives (40%)

Design Options - Fixed Wing

Design Option Includes:

1. Retrofit last year's model

Benefits for competition:

- Longer flight duration
- Greater velocity
- Increased payload

Design Options - Multi-Rotor

Design Options Include:

1. Build multi-rotor vehicle
2. Purchase a pre-built quad copter

Benefits for Competition:

- Agile
- Hovering Ability
- Take off and landing

Results of Design Options

Component	Importance	Retrofit Fixed	Build Mulit-Rotor	Buy Multi-Rotor
Cost	10	9	5	3
Build Time	10	9	3	6
Weight	4	6	5	5
Duribility	4	4	7	7
Troubleshooting	7	3	6	6
Tech. Development	10	6	10	5
Fondation for Future	5	3	7	7
Stability	3	5	8	8
Payload	5	8	5	5
Flight Duration	8	7	5	5
Velocity	6	7	5	5
Automation Feasibility	8	8	7	7
Airdrop	4	5	8	8
Agility	4	5	8	8
	Total Score	566	521	481

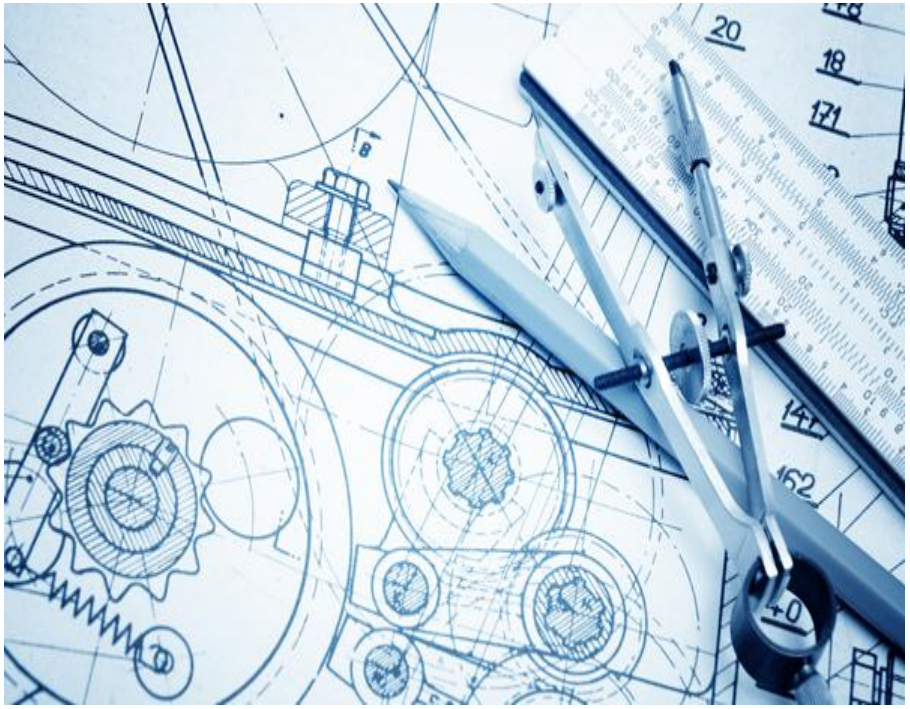
- Design matrix assisted in the decision making
- A multi-rotor aircraft will be used based on:
  1. Performance benefits
  2. Technical Development
  3. Foundation for the future

Secondary Objectives

Secondary Objectives	Importance	Cost	Difficulty	Time	Total
Autonomous Target Localizion	8	8	6	8	**176**
Actionable Intelligence	4	4	3	3	40
EO/IR Target Detection	4	1	3	3	28
Off-axis Target Detection	4	8	8	7	**92**
Emergent Target Detection	4	8	8	7	**92**
Radio Freq. Upload/Download	4	2	3	4	36
Air Drop	2	6	8	7	**42**
Network Interoperability	2	5	2	3	20
Sense, Detect, and Avoid Tasks	4	5	2	3	40

Ideal Prototype

- Lightweight and aerodynamic to increase efficiency
- Flight Control
- Static and Dynamically Stable
- Cost effective
- Meets Competition Requirements
  - Weight
  - Temperature
  - Altitude



Quadcopter Design

1. Quadcopter
   - Fewer motors to control
   - More power output to individual motor
   - Easy to fly
   - Light weight
   - Cost efficient
2. Custom Quadcopter
   - Easily reproduced
   - Customizable to needs

Hexacopter Design

1. Hexacopter
    - More stability but higher power consumption
    - Can support larger payload than quad-copter
    - Higher resistance to wind
    - Less strain applied to each motor
2. Custom Hexacopter
    - Easier to modify to our needs
    - Made to be easily reproduced

Constraints and Contingency Plan

Constraints

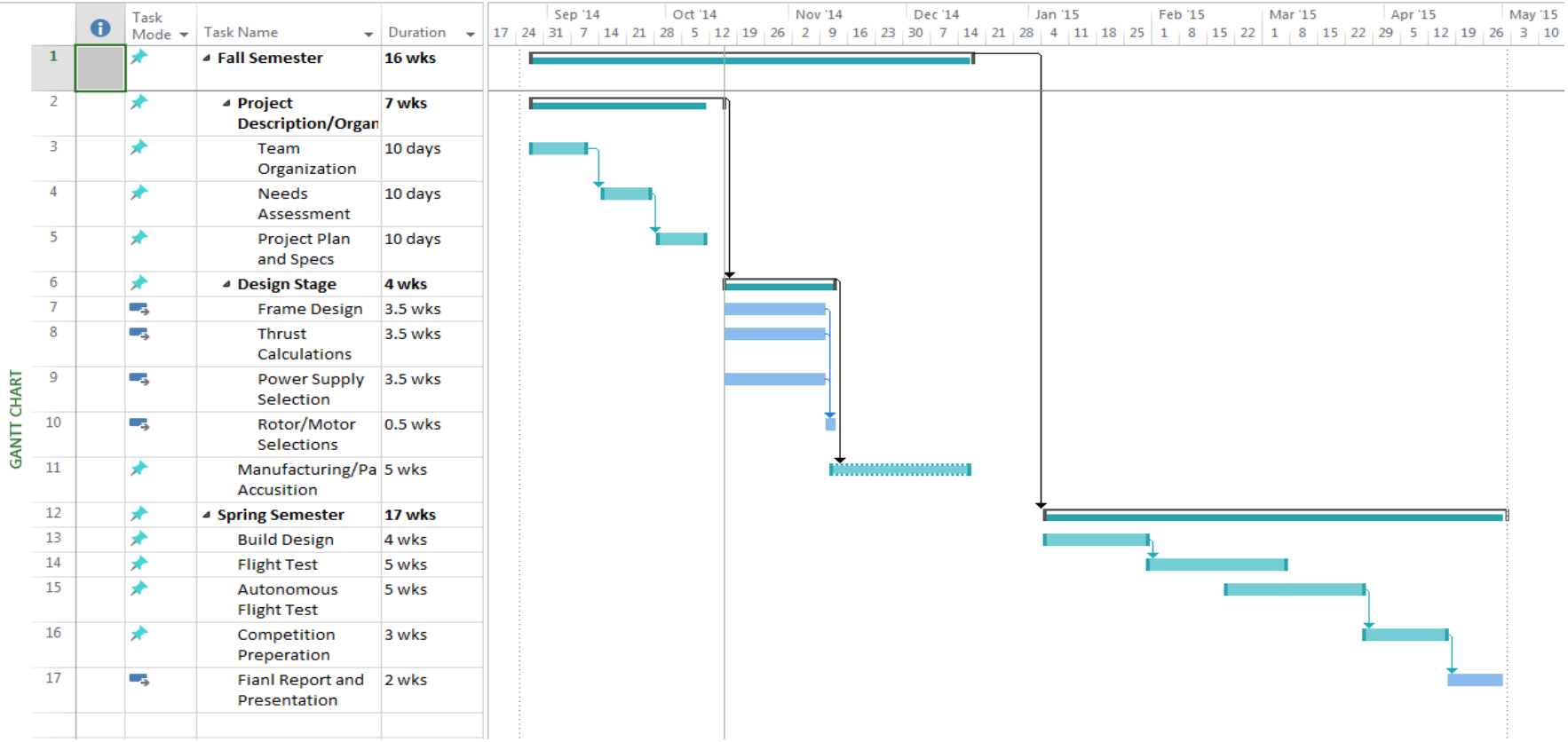
1. Physical
   - Weight
   - Power consumption
   - Flight Time

2. Real World
   - Time
   - Budget

Contingency Plan

1. Last team's fixed wing plane
   - Communication, character recognition, airdrop, and navigation systems similar
   - Autonomous flight control will be different

Schedule/Gantt Chart



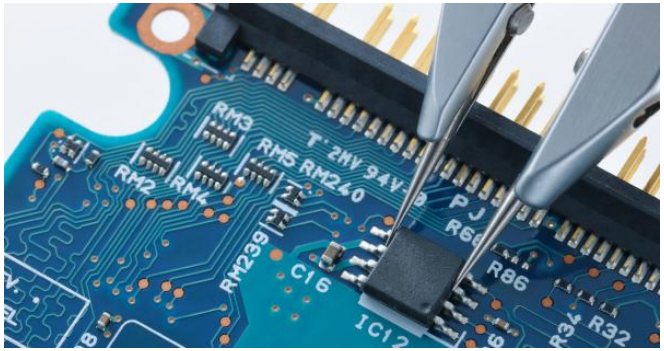
Group Number: 8

Will Di Scipio

Future Work

Mechanical:

- Thrust Calculations
- Design of vehicle
- Parts acquisition
- Fabrication



Electrical:

- Electrical power calculations
- Autopilot selection/programming
- Microcontroller selection/programming
- Character recognition programming

Final Summary

1. Decided on multi-rotor design
2. Calculations needed to complete design
3. Begin acquiring parts
4. Meet all deadlines for competition
5. Defined a contingency plan

References

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ANY
QUESTIONS
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