Team 518: Drone Disabling Device

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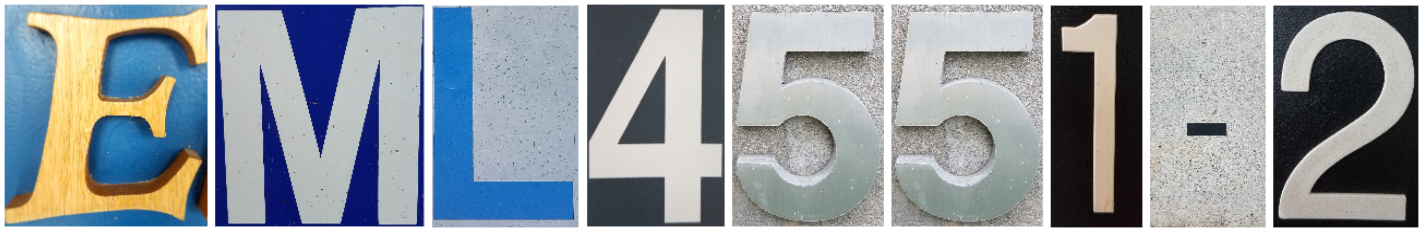
Team 518



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Team 518

2019

Abstract

Disclaimer

Acknowledgement

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Chapter One: EML 4551C

1.1 Project Scope

The objective of this project is to design a device that is used to protect and secure airspace from unmanned flight vehicles. The major key goals are to detect, neutralize, and secure the unmanned flight vehicle. This project is a continuation of work from a previous team and is tasked with decreasing the form factor, adding a detection system, and improving the functionality. The primary market for this product will be government and military operatives, with the secondary market being contractors, private security, and defense companies.

The device is assumed to be primarily used in defense and security operations. It is not intended for civilian use, but to neutralize civilian unmanned aircraft (specifically drones). These aircraft can pose threats to the safety of attendees at major public events or important private gatherings. The design will be focused on increasing device portability and the addition of a detection system. Portability will allow the user to move more freely and adjust to frantic drone movements. The current device is bulky, cannon like, cannot be easily transported, and has a long assembly time. The detection system addition will give the device a slight autonomous feel while still being manually operated. Assembly and integration of the device into security tactics before an event takes place are needed to optimize the device's overall presence.

The stakeholders for this project include Tameika Hollis of Northrop Grumman, Shayne McConomy, and Jonathan Clark of the FAMU-FSU College of Engineering.

1.2 Customer Needs

The sponsor of this project is the executive director of Northrop Grumman Mission Systems, Tameika Hollis. Due to the difficulty of schedule matching to initially meet with Tameika, more specific details and assistance was received from Stan Zoubek, who is the Chief Engineer at Northrop Grumman for E-2X Advanced Technology. The following questions were initially asked to address the needs of the Drone Disabling Device project:

What is the size and type of drone to be neutralized?

Recreational drones that could be carrying IEDs or have cameras.

How long does this device need to be operable for?

The device should be operable for the time necessary until the user powers it off.

What is the outcome of the neutralized drone?

We are looking to just neutralize the drone given the time constraints, but if possible, recover the drone if it is not destroyed completely.

Is the device expected to be autonomous?

No, due to time constraints it will most likely not be possible; but ideally that is what we would want.

Is there a specific range that the device must function within?

100 yards in radius, 100 feet altitude. Constraints may need to be adjusted due to not being possible to meet.

Does this device need to be portable?

Yes, must be able to assemble the device within 4 hours.

What is the purpose of Northrop Grumman sponsoring this project?

To aid-to-hire and give students an understanding of the learning process. Northrop Grumman is not looking for a proof of concept to scale.

After analyzing these questions, it was determined that the original needs of the project were to disable non-military, recreational drones; have a device operable for as long as possible; being able to at least disable the drone (recovering the disabled drone would exceed customer expectations); have a user-operated device; operate the device at the maximum range possible; design the device to be portable and quick to set up (within 4 hours); and to focus on the project development process rather than the product.

Many of these needs were addressed by last year's Drone Disabling Device project team, but our team was instructed to make the device smaller (preferably close to the size of a paintball

gun) with improved functionality such as: improved drone detection, quicker target acquisition, and quicker assembly and disassembly time, and delivering a product that is sleek in design.

1.2 Functional Decomposition

The objective is to secure air space from civilian drones, and these was separated into the following functions:

- Assembling and disassembling the device
- Locating the drone
- Neutralizing and securing the drone

The sub-functions can be seen in Appendix B in the functional decomposition.

1.4 Target Summary

1.5 Concept Generation

Concept 1.

Concept 2.

Concept 3.

Concept 4.

Concept n+1.

1.6 Concept Selection

1.8 Spring Project Plan

Chapter Two: EML 4552C

2.1 Spring Plan

Project Plan

Build Plan

Appendices

Appendix A: Code of Conduct

Mission Statement

The Drone Disabling Device project team, Team 518, is committed to ensure an environment where members can work professionally and are respectful towards their peers. Within this work environment, every member is responsible for putting in 100% effort in every task that they perform. Each member of this team will contribute, with a positive attitude, towards the creation and maintenance of such an environment in order to bring out the best in all of us; as well as maintain the standards of this project.

Team Roles

Project Manager - Trevor Stade

The Project Manager is required to set meetings with sponsors and advisors. Expected to present in all presentations. Review and signs off on all assignments before submission.

Sensor Interface Engineer - Quentin Lewis

The Sensor Interface Engineer is tasked with developing the sensing system used to automatically detect and target a drone.

Design Engineer - Dylan Macaulay

The Design Engineer is tasked with the work of 3D CAD modeling. He is expected to complete extensive research on similar products in order to fully satisfy team ideas with the modeling of

the device. The Design Engineer also helps to improve current products efficiency and overall performance.

Test Engineer - Ryan Cziko

The Test Engineer is required to establish a testing environment in which several scenarios are implemented different scenarios in order to test every aspect of the device and to determine any errors and change design test plans accordingly.

Systems Integration Engineer - Taylor Stamm

The Systems Integration Engineer is tasked with integrating mechanical and electrical systems together and ensuring that the electrical components are supplied with correct and safe power according to system specifications.

Though roles are assigned, each member is not confined to his said role. Advice and input are welcome, and each member is seen as an equal. Members are encouraged to take on sub-roles to increase team efficiency. Sub-roles can be webmaster, finance manager, bookkeeper, etc. Sub-roles will become apparent throughout the project.

Communication

Team members will stay in close contact with each other through text messaging and email. Any reason for being late or absent from team events or meetings should be communicated in

advance (24-hour notice) to other team members so that the team has ample time to account for the absence of a member.

Dress Code

There is no required dress code for team meetings. Sponsor meetings require a business casual dress code, but this may be subject to change if deemed suitable by the group. During group presentations, a strict business formal dress code will be enforced.

Attendance Policy

Team meetings have been scheduled every Sunday from 11:00 AM to 2:00 PM. An extra meeting will be scheduled during the week if needed. Meeting times may be shortened or extended. A 24-hour notice is required if a member cannot make the scheduled meeting time. If a member is absent for a meeting and has not notified the team, they will be marked as absent for the team meeting. An attendance is taken at each meeting and is documented.

Team Building

Team members are expected, but not required, to meet recreationally twice a month to promote synergy and boost morale. Such activities will be scheduled when time is available, and each member will be notified in advance via text message.

Statement of Understanding

By signing this document, each member is in agreement with said rules, roles, and the NSPE Engineering Code of Ethics.

Name (Print)	Name (Signed)	Date
Ryan Cziko	Ryan Cziko	9/16/18
Quentin Lewis	Quentin Lewis	9/16/18
Trevor Stade	Trevor Stade	9/16/18
Taylor Stamm	Taylor Stamm	9/16/18
Dylan Macaulay	Dylan Macaulay	9/16/18

Team 518

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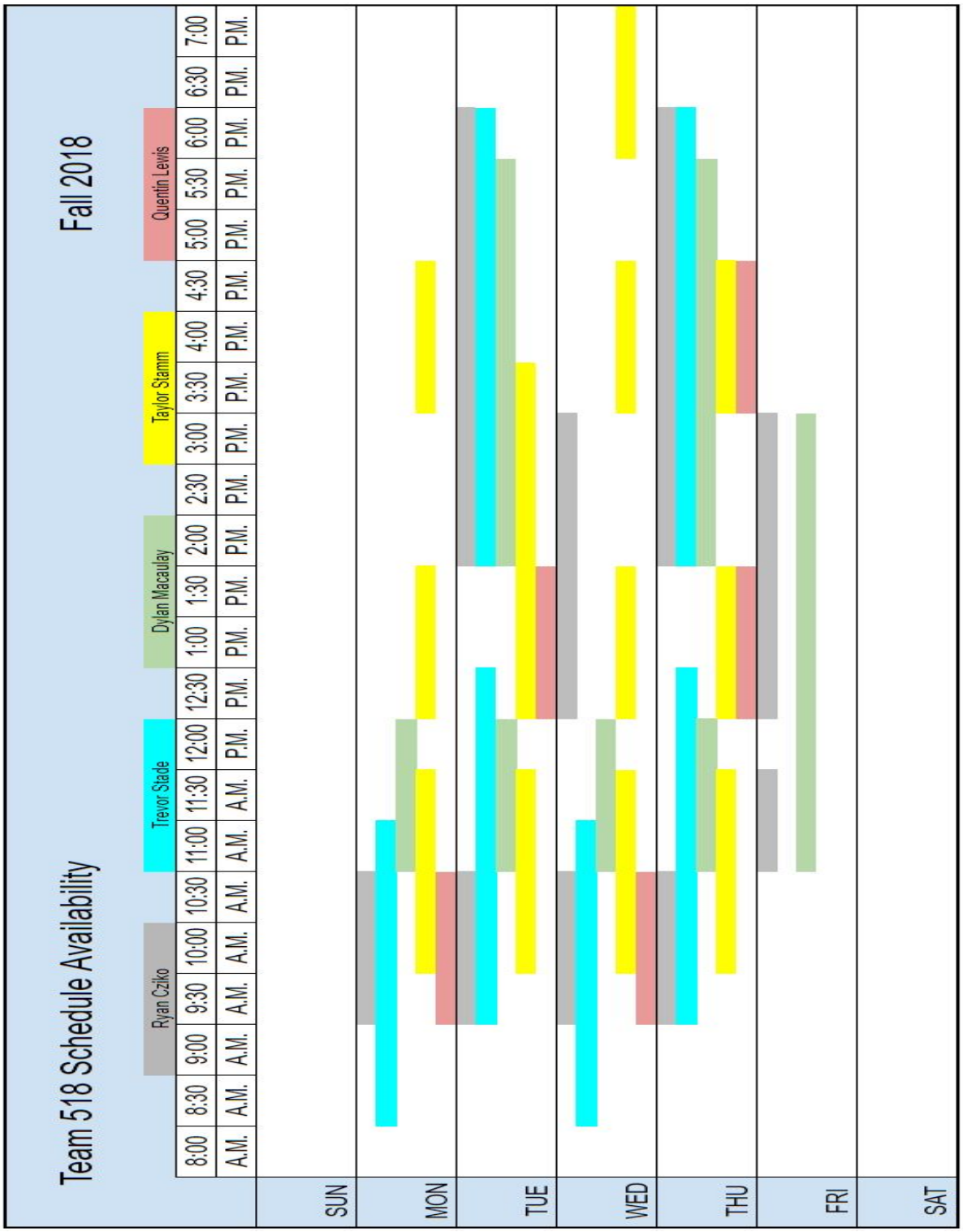
Team Availability


Team 518 Schedule Availability
Fall 2018
Ryan Cziko
Trevor Stade
Dylan Macaulay
Taylor Stamm
Quentin Lewis
8:00 A.M.
8:30 A.M.
9:00 A.M.
9:30 A.M.
10:00 A.M.
10:30 A.M.
11:00 A.M.
11:30 A.M.
12:00 P.M.
12:30 P.M.
1:00 P.M.
1:30 P.M.
2:00 P.M.
2:30 P.M.
3:00 P.M.
3:30 P.M.
4:00 P.M.
4:30 P.M.
5:00 P.M.
5:30 P.M.
6:00 P.M.
6:30 P.M.
7:00 P.M.
SUN
MON
TUE
WED
THU
FRI
SAT

*Colored Areas indicated times when the team member is unavailable

Appendix B: Functional Decomposition

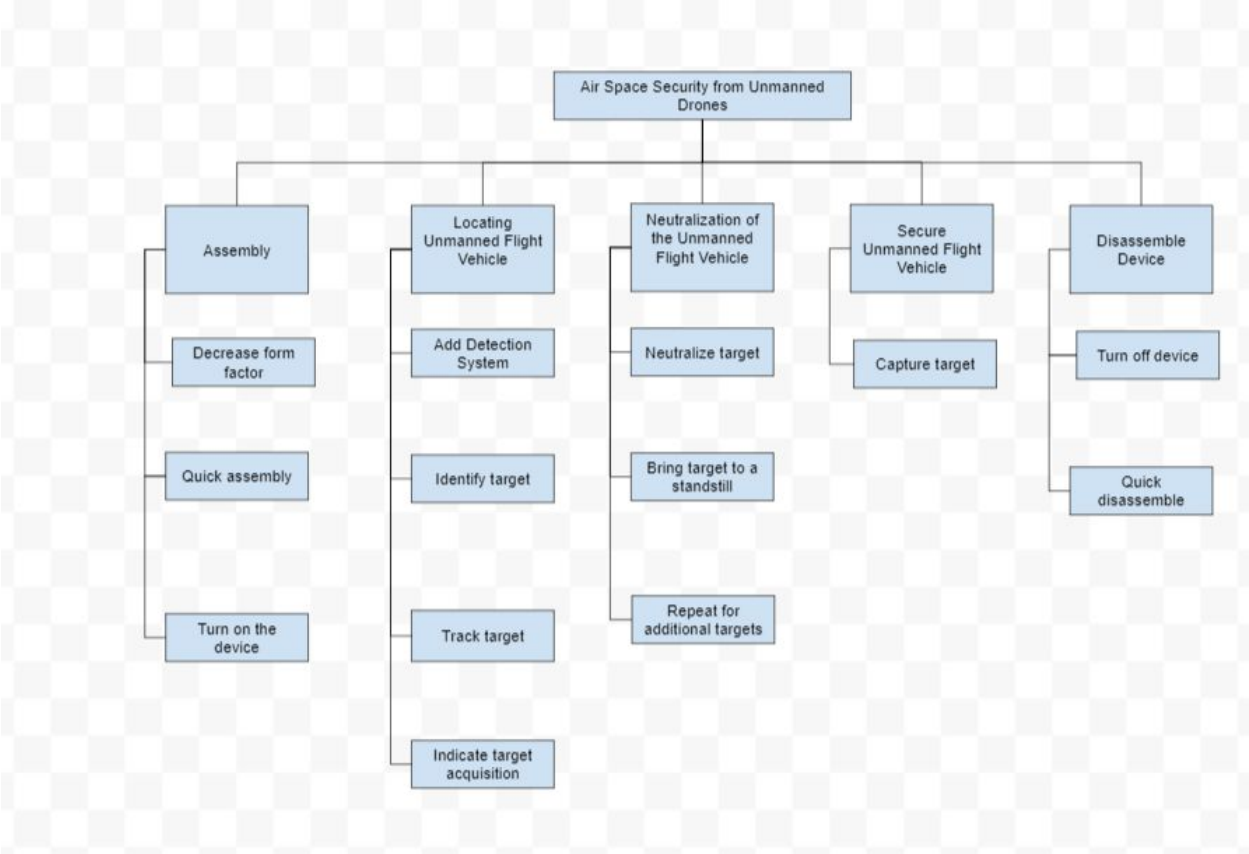


Figure B.1. –Functional Decomposition

Appendix C: Target Catalog

References