

***NORTHROP GRUMMAN***

# Drone Disabling Device Virtual Design Review 1

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Team 518



# Team Introduction



Trevor Stade

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*Project  
Manager*

*Sensor Interface  
Engineer*

Test  
Engineer

Systems  
Integration  
Engineer

Design  
Engineer

Mechanical  
Engineering

Computer  
Engineering

Mechanical  
Engineering

Electrical

Mechanical  
Engineering



## Objective



Develop a device to secure specified air space from unmanned flight vehicles. There needs to be an improvement upon functionality, size, and overall use.



# Key Goals



- Develop wider-frequency band signal jamming of the drone
- Improve speed and accuracy of drone-detecting functionality
- Reduce size of drone disabling apparatus to the size of a rifle
- Increase range of device functionality to a 50 ft dome
- Adhere to all safety, legal, and environmental regulations

# Project Background

# Previous Project



## Three-Camera Video Detection

- 360 degree field of view
- Drone visual recognition software
- Drone sound recognition

## Radio Frequency Interference

- Disrupts signal from controller to drone
- 6
- Four signal jammers
  - 2.4 GHz bandwidth interference

## Weighted Net

- Backup to RF interference
- Launches projectiles attached to net
- Manual angle control to adjust distance

# Project Scope



# Stakeholders

Tameika Hollis

- Executive at Northrop Grumman

Shayne McConomy

- Senior Design Professor; FAMU-FSU College of Engineering

Jonathan Clark

- Associate Professor; FAMU-FSU College of Engineering

Chiang Shih

- Professor and Chair of Mechanical Engineering Department; FAMU-FSU College of Engineering





# Intended Markets

- **Primary Market:**
  - Government
  - Military operatives
  - Law Enforcement
- **Secondary Market:**
  - Contractors,
  - Private security
  - Defense companies

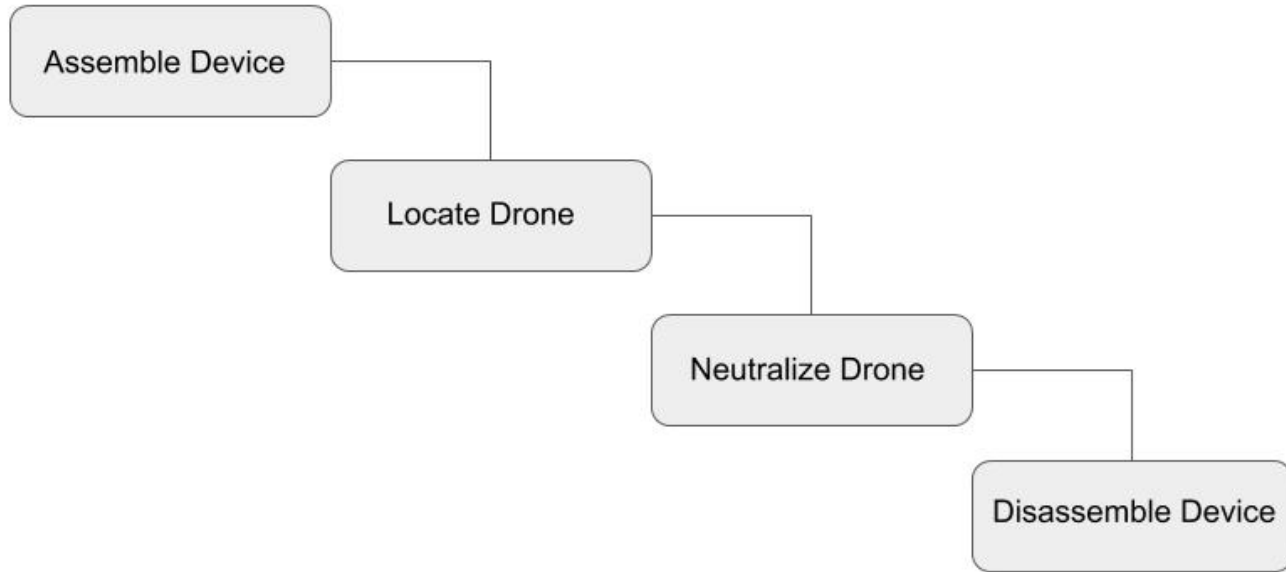


# Assumptions

- Device primarily used in defense and security operations
- Not intended for civilian use
- Intended target is unauthorized civilian drones



# Basic Device Function



# Device Operations



# Assembly and Disassembly

- Device assembly and disassembly time to be reduced substantially
- Assembly and disassembly time reduction ideas:
  - Replaceable compressed CO2 bottles instead of compressor setup
  - Handheld rifle-sized device instead of tripod setup
  - All components to be powered without need of power outlet
  - “Pickup and fire” ease-of-use functionality



# Identifying and Locating the Target

- Device needs to locate the target within a specified range.
- Device needs to distinguish between a potential target and an undesirable target
- Detection ideas:
  - Aim Assist
  - Pulse Sensor
  - Infrared
  - RF Detector
  - Combination of above methods



# Neutralizing and Capturing the Target

- Targeted drone must be neutralized
- Capturing drone is not required, but would be preferred
- Neutralization ideas:
  - Radio Frequency Jammer
  - Faraday Cage
  - Electromagnetic Pulse (E.M.P.)
- Capturing ideas:
  - Weighted Net

# Summary





# Summary

- Reduce size of capturing apparatus
  - Convert from sentry gun size to rifle size
- Increase neutralization and capture range
  - Improve from 30 ft dome to 50 ft dome
- Install wider-frequency band signal jamming
  - Enable jamming of 5GHz frequency and experiment with jamming other frequencies
- Improve drone detection functionality
  - Quicker target acquisition Account for objects of similar size and shape to drones



# References

[1] SDT13. (2018) - Senior Design Team 13 year 2018; Concept prototype of drone disabling device. [digital Image]. Retrieved from

[https://ww2.eng.famu.fsu.edu/me/senior\\_design/2018/team13/docs\\_pdfs/Design\\_Review2.pdf](https://ww2.eng.famu.fsu.edu/me/senior_design/2018/team13/docs_pdfs/Design_Review2.pdf)

[2] NA. (2018, January 23). - Mavic Air for limitless exploration. [digital Image]. Retrieved from

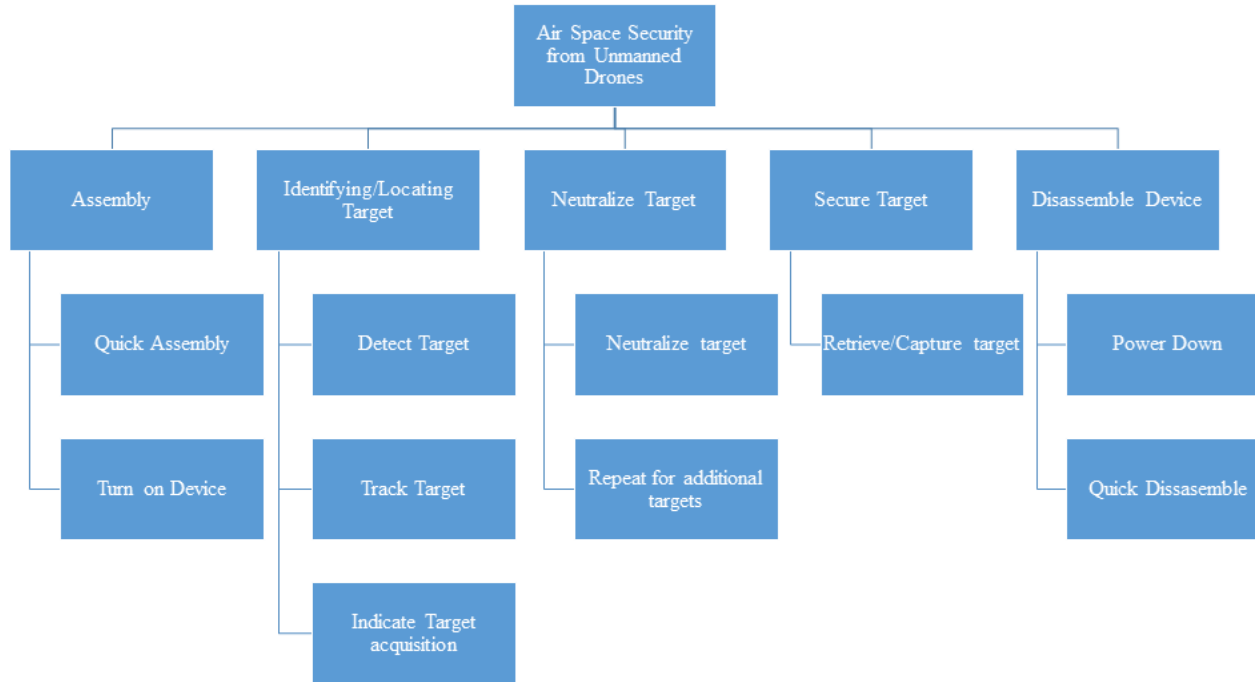
<https://forum.dji.com/thread-130833-1-1.html>

[3] <https://dronelife.com/wp-content/uploads/2016/05/ANTIDRONE-SYMBOL-232x300.jpg>



# Questions?

# Functional Decomposition





# Customer Needs

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 completely destroyed.**

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.**



# Customer Needs

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

- **100 feet 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.**

