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| **1. Name: Matthew Gilene** | **Major: Computer Science** |
| **3. White Paper Submission Number/Total Submissions: 1/3** | |

**4. Summary of Unique Seed Idea (or Seed Idea Number):**

*Warden*

The concept for my seed idea, currently name *Warden* is a drone built for surveillance designed with military and private sector security in mind. The drone would provide the capability to monitor a designated area and alert the appropriate personnel when there is a breach.

Requirements:

1. The platform shall provide live high definition (HD) video feed to the operator/control station
2. The platform shall provide live infrared (IR) video feed to the operator/control station.
3. The platform shall provide live audio feed to the operator/control station.
4. The platform shall patrol between given waypoints.
5. The platform shall recognize hostile targets.
6. The platform shall relay hostile target locations to the operator/control station.

**5. Approach:**

The platform will be built from the ground up utilizing Commercial-Off-The-Shelf (COTS) parts. This will include primarily a drone body and rotor kit, an auto-pilot flight control module, HD and IR video recording devices, and a microphone. These devices will be hooked up and controlled via a central control module that will communicate with the ground controller. The control module will relay flight telemetry and video/audio signals to the ground where it will be analyzed for possible threats and hostile targets.

Constraints:

*Technical*:

1. The platform shall adhere to all FAA Summary of Unmanned Aircraft Rules and regulations [2].
2. The platform software shall adhere to the ISO/IEC/IEEE 15288:2008 Systems and software engineering standard [3].
3. The platform software shall be developed in Python and shall adhere to the PEP 8 Style Guide for Python Code [4].

*Non-Technical*:

1. The platform shall use a Raspberry PI 3 Model B to control all non-flight control systems and peripherals [5].
2. The platform shall use only Commercial-Off-The-Shelf (COTS) components.

**6: Feasibility:**

This platform is highly feasible given enough time and resources as there are various other products like this out on the market already. The primary obstacle to the feasibility of this project is going to budget as some of the equipment can be quite expensive such as the IR camera and flight controller kits.

One similar product is *BlackHawk*by *Aptonomy*. *BlackHawk* is designed for securing your property by providing extensive surveillance coverage and autonomous threat response. *BlackHawk* provides live thermal imaging of the situation as well as providing exact GPS coordinates. It also features a powerful floodlight giving it excellent vision and image quality even at night [1].

Many of the capabilities of the *BlackHawk* are similar to those of what *Warden* is aiming to accomplish.

**7. Capabilities:**

Relevant technical skills of mine that will aid in making this project a success include experience in writing python code. Alongside knowing how to write python code, I have experience with developing code for a physical system from when I worked on a project where my team was tasked with developing an autonomous vehicle designed to traverse a track under specific guidelines and requirements. I as well have experience developing code on a team and utilizing version control systems alongside good coding practices to ensure that our work is properly developed, documented and maintained.

**8. References**

[1]"Home", *Aptonomy*, 2017. [Online]. Available: https://www.aptonomy.com/. [Accessed: 12- Sep- 2017].

[2]"Fact Sheet – Small Unmanned Aircraft Regulations (Part 107)", *Faa.gov*, 2017. [Online]. Available: https://www.faa.gov/news/fact\_sheets/news\_story.cfm?newsId=20516. [Accessed: 12- Sep- 2017].

[3]*ISO/IEC/IEEE International Standard - Systems and software engineering System life cycle processes*. IEEE, 2008.

[4]G. Rossum, B. Warsaw and N. Coghlan, "PEP 8 -- Style Guide for Python Code", *Python.org*, 2001. [Online]. Available: https://www.python.org/dev/peps/pep-0008/. [Accessed: 12- Sep- 2017].

[5]"Raspberry Pi 3 Model B - Raspberry Pi", *Raspberry Pi*, 2017. [Online]. Available: https://www.raspberrypi.org/products/raspberry-pi-3-model-b/. [Accessed: 12- Sep- 2017].