

## SUAS Report

Our team developed SUAS, Small Unmanned Aerial System, an android application designed to autonomously control a DJI Mavic Air drone. The drone will be loaded with a flight plan that must be executed accurately and safely. The drone will operate autonomously while executing the flight plan. This project was separated into three releases.

In release one, we focused on familiarizing ourselves with the environment Android Studio followed by connecting to the drone using DJI SDK. Once connected, our task was to get the drone to hover at a 4-foot height, do a 90-degree left turn, a 90-degree right turn, and land.

In release two, our team used the sensors on the drone to detect nearby obstacles. The use of these sensors allowed us to gather information about the obstacles in front of the drone such as the distance between the obstacle and the drone. Once the app connects to the drone, and the user presses the “take-off” button, the drone will fly to a hover, then it will move forward and once it detects an obstacle, the drone will land.

In release three, the drone will be able to get start and end coordinates from an external source. This uploaded JSON file will contain not only coordinates but also boundaries in which the drone is not allowed to fly past. When the user presses the “take-off” button, the drone then takes off and navigates to the final destination while avoiding obstacles in its path.

There were many challenges that we faced during the project. One of the difficulties we had to overcome was getting to know the DJI SDK on how to communicate with the drone and the application we were building, as there were not many resources that we could refer to solve our problems. As a result, we ended up coding through lots of trial and error. Every line of code written had to be tested to make sure the hardware responded correctly. Another challenge we

faced was the lack of hardware itself since our team was given a single drone. As a team, we were taking turns on taking the drone home to test our assigned portion of code which usually ends in lots of adjustments having to be made. The repetition of this process has slowed down the production of our software.

The future of this project is bright since it can potentially save many lives in the military, police force, etc.... The authorities could use this drone to autonomously go to remote locations to obtain footage and exit. The drone will be especially useful in a spot where a lot of land mines are put in place to avoid jeopardizing the lives of military personnel. Firefighters could navigate in the building that may be burning to locate anyone in the building prior to entering. The drone will use its obstacle avoidance to go around any obstacle in the path and return with footage for the authorities.