Summation Form
PEO Kingston Student Paper's Night

Name(s): Olivier Sirois Mathieu Gagnon		Title of Research: Airborne Tracking System	
University: Royal Military College of Canada		Year: 4th	Engineering Field of Research: Electrical Engineering and Computer Engineering

Aim / Objective / Scope of Research:
The aim of the project is to create an airborne tracking system to be installed on an unmanned aerial vehicle (UAV). The system will detect and calculate the location of targets in real-time using a camera and integrated navigation system (INS). The position of target is given in 3D and accounts for the relief of terrain using a pre-loaded digital elevation map. In order to make this feasible in a laboratory environment, we scaled down the environment by a factor of 150:1 to reflect the reality of a UAV flying at altitudes between 150m and 300m. We also integrated an indoor tracking system to simulate our GPS feed.

Did you conduct numerical modeling? Yes <u>No</u> If so, which software did you use?	Did you conduct a physical experiment? (i.e. laboratory testing) <u>Yes</u> No If so, comment on type of test: We built a prototype and tested it within our laboratory
Did you build a prototype? <u>Yes</u> No	**Originality. What did you create?** -We 3d-printed a model drone and installed our system on it to simulate an actual implementation. -We created a python script using open-sourced libraries that runs on a RaspberryPi equipped with a camera. -We built a power supply to autonomously power the RaspberryPi

Describe how 'practical' your research is: (i.e. is it theoretical or application based?)
An example of application would be in a search and rescue operation. A drone equipped with such system would be able to find victims and relay their positions to its vessel. Using this information, the vessel would be able to accurately send help to the victim's location and accomplish their mission in a significantly reduced amount of time.

Major Results / Findings:

Our prototype managed to be able to identify targets and relay their position with an accuracy of about 4-5 centimeters. By re-scaling our projects, we can assume that in a real scenario our system would be able to detect a victim with an accuracy of 6-7.5 meters. This would be accurate enough to send a rescue helicopter and safely assume that they will be rescued.

Major Conclusions:

We managed to accomplish all of the requirements using minimal budget and getting satisfactory results. The advantages of the system lie within its flexibility to be integrated on any kind of aerial vehicle whilst retaining its capabilities. A point to mention is also its very cheap cost to build (150$ for the prototype). It would not be expensive to equip a fleet of UAV with such systems, and with optimized pathing, these UAVs would be able to scan a significantly increased amount of terrain with minimal cost. Thus adding several layers of depth to its applications.