Obstacle Detection Using Monocular Camera for Low Flying Unmanned Aerial Vehicle

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Thesis Defence Revisions

M.A.Sc. in Electrical and Computer Engineering

January 05, 2015

Prof. Miodrag Bolic

- Your background review states that the slam algorithm for obstacle detection was used for simulation results why didn't you compare these simulations to your work
- How do you qualify your work as one of the first
- Regarding obstacle detection, the UAV is above the obstacles. It looks like the primary goal is observing landmarks as opposed to obstacle detection (Answer the way to detect them is the same). Is the title correct?
- How did you determine the landmarks?
- How does the algorithm behave when it misses some of edges due to light conditions?
- In the beginning of Chapter 6, page 52, error caused by slam algorithm due to non-linearity but this is not shown in the algorithm
- One other source of error is that the model can be improved
- Regarding the results, is there a way to summarize the results? In some graphs you have a very large number of graphs. Could you give, for example the mean square of the error? This will help quantify the results through a table or a summary
- Page 48; is this the real terrain map? Why aren't they matching? What is an acceptable error in this application?
- Why didn't you use map joining from the beginning?
- Did you consider particle filtering as opposed to Kalman filtering?

Prof. Mohamed El-Tanany

- When you talk about the implementation, you elected to use Python as opposed to matlab; why? Does it offer you advantages in terms of processing speed?
- What was your ultimate objective?
- It will be good to mention the real-time requirements of your algorithm

- Monocular vs binocular. A lot of pixels in the image are not relevant. Is the use of a camera the most appropriate for obstacle detection (compared to sonar, …)
- Impact of landmark shape and distribution
- Given your experimental setup, it looks like the kind of resolution that you are looking for is quite high whereas the ground truth data is only 100 meters
- You noticed some discrepancies with the slam algorithm so you used simulation to investigate specific error source. How did you model the errors and run the SW long enough to assess its impact

Prof. Paul Straznicky

- You mentioned several times the oscillation of the UAV. It affects the results. Was it a feature of the towed bird or would it be present in the actual UAV? The frequency of 1 Hz is too high for an actual UAV. If the frequency is reduced, how would it affect the error that you have predicted?

Prof. Miodrag Bolic

- I was expecting that the manual landmarks will lead to better results. This is not the case in your thesis? Answer: because they are at the edge. Why didn't you use some in the middle?
- Variance: Figure 5.5, why does the variance increase this way?

Prof. Mohamed El-Tanany

- The analog image was recorded in the UAS. Why was the camera and data acquisition system so big? Do you know how fast your recording sampling rate was?
- Could you run your algorithms in fixed point as opposed to floating point?

Prof. Paul Straznicky

- Did you see any stand out landmark such as a single tall tree in your experiment in Gatineau? I am sure that the system would detect a tower or a tall tree.
- The landmarks that leave the field of view are deleted. How to deal with this problem?