Mobile Vision Based Risk Detection

Report Name	Outline Project Specification
Author (User Id)	Joseph James (jgj2)
Supervisor (User Id)	Myra Wilson (mxw)
Module	CS39440
Degree Scheme	G400 (Computer Science)
Date	February 5, 2016
Revision	0.1
Status	Draft

1 Project description

This project will be focused on developing a risk detection system for a parrot AR Drone 2.0 using a vision-based system. This will allow the drone to focus avoid potential upcoming risks through it's main camera, as the drone doesn't have any other methods for avoiding collisions due to it normally being manually controlled.

This would also provide a myriad of possibilities in what the drone could help do; this includes things like assistance for those poor of sight, leading in search and rescue through sight and general collision avoidance through sight. Currently, the drone operates via user input for control and relies on their vision through the cameras on the drone and their outside view of the drone to avoid collisions. This is fine for personal use and some photographic use, however for autonomous flight, the drone needs to be able to detect these collisions on it's own.

In order to do this, I would implement a computer vision based system to attempt to detect particular risks through the cameras. It's likely that I would use the principal of relative motion in optical flow to do this, as objects that are closer to the drone will appear to be moving faster, however this will require further investigation into different methods of determining risks through vision. The plan will also involve starting with a very limited scope of risks, for example I would use only red shapes initially and then try to generalize from there. This allows for an increase in scope as I move forward in the project, while limiting it to make sure the scope is suitable at the beginning.

In order to complete this project, I will be following an agile methodology consisting of sprints, iterative process improvement and a personal kanban system [1]. Early on in my process, I will be setting up my system for my workflow and writing up the methodology and my motivation behind my decisions.

2 Proposed tasks

Set up and write up methodology This task will allow me to have a clear idea of how I'm going to progress with further work, keeping me on task and always making progress. It also helps me keep an idea of how my methodology has changed, as I'll have a written record of how it started. This will be done very early on in the project, before any work commences.

Research This task is to gain further understanding of the technology I'll be using and the concepts I'll be basing my system off.

- **Vision based risk detection systems** Here, research on preexisting vision based systems for risk or collision detection will take place. This is done to gain a clear view of the type of system that should be implemented, what different layers it will need and anything else it will entail.
- **Parrot AR Drone 2.0 API/SDK** In this task, there will be investigation of the API and SDK of the drone I will be using as a platform for my system. This is to gain an understanding of the system before development gets underway, to improve development time.

3 Project deliverables

at the bibliography is also shown in the table of contents. There is the possibility that this is

Annotated Bibliography

[1] J. Benson and T. D. Barry, “Personal kanban,” http://www.personalkanban.com/, accessed February 2016.

This site provides an explanation and guide for ”Personal Kanban”, which is a kanban system for personal work flows.