Introduction
The goal of the project is to navigate through a room using augmented reality (AR) markers to know the position of the unmanned aerial vehicle (UAV) and detect landing platforms to land on them. The research is mainly focused on visual servoing of the UAV to navigate and perform proper landings.

ROS
Robot Operating System (ROS) is an open source software framework for robot software development by Willow Garage. Here are a few features:
* Hardware abstraction
* Message passing between process
* Package management

Visual Servoing
Visual Servoing is the technique which uses feedback information extracted from a vision sensor to control the motion of the robot. Two web-cams are used to get the feedback. With the help of ARToolKit, it is possible to get the position and orientation of the web-cam with respect to a target marker.

Fish-eye lens
Due to the limited area of view of the web-cams, fish-eye lenses are attached to have a wider view.

Undistortion
- Calibrate camera
- Tune camera matrix and distortion coefficients
- Undistort image

Navigation
With the position of the markers, using transforms, we can easily calculate the goals desired depending on the marker we see and with which camera sees it.

Results
At first, the calibration for the fish-eye lens was not really good, and the positions and orientations of the marker were not precise and used to moved a lot. After, adjusting the camera properties and distortion coefficients the marker tracking improved in consistency.

The visual part was successfully done and the markers were displayed in the correct place, the navigations goals were also given correctly.

Conclusion
This research is useful for navigation and objection recognition. The AR markers could be put in walls or objects to get their locations.

Acknowledgment
Special thanks to my supervisor Maxim Likhachev, also I will like to thank Jonathan Butzke, Brian MacAllister and Micheal Phillips for all their help, support and advise during the entire research.