Student	Title	Description	Objectives/Outcomes	Examiner
	Investigation of Camera Calibration Models for Low-Cost Photogrammetry	Low cost / consumer cameras have been used for many years for photogrammetric mapping projects. Although capable of providing cheap mapping solutions, one of the main drawback of these camera systems in the difficulty in modelling camera lens distortion. This project aims to investigate various lens distortion models and their effect on the photogrammetric mapping process and its products.	Investigation of lens distortion models and their effect on the output of the photogrammetric products from low cost camera systems.	J Smit
	Creation of Distortion Free Images for Photogrammetric Production	Low cost / consumer cameras have been used for many years for photogrammetric mapping projects. Although capable of providing cheap mapping solutions, one of the main drawback of these camera systems in the difficulty in modelling camera lens distortion. This project aims to develop software capable of removing lens distortion from images and to produce 'distortion free' image outputs which may be used in a photogrammetric production process.	Development of algorithms and software capable of producing 'distortion free' images from low cost camera systems capable of enabling high precision photogrammetric mapping.	J Smit
	Investigation of Photogrammetric Processing for Mapping from UAV platforms	UAV's are increasingly used for photogrammetric mapping projects. This project aims to investigate the benefits and limitations of Unmanned Aerial Surveys (UAS) for mapping.	Evaluate current UAS mapping options and prototype a UAS mapping project.	J Smit
	Investigation of Photogrammetric Processing for 3D Model construction from UAV platforms	UAV's are increasingly used for 3D modelling projects. This project aims to investigate suitable project planning and implementation strategies for 3D modelling.	Development of production planning and workflow for 3D modelling from UAV platforms	J Smit
	Change Detection using 0.5m multispectral NGI now has large areas of SA covered by two coverage's of 0.5m GSD multispectral imagery.	This presents an excellent opportunity for change detection (image to image comparison).		A Parker (Promoter)

	Impact of digital image acquisition at low solar elevation	• The Chief Directorate: National Geo-spatial Information has, since 2008, acquired all imagery digitally with multispectral large format digital sensor systems. • The acquisition of aerial photography is influenced by several factors. In order to get quality products from imagery, images must be taken in accordance with the standard set by CD: NGI. The standard specifies clearly the flying times for capturing of the images. However, the criterion for the flying times were adapted from analogue aerial photography without any scientific basis, and its relevance, and was not verified for digital imagery. The low sun angle, especially during winter, has historically presented the aerial mapping community with significant imagery acquisition constraints. For decades, the accepted practice (documented in virtually all specifications for aerial photography acquisition) frowns on obtaining imagery when the sun angle is below 30 degrees. • No thorough research has been done regarding the question of how low the sun angle can be in order to capture images that are still within the acceptable quality, from a visual point of view, and also from the remote sensing point of view. That is one of the key issues for this investigation. NGI has commissioned imagery at low solar elevation (20 deg) in both a city and mountainous area. Imagery of the same area is available at higher solar elevation.		A Parker (Promoter)

	Verifying the accuracy of airborne GNSS and INS parameters	• The CD: NGI Standard on digital aerial imagery requires: • GNSS airstations coordinates proven to have accuracies of better than or equal to 0.2 metres. • The IMU be proven to meet or exceed a post-processed accuracy in roll and pitch of 20" of arc and a post-processed accuracy in heading of 30" of arc. • It is very difficult to determine whether this requirement is actually met. • The objective of this research is to identify methods of verifying accuracy statements of GNSS/INS measurements by contractors	• CD: NGI will institute independent checks on GNSS airstation coordinates and IMU outputs to guarantee that the standard is met. • If this is done, it lays the foundation for considering direct geo-referencing (no Aerial Triangulation)	A Parker (Promoter)
	Accuracy of Direct georeferencing in aerial photography. {UKZN 2012}	• Doing rectification without the need to do A/T is highly desirable as there is a major bottleneck and delay in getting ground control in the region of interest. Three possibilities exist. • Using the INS data straight as it comes off the plane • Running an AT job using machine generated tie points but without any ground control (GC). • Investigation needs to be done to find if any (or both) of the above postulations in different contexts will deliver the required accuracies as per CDNGI standards • Comparing raw external orientation parameters to Triangulated and adjusted parameters. This is becoming increasingly relevant to NGI. We will gladly make data available for this research.]	• If suitable DTM/DSM is available, this would permit very rapid generation of orthorectified imagery	A Parker (Promoter)
	Laser scanning of Meerkat/SKA dishes			A Parker (Promoter)

Banita Kassen	Edge based 3D indoor model reconstruction.	A recurring problem with the creation of indoor models is presence of texture less surfaces, e.g., walls. A possible solution is to detect edges in overlapping images and reconstruct models from the edges in the images. This project will aim to reconstruct 3D indoor models from images.	Study and test the reconstruction of 3D models from images based on detect edges. Determine the accuracy of such reconstructions.	G Sithole
	Content retrieval in oblique imagery of urban scenes	High resolution oblique images of urban scenes provide a wealth of information. However this information is often difficult to access in user friendly ways. Classification or clustering is one of way accessing this information. However this is not ideal for naïve users. An image content retrieval system based on natural language is a possible solution.	Explore and test ways in which content can be retrieved from oblique images of urban scenes. A user should be able to search a scene based on natural language.	G Sithole