NOTICE OF
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GEODESY AND GEOMATICS ENGINEERING

Master of Science in Engineering

Ruisheng Wang

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Board of Examiners:	**Supervisor:**	**Dr. Yun Zhang, GGE**
	Examining Board:	**Dr. Wolfgang Faig, GGE**
		Dr. Lev Goldfarb, CS
	Chair:	**Dr. Sue Nichols, GGE**

Automated Road Extraction From High-Resolution Satellite Imagery

Abstract

Automated road extraction from aerial and satellite images can significantly reduce the cost of the data acquisition and update, database development, and turnaround time. However, conventional data sources (aerial photographs and low-resolution satellite images) do not simultaneously contain both the high resolution and the multispectral information that are valuable for road extraction. The availability of high spatial resolution and multispectral information in the latest high-resolution satellite images, such as IKONOS and QuickBird, therefore, provides a great opportunity to address the road network data problem.

The research in this thesis focuses on the development of effective methods to extract roads from high-resolution satellite images, and two new methods have been developed. The first one is a semi-automated road extraction method based on profile matching and optimized by an auto-tuning Kalman filter. A new approach for determination of system and measurement noises for the Kalman filter is presented, which leads to a significant improvement in road extraction. The method is also efficient for the extraction of partially shadowed and occluded roads. The second is based on multi-spectral classification. A new approach is proposed for automated road extraction through the Pan-Sharpening technique and the Edge-Aided classification algorithm. The proposed method can accurately extract road networks from multispectrally classified urban roads. The misclassified objects, especially small driveways, house roofs connected with the road networks, and extensive paved grounds, can be eliminated. Accuracy assessment in both urban and suburban areas indicates the completeness reaches 90-94% and correctness reaches 97-98%. The high accuracy has demonstrated that this new method is significantly superior to the traditional multispectral classification, panchromatic image-based feature extraction, and other existing multispectral and panchromatic image integrated classification.

Faculty Members and Graduate Students are invited to attend this presentation.