



**NOTICE OF  
UNIVERSITY ORAL  
GEODESY AND GEOMATICS ENGINEERING**

**Master of Science in Engineering**

**Sabarish S. Muthu**

**Wednesday, February 4, 2015 @ 4:00 pm**

**Head Hall – Room E-11**

**Board of Examiners:**      **Supervisor:** Dr. Emmanuel Stefanakis, Geodesy & Geomatics Eng.

**Examining Board:** Dr. David Coleman, Geodesy and Geomatics Eng.  
Dr. Paul Peters, Dept. of Sociology

**Chair:** TBA

**VISUALIZATION, STATISTICAL ANALYSIS, AND MINING OF HISTORICAL VESSEL DATA**

**ABSTRACT**

An important area of research in marine information systems is the management and analysis of the large and increasing amount maritime spatio-temporal datasets. There are lack of systems that may provide visualization and clustering techniques for large spatiotemporal datasets (Oliveira, 2012). This thesis describes the design, and implementation of a prototype web-based system for visualizing, computing statistics, and detecting outliers of moving vessels over a massive set of historic AIS data from the Aegean Sea in the Mediterranean. This historic AIS data was acquired from the Marine Traffic project (MarineTraffic, 2014) which collects the raw location points of the vessels. The web-based system provides the following functionalities: (i) user interface to upload the location points of vessels into a database, (ii) detailed and simplified trajectory construction of the uploaded location points of vessels, (iii) distance, speed, direction, and turn angle computation of the constructed trajectories, (iv) identify vessels that intersect the European Union's Natura 2000 protected areas, (v) identify spatio-temporal outliers in the location points of vessels using DBSCAN algorithm, and (vi) heat map visualization to show the traffic load and highlight sea zones of high risk.

The architecture of the web-based system employed is based on open standards, and allows for interoperable data access. The system was implemented using PHP as the server-side scripting language, and Google Maps API as the client-side scripting language. Furthermore, improved system responsiveness, and server performance was achieved by asynchronous interaction between client and server by utilizing AJAX to send and receive requests. In addition, data transfer between client and server was achieved using the platform-independent and light weight JSON format.

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