

Master Thesis at Carmenta

Carmenta is one of the leading providers of Geographic Information Technology in Europe. We offer a wide range of software products for business-critical geospatial applications. Our main markets are Location Based Services, Security and Defense & Aerospace. With over 20 years' experience we have a unique competence and experience of geographic information, positioning and advanced graphical user interfaces.

Carmenta offers challenging Master Thesis opportunities in the field of Geographic Information Technology. We recommend that the work be carried out at our offices in Gothenburg. Below is a list of current topics, but you are of course welcome to present other ideas as well. If you find this interesting, please contact us at employment@carmenta.com.

Generalization of Geospatial Vector Data

The presentation of maps based on vector data often requires generalization and simplification to avoid clutter and preserve readability. This is especially important on small displays, such as those found on mobile devices. The thesis work should start with a survey of one or more specific problems. Followed by an investigation into known methods and a search for a new or improved method. The final step is to apply the most promising methods, by implementing prototypes using Carmenta's Technology.

Rich Web Map Applications

Ajax technology has revolutionized the use of online maps, such as Google Maps, despite them only providing a rather limited support for graphics and user-interaction. By applying the latest RIA (Rich Internet Application) technological advances, such as Microsoft Silverlight 4 and Adobe AIR 2, there should be new opportunities for taking the web map experience to new levels.

The thesis work will investigate the technologies and propose ideas for improving the user experience in web map clients. The work should also include prototyping, to demonstrate this type of client connected to geospatial data sources with standard OGC WFS interfaces, such as Carmenta Server.

Augmented Reality in 3D Geospatial Views

Our Carmenta Engine tool provides a powerful platform for generating artificial 3D views from 2D geospatial data. Overlaying this kind of view onto a video from an aircraft or even a mobile phone presents exiting opportunities for 'augmenting' reality; streets can be highlighted, place names can pop-up in the view, and so on.

The thesis work should begin with a survey of the field. Followed by analysis and design of how augmented reality can be demonstrated. Finally, a prototype implementation based on Carmenta's technology should be developed.

Automated Search and Management for Geographical Web Services

The OGC standardization of web services has led to an ever-increasing number of geospatial data sources on the Internet. Many new opportunities for products and services could emerge from such sources. However, there is no easy way to find them.

The thesis work involves finding, evaluating and developing new methods for automated search and management for geographical web services. The work should also include prototype implementation of the proposed solutions, e.g. web crawler, and evaluation of the results.

Efficient Tools for Describing Web Map Visualization

The OGC standard for describing the visualization of map layers is called SLD (Styled Layer Descriptor). SLD is an XML schema primarily intended to describe how an OGC web map layer will be displayed (rendered). Writing the XML is quite complex and time-consuming.

The thesis work aims to design and propose more efficient and visual methods for producing SLDs. Prototype applications and tools to demonstrate and evaluate the methods should also be developed.

Geospatial Data Management and Distributed Computing

Geospatial data, such as satellite images, is often very voluminous which results in high storage and processing capacity requirements. Providing efficient and high quality services also requires frequently updated data. Parallel processing is one way to cope with this.

The thesis work should involve a search for appropriate methods that can be applied in the design of a solution. The goal is to provide a fast, scalable and quality assured system architecture for managing large geospatial datasets. The work should also include the development of a demonstration system.

Using Dynamic Data Sources for Mission Planning

Carmenta develops systems for map-based mission planning, command and control. Availability of dynamic data, e.g. traffic information and weather data, could be of great value for the operators' situation awareness and decision support.

The thesis work involves investigating and proposing possible data sources. Followed by the development of a prototype, to demonstrate and evaluate how to get the most out of that kind of information in this type of system.

Methods for Optimizing Preparedness

Carmenta's ResQMap offers powerful features for showing the calculated preparedness for emergency incidents. These features could be extended for simulation that would enable fine-tuning preparedness by, for example, allocating resources differently.

The thesis work involves investigating how to collect, analyze and visualize statistics, e.g. on waiting times and driving times. The work will also involve meetings with users and management for feedback on how to provide the most useful views and reports. Proposed features should also be implemented in the prototypes.