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MS Graduate Student Opportunities – Dr. Stefan Robila

Often, topics that you would like to investigate in depth may not be available as regular course offerings. Moreover, as part of the graduation requirements you have the option to perform an in depth topic investigation either as Project or Thesis. I am currently looking for enthusiastic students to embark on investigative work associated to several projects. Skills needed for these projects vary greatly and I encourage you to approach me to discuss them. Work on these projects also vary greatly and include one or more of the following: software development, system design and administration, as well as reading and writing. Opportunities to present your work in local and national meetings exist.

No pay is provided, however, research projects are done in collaboration with a faculty mentor and taken as for credit course for 3-6 credits. Registration for such projects can be done as independent study, MS Project or MS Thesis based on a signed written agreement. Participation in the projects allows you 24hr access to the Computational Sensing Laboratory (267B) that includes computing systems, printers, and an extensive library. Some projects may involve collaboration with undergraduate and other graduate researchers.

If you are interested in any of the project directions described on the next pages, or would like to propose your own project, please contact me.

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Graduate Projects

G1. Spectral Imaging

We are working on a variety of problems centered on spectral imaging. First, we investigate a unifying framework for the use of higher order statistics in multispectral/hyperspectral image processing. The main goal is to find efficient algorithms for land cover classification, feature extraction and target detection. Second, we are also investigating new applications of spectral imagery. One direction followed here is the use of hyperspectral images for face recognition. Participating in the project you will learn about spectral imaging, work with a hyperspectral camera, develop applications and test solutions. Alternative projects include computing configuration and set up for mobile data collection.

G2. Distributed Computing

A 512 compute-cores AMD Opteron system with Linux OS is available for use. Various problems including matrix and vector processing, computer security techniques and system benchmarking have been approached and new directions are available. While engaged in these project you will receive access to the cluster as well as other Linux machines. You will learn paradigms of parallel and distributed computing, implement and test new algorithms.

G3. GPU Computing

“GPU computing is the use of a GPU (graphics processing unit) together with a CPU to accelerate general-purpose scientific and engineering applications. Pioneered five years ago by NVIDIA, GPU computing has quickly become an industry standard, enjoyed by millions of users worldwide and adopted by virtually all computing vendors.” ([NVIDIA](#)) A Microway Xeon Tesla WhisperStation that includes a 2,496 core NVIDIA GPU is available for use. The first steps of the project include set up, configuration and benchmarking, future steps include development and testing of applications on the GPU environment. While participating in this project you will learn about parallel processing, GPU programming and performance analysis.

G4. Energy Conservation

I have played a leading role the “Green IT” Project at MSU. The project aims to reduce power consumption within the MSU data centers, to increase community awareness of the IT equipment energy usage and develop energy saving intelligent decision systems for IT professionals. I propose to extend the Green IT initiative to a broader question: how do address computing needs in a sustainable fashion? How do we measure the computing impact on the environment? How do we reduce it? Many opportunities exist, from focusing on user education, to designing new metrics, to modeling energy usage for computing systems. Moreover the same metrics can be applied to other industries (for example, mobile communication networks.)

G5. Computer and Information Security

The projects under this title cover a variety of directions and often can be a continuation of the work done in the security course you might have enrolled. They range from design and experimentation of brute force attacks to investigation of communication protocols to social aspects of hacking.