



KITCHENER-WATERLOO SECTION

March 2007

KW Section Executives	1
Section Officers.....	1
Committee Chairs	2
Society Chapter & Affinity Group Chairs	2
Student Activities Chairs and Programs	2
Upcoming Events.....	3
Alternative Energy Tour	3
ATS Plant Tour	Error! Bookmark not defined.
Recent Events.....	3
Digital Stains.....	3
Overview of imaging and surveillance algorithms	3
Universities Get \$6 Million to Build 'Green' BioCars	4
Accelerator centre marks growth.....	5
Engineers and the World.....	6
Student duo will bike from sea to sea	6

The Kitchener-Waterloo Section of the Institute of Electrical and Electronics Engineers serves members whose mailing address is in Bruce, Grey, Perth, Waterloo or Wellington counties. It collects news relevant to local engineers and is published online bi-monthly. Contact the editor to have a printed copy mailed.

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Upcoming Events

Check <http://kw.ieee.ca/activities.html> for updated information.

Alternative Energy Tour

April 14 1-4pm

Woolwich township has arranged a tour of local alternative energy sites. It includes geothermal, micro-scale wind turbine and solar installations. For more information see: <http://www.woolwichhealthycommunities.org/>

Recent Events

Digital Stains

IEEE seminar by Professor Bernhard Bodmann, Dept of Mathematics, Waterloo

This talk gives an overview of new statistical concepts that allow us to extract latent information from high-resolution biomedical images such as Computed Tomography scans and Confocal Fluorescence Microscopy images. In the first part, we discuss the characterization of plaque tissue by analyzing Micro-CT scans of human coronary arteries. The statistical discrimination of plaque components is based on their characteristic textural consistencies. The second part of the talk concerns the use of confocal spectrophotometry for the purpose of reliably tracking stem cells labeled with Green Fluorescent Protein on the background of auto-fluorescent infarcted tissue. The statistical discrimination of spectral signatures presented here is applicable for the detection of many common fluorescent markers. This talk is intended for a general audience.

Overview of imaging and surveillance algorithms

IEEE seminar by Prof. Xiaolin Wu, Dr. Abhijit Sinha, McMaster University, Hamilton

We briefly introduce our superresolution algorithm and its relevance in visual surveillance. An imaging sensor samples the projection of an underlying 3D scene at the intersect points of a 2D grid. An imaging sensor samples spatially blurred intensities because of the finite dimension of its constituent sensors. The sampling grids of neighboring frames of a video sequence are, in general, non-identical due to camera and object motion. This means that the information from a number of adjacent frames can be

combined to obtain a superresolved frame. Such a higher resolution frame will improve the effectiveness of recognition of targets which in turn will improve surveillance. We have developed a novel superresolution algorithm based on a fast motion estimation technique. Two stages of this algorithm, namely, motion estimation and high-resolution reconstruction, rely on an area-based interpolation scheme that involves intersecting two pixel grids in arbitrary orientation, displacement, and scaling. We develop a fast approximate solution of the interpolation, whose exact solution is prohibitively expensive. In addition, gradient descent algorithm is used for fast convergence of the motion estimation algorithm. Experimental results demonstrate the good performance of the proposed superresolution algorithm as well as its robustness against noise.

Universities Get \$6 Million to Build 'Green' BioCars

U of Guelph

Imagine every car in Ontario having a “green” interior, with the dashboard, seats, headrests, door panels and other parts made from composites of agricultural crops like corn and wheat.

The concept is a step closer to reality today with the announcement that the provincial government is investing nearly \$6 million in the BioCar Initiative, a multi-university project led by the University of Guelph.

It involves 16 scientists at Guelph and the universities of Toronto, Waterloo and Windsor. They are combining their research strengths and efforts to improve the development and delivery capacity of biomaterials for the automotive industry.

“The BioCar initiative aligns some of the most distinctive innovation capacity in Ontario,” said Alan Wildeman, vice-president (research). “It involves a consortium of universities working with two of the largest industries in Ontario, the automotive industry and the agricultural industry. This combination provides an unprecedented opportunity for the province to be seen as a major contributor to the global biobased industrial revolution that is occurring.”

Support for the project will come from the Ontario Research Fund's Research Excellence Program and was announced today in Toronto by Premier Dalton McGuinty, minister of research and innovation.

Guelph’s role will include creating new industrial crops that can be turned into composite materials used to make interior automobile components.

“It’s a whole new way of looking at agriculture and a whole new relationship between the sector and Ontario’s economy,” said plant agriculture professor Larry Erickson, one of the lead researchers. “It opens the door for a lot more approaches and utilization of crops. Now, agriculture is more than meat and potatoes; it’s car parts, building materials, fuel and more.”

It's been known for years that plant material can be used to make components in the manufacturing process, but it's only recently that society recognized the need to do this commercially.

For the past 100 years, research efforts and resources have not been focused on using crops in this way because there's been an abundant supply of low-cost petroleum, said Erickson. "All of that has changed now. We have to catch up and make up for lost time and develop alternative technology."

The BioCar project literally starts in the field, with Guelph looking at the raw agricultural materials and studying crop genetics. It then moves to processing and separating the biological feedstock in collaboration with the University of Toronto, to engineering composite resins and polymers for application to automotive parts at Waterloo, to finally incorporating the new products into automobiles at Windsor.

"Talk about a value-added chain of research," said Erickson. "The BioCar Initiative is a continual stream of research and development with incremental improvements made at each point in the value chain. The whole is greater than the sum of its parts."

He added that research into bioproducts has often been challenging because these new materials are currently not economically competitive with synthetic products. But the four universities joining together and creating an integrated scientific team changes things, he said.

Mohini Sain, a University of Toronto researcher, is the co-principal investigator for the project. Other key Guelph researchers involved are Ian Tetlow, Michael Emes, Istvan Rajcan, Peter Pauls and Gary Ablett.

Accelerator centre marks growth

from the UW media relations office

In less than a year, the Accelerator Centre at the Waterloo Research and Technology Park has laid the groundwork for some of Canada's high-tech stars of the future. "It's been a very successful time since our launch last May. We're at 98 per cent capacity and we have plans to expand," says Gerry Sullivan, AC's chief executive officer. "We provide start-up companies with access to industry experts who can help direct budding entrepreneurs through the process for launching a technology enterprise."

Bobbi Holte, director of client programs, said there are 17 start-up high-tech companies currently based at the AC. "We have a total of more than 90 people who work here every day," she says. As well, the AC works with innovation partners, including Communitech, Canadian Innovation Centre, Infusion Angels Innovation Centre (sponsored by Microsoft), Ontario Centres of Excellence and the National Research Council's Industrial Research Assistance Program.

The centre's entrepreneurship council, made up of business and technology leaders, offers experience in critical roles to growing an enterprise, such as financial management,

investment, research and development, product development, marketing, sales and human resources.

The not-for-profit AC is the result of a multi-stakeholder partnership, with land and a portion of the initial operating funds provided by UW. The Government of Canada, Province of Ontario, Region of Waterloo and City of Waterloo provided the primary capital funding. Other stakeholders include the University of Guelph, Wilfrid Laurier University, and Conestoga College.

<http://www.acceleratorcentre.com/>

Engineers and the World

Student duo will bike from sea to sea

UW media relations

Biking across Canada this spring with GPS, Bluetooth and BlackBerry technology tracking their daily progress on a website, two Waterloo engineering students want to inspire the next generation of scientists and engineers now in high school to build a greener better world.

Benjamin Sanders and Eric Vieth, both fourth-year majors in electrical engineering, plan to recharge any battery-operated devices they use on the journey -- such as their wireless BlackBerries and Global Positioning System receivers -- with hydrogen fuel cells, portable power generators and solar panels mounted on two bike trailers. They also hope to use the alternative power to prepare meals when camping along the way.

The two will visit 29 high schools in 10 provinces during their 7,900-kilometre gruelling trek from Victoria to St. John's in order to encourage students to consider a future in science, engineering and environmental fields. The 68-day tour begins April 23 in Victoria.

"Clean energy is our key theme," says Sanders. "Concern for the environment is on everyone's mind these days, which has prompted a renewed focus on clean forms of energy. We want to show high school students how technology in science and engineering can solve environmental problems, how it can effect real change and help bring about a more environmentally sustainable world."

That's why it's important to exhibit small hydrogen fuel cells and portable power generators supplying the renewable energy needed during the trip for everyday tasks such as cooking. "It will attract the attention of curious high school students and promote science and engineering as a career," Sanders says.

The name of their interactive website -- www.next-generation.ca -- sums up the project's purpose: To engage the next generation of scientists and engineers in building a world using next-generation technologies, as exemplified by UW research expertise in alternative fuels and fuel cell technology. <http://www.next-generation.ca/>