#### <u>Engineering</u>



# Engineering Research

#### **\$5 Million to Support Sustainable Food Engineering and Innovative Discovery**

On Tuesday October 31st members of the Barrett Family Foundation visited the School of Engineering to tour the facilities, meet faculty and students and help us celebrate their generous donation.



The Barrett Family Foundation donated \$5million to the school to support the establishment of the Barrett Family Chair in Sustainable Food Engineering, the Barrett Family Fund for Research in Sustainable Food Engineering and the Barrett Family Graduate Scholarships. Their donation represents the single largest philanthropic investment for the School of Engineering an the 4th largest in the University's history. It is very important to the Barrett family, for the Foundation to support significant endeavours that align their visions with the aspirations of like-minded organizations. In particular, the intent is to partner with qualified organizations that are working in the spheres of educational impact and environmental sustainability.

IMPROVE LIFE.



#### ...continued

The Barrett Family Foundation Board of Directors is made up of Bob Barrett - -President, Francine Rouleau-Barrett – Vice President, Kim Barrett McKenna – Director, Rebecca Barrett - Director, Don Posterski – Executive Director and Mark Cullen – Advisor. The Barrett Family Foundation Gift to the U of G is considered the largest gift ever (by a significant margin) to University of Guelph Engineering and will support faculty, students and research in three key areas; food packaging,green technology and advanced food

The Barrett Family Foundation Gift...considered the largest gift ever...to University of Guelph Engineering.

manufacturing technology over a period of 5 years. The School of Engineering is extremely grateful to the Barrett family for their support and looks forward to the working with them over the next several years to make their shared vision a reality.



### Engineering Systems and Computing Research



ES&C and Computer Engineering researchers work on a widevariety of areas including, but not limited to: computing systems, sensor networks, communication systems, multimedia, software & hardware engineering, machine learning and artificial intelligence, nano-scale circuit design, mechatronic systems and manufacturing systems.

This breadth of expertise positions us well to push the boundaries of tomorrow's technology in an effort to find potential solutions to some of the problems facing our society as a whole. Aligning well with the rest of the School of Engineering and the University of Guelph's research expertise, the Engineering Systems and Computing/Computer Engineering group is striving to make a difference every day by driving these answers while also training and preparing the next generation of highly qualified engineers who will strive to further this pursuit.

#### Engineering





## Mechanical Research

The Mechanical Engineering Area is the home of state-of-the-art research laboratories and facilities.

The Mechanical Engineering faculty conduct advanced research in fundamental and emerging areas involving manufacturing processes and systems, intelligent control of industrial and manufacturing systems, mechatronics systems, thermochemical conversion, renewable energy, and power plant design. New research initiatives related to food include, food packaging and handling, developing multi-layered food packaging to avoid food spoilage, intelligent food



packaging for improved product shelf life and consumer protection, development of technologies for field- and shed packaging systems supply, chain and inventory management for perishable food items, sustainable food refrigeration systems, and agri-food waste valorization.



## Biological & Biomedical **Research**



Biological Engineering Program is pleased to be the home of the new Chair in Sustainable Food Engineering. Food Engineering is an integral part of Biological Engineering program since the 1970s at the School of Engineering of the University of Guelph. In fact, Biological Program is an extension of Engineering, whish was the first program started from the School and in a way it is the mother of all the engineering programs at the University of Guelph. To be able to resonate within and outside the Canada's Food University, the Barrett Family Foundation's funding and awards will help to rejuvenate the food engineering minor under the biological engineering program.

To address the challenges associated with sustaining the ever increasing global demand for food for the next centuries, an immediate need for efficient food production system is required. This system will embrace sustainable practices to protect humans, plants and animals and thereby enhance food processing and food safety. To advance innovation super-cluster and to promote the profile of School of Engineering, the funding from Barrett Family Foundation will be used in the Biological Engineering program towards creation of research chair and also through projects concerning development of new food and bio-processing technologies for food products and biosensors for food safety and

#### ...continued from Biological & Biomedical Research

production. In addition, automated food inspection instrumentation for safety and quality; innovative processing and product development for Canadian pulses; structure-function and structuredigestion relationships of plant tissue materials as well as the connection between food biophysics and health will be advanced through the Barrett family funding award.

Recent advances in bionanotechnology allows biosensors to be integrated with food processing and food safety instruments to design ad-hoc sensing units and systems. This helps to meet the requirements of efficient monitoring of food supply chain. Novel smart analytical methods and diagnostic tools improve the sustainability in food engineering through ready to use biosensors, with low-cost and enhanced accuracy. Bionanotechnology for agrifood and animal health systems will be the flagship of the theme of sustainable food engineering.

# Environmental & Water **Research**

Ensuring the safety, efficiency and sustainability of our food production system is an important application within environmental and water resource engineering.





Environmental and water resources engineering faculty are leading a wide range of relevant food production-related research.

Environmental engineering faculty are also working to improve the sustainability of agricultural operations. Work include characterizing pollutant-generating processes within animal housing, determine emissions factors, and then apply that knowledge to develop methods to reduce emissions of greenhouse gases and air pollution. Also reducing waste and close the loops in food production and research related to processing crops post-harvest. The focus is to reduce energy costs and greenhouse gas emissions associated with this essential first step in post-harvest grain preservation.



Jinghan Zhao is explaining her masters project to Francine Rouleau-Barrett

..continued from Environmental & Water Research

Water supplies are the foundation of a sustainable and efficient food production system. Water resources engineering faculty areA working to ensure the environmental sustainability and resiliency of water supplies for agriculture.

UofG's Water Resources Engineering is a one-of-a-kind program that has been producing highly qualified graduates since the 1970's. Our researchers are involved in investigating and designing systems for the control and utilization of land and water resources as part of an effort to best manage our urban & rural watersheds. As well, research is focused on, but not limited to, the following fields: environmental hydraulics, water supply infrastructure, groundwater flow & contaminant transport, water supply security, the remediation of groundwater systems and drainage and irrigation systems.

This breadth of expertise positions us well to push the boundaries of what we know about engineering sustainable solutions through the application of innovative technologies. Aligning well with the rest of the School of Engineering and the University of Guelph's research expertise, the Water Resources Engineering group strives to make a difference every day by driving these pursuits while also training and preparing the next generation of highly qualified engineers.

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