

Archimedes Screw Turbine Remote Monitoring System Development

INDUSTRY CONTACT:

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Sales and Marketing
Bluestreak Equipment
greenbugenergy.com

DURHAM COLLEGE FACULTY MEMBER:

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School of Science & Engineering Technology

BACKGROUND:

Bluestreak Equipment has designed and manufactured innovative micro-hydro turbines that have the ability to generate electricity at distant micro-hydro sites. To monitor these sites and ensure they are working by physically visiting them was not feasible. Therefore, a more efficient and cost-effective remote monitoring system was required. Monitoring systems on the market are designed for large installations and require both a capital investment and monthly fees and are not economically feasible for micro-systems.

DURHAM COLLEGE STUDENTS AND FACULTY:

- Reported on available monitoring systems.
- Developed/selected a low-cost remote monitoring system.
- Designed and constructed the prototype(s).
- Tested the system with Bluestreak's turbine and controls.

OUTCOME:

A cost-effective and simplified monitoring system for fault detection was developed for Bluestreak. By using an Arduino Uno, a cellular shield, and a current line sensor, a text or email is sent when the power is turned on and off. With the use of a simulator, it was demonstrated that the device will work independently of any human interaction.

Bluestreak can now introduce their Archimedes screw generator to a new market (micro hydro < 100 KW) where no other economically viable solutions currently exist. The ability to monitor micro-hydro systems at low cost allows the company to increase their revenues.

NATURAL SCIENCES AND ENGINEERING RESEARCH COUNCIL OF CANADA (NSERC):

NSERC aims to make Canada a country of discoverers and innovators for the benefit of all Canadians. The agency supports students in their advanced studies, promotes and supports discovery research, and fosters innovation by encouraging Canadian companies to participate and invest in post-secondary research projects. NSERC researchers are on the vanguard of science, building on Canada's long tradition of scientific excellence.

NSERC'S GOALS:

1. **Advancing knowledge, seizing opportunities:**
Fuel the advancement of knowledge in science and engineering and ensure that Canadian scientists and engineers are leaders and key players in a global knowledge community.
2. **Building prosperity through research:**
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3. Inspiring the next generation:

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4. Showing the value of research and development investments:

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5. Increasing visibility of research:

Celebrate the accomplishments of Canadian natural sciences and engineering researchers and institutions, and increase their visibility in Canada and worldwide.

FOR MORE INFORMATION, PLEASE CONTACT:

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Development of GAP-APP

INDUSTRY CONTACT:

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DURHAM COLLEGE FACULTY MEMBERS:

Darren Puffer and Johanna De Boer
Professors
School of Business, IT & Management

Linda Cheng
Professor
School of Media, Art & Design

BACKGROUND:

Durham Foods is a recent recipient of the regional Ontario Premier's Award for Agri-Food Innovation Excellence and the first North American producer of year-round hydroponic spinach. The company provides year-round fresh produce for Ontario consumers and requires a web-based system with an interface for easy auditing, employee compliance and food safety processes. This would allow Durham Foods to attain CanadaGAP certification and meet Canadian government food safety program recognition requirements.

OBJECTIVES:

- To design, develop and implement a web-based system to replace and eliminate paper and binders.
- To design, develop and implement a mobile device app to ensure ease of audit, employee compliance and food safety at point of action.
- To leverage the above two systems to provide an automatic reminder system.

OUTCOME:

Food safety programs and audits are mandatory and standards must be met in order to provide produce to national grocery chains. With the development of a mobile device app, Durham Foods now has an electronic safety protocol that is accurate, tractable and inexpensive due to ease of use and access of data. This app has enhanced the operational effectiveness of Durham Foods and enabled it to acquire larger-scale contracts. As leaders in Ontario in food safety processes, Durham Foods now has the ability to expand its capacity tenfold.

THE COLLEGES ONTARIO NETWORK FOR INDUSTRY INNOVATION (CONII):

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Bioflx Ground and Equipment Protection Mats and Tarps

INDUSTRY CONTACT:

Judy Casteels

President

DURHAM COLLEGE FACULTY MEMBER:

Maureen Calhoun

Professor

School of Science & Engineering Technology

BACKGROUND:

Formflx Technology manufactures highly durable mats and tarps consisting of automotive-grade fire-resistant rubber, ethylene propylene diene monomer (EPDM) and neoprene. The tarps are customizable because of the size of the individual tiles that make up the tarp and the grommets that can fasten to equipment or other tarps. The product is not restricted by the environment and can be used by emergency services to protect the ground, property, equipment and can even be used at accident scenes to shield victims.

OBJECTIVES:

The objective of this collaboration was to test the FormFlx tarps for performance of the material and to validate the product when exposed to extreme conditions and compare it to canvas-type material. The project would determine both the strengths and weaknesses of the FormFlx staging mat and assess whether or not it would be a viable alternative to the one currently in use.

OUTCOMES:

Various experiments were carried out to evaluate FormFlx tarps' strength, durability, heat resistance, flame resistance, low temperature performance and resistance to water, mildew, punctures and load weight. Students and faculty established that FormFlx tarps were superior to the usual canvas being used for firefighting purposes which allowed them to successfully procure contracts with fire departments.

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Grid-Free Solar Power system

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DURHAM COLLEGE FACULTY MEMBER:

Philip Jarvis

Part-time faculty
School of Science & Engineering Technology

BACKGROUND:

Miratec is a Canadian company with a comprehensive line of molded assemblies, cables and inverters. They also offer customized solutions to companies by leveraging their expertise in wiring harnesses, custom cable assemblies, control panel integration, injection molding of connectors and electronics. For the wind and solar energy industries, Miratec designs and builds electromechanical, back panels wiring and enclosures. As part of this project, they wanted to establish a niche in the marketplace and develop a weather-proof grid-free solar power system with wireless monitoring.

DURHAM COLLEGE STUDENTS AND FACULTY:

- Constructed and tested the solar panel assembly.
- Modeled a weather-proof enclosure to house the voltage-regulating circuits and batteries.
- Attached wireless devices for telemetry and remote monitoring.

OUTCOME:

The designs were developed and tested for a grid-free solar power system comprised of a solar panel mounted on a pole. The voltage generated is transmitted down to a weather-proof enclosure that houses the electronics to regulate the voltage and charge deep-cycle batteries. The entire system is easily assembled and disassembled, thereby reducing the cost compared to systems presently available in the market. These pre-packaged solar electric systems are ideal for remote locations and applications such as radio, security camera, telemetry or lighting where normal power is not readily available.

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Designing and Building Power Conservation Module

INDUSTRY CONTACT:

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President
North-Line Canada

DURHAM COLLEGE FACULTY MEMBER:

Philip Jarvis

Part-time faculty
School of Science & Engineering Technology

BACKGROUND:

North-Line Canada has more than 30 years of experience in intelligent traffic detection hardware and systems. They are expanding into the relatively new field of energy harvesting that uses materials and devices which allow ambient energy sources to be converted into electrical power. Previous work with Durham College involved the hardware testing and development of prototypes to determine whether sufficient voltage/current can be generated from a miniature hybrid power-harvesting generator. The company required assistance with the concept and design of a device that would conserve and store energy to provide power temporarily, as well as in-road sensors and detectors.

DURHAM COLLEGE STUDENTS AND FACULTY:

- Designed a simple plug-in module device.
- Developed a series of prototypes.
- Tested the device to ensure functionality in simulated conditions.
- Improved the sensor circuits and sensor specifications.

OUTCOMES:

This project developed a new and innovative technology that will be implemented for the remote monitoring of highway traffic. This miniature power storing device will initiate an entirely new generation of sensors. North-Line Canada will fill the gap in the sector of traffic and highway management by using new harvesting energy principles and energy storage in solar as well as super capacitors.

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Medical Device Autoclave Handle

INDUSTRY CONTACT:

Vincent Borg

Product engineering supervisor
OASYS Healthcare

DURHAM COLLEGE FACULTY MEMBER:

Rob Braithwaite

Part-time faculty
School of Science & Engineering Technology

BACKGROUND:

OASYS Healthcare provides customized solutions in the medical marketplace. The objective of this project was to create an autoclave handle for medical devices that could sustain damage and discoloration when exposed to heat and UV rays. Without sacrificing materials or functionality, a medical device autoclave handle system was required that was comfortable for hands of different physical shapes and sizes which also supported optional disposable sterile sleeves.

DURHAM COLLEGE STUDENTS AND FACULTY:

- Produced handle prototypes using rapid prototyping equipment and computer numerical control (CNC) machines.
- Tested the prototypes ensuring the fit and function of the universal handle designs.
- Tested the handles through the autoclaving process to validate the material selection.

OUTCOME:

Durham College's expertise in injection molding and material selection and analysis helped OASYS designers create a cost-effective handle product that did not discolor or lose structural integrity with exposure to heat and UV light. It could be sterilized and has better mechanical connections to the devices, improving the handle's usability. After post-processing at OASYS, these prototypes allowed the designers to assess the design's fit, form and function. The design itself met many of its expectations and will be displayed at future international medical shows.

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A New Dealer Desktop

INDUSTRY CONTACT:

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Sunspace Modular Enclosures

DURHAM COLLEGE FACULTY MEMBER:

Johanna de Boer

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School of Business, IT & Management

BACKGROUND:

Sunspace Modular Enclosures (Sunspace) is a manufacturer and supplier of customized sunrooms. Sunspace had an existing in-house proprietary software application called Dealer Desktop used by its dealers and employees in the design and production of modular sunrooms. In collaboration with Durham College, Sunspace sought to improve the functionality and robustness of the current Dealer Desktop to meet the demands of today's sophisticated and web-connected customers through the integration of various Sunspace software systems, creating a strong enterprise resource planning (ERP) software.

OBJECTIVES:

- Full revision of Sunspace's proprietary software.
- Integration of Dealer Desktop and inventory management.
- Integration of Dealer Desktop with accounting software.

OUTCOMES:

The new system allows Sunspace to process more orders as well as improve the time it takes to fulfil each order. This will allow Sunspace the opportunity to increase its dealer network while doubling the retention rate of existing dealers. Sunspace expects this opportunity to translate into a 10 per cent expansion of its dealer base each year and a 10 to 15 per cent increase in sales overall.

ONTARIO CENTRES OF EXCELLENCE (OCE):

OCE drives the development of Ontario's economy by helping create new jobs, products, services, technologies and businesses. In partnership with industry, OCE co-invests to commercialize innovation originating in the province's publicly funded colleges, universities and research hospitals.

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