



# Event Agenda

April 4<sup>th</sup>, 2013

Wayne & William White Engineering Design Center

- 6:00 PM Industry Night Opening/Check-in
- 6:30 PM Industry Night Project Presentation
- 8:00 PM Project Award Presentation
- 8:30 PM Industry Night Closing

# Floor Map



# Industry Night

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## Acknowledgements

It is with great pleasure that the Integrated Engineering Students and Faculty members would extend their special thanks to all Industry Night Guests for attending this traditional and monumental event. The following companies are recognized for their attendance and participation in choosing the award winning projects of the evening:

Acuere Consulting	i2r Solutions
Acuren	INETCO Systems Ltd.
Aerospace Bizdev	Integral Group (Cobalt Engineering)
APSC Development & Alumni Engagement	Kinetics Design Solutions
City of Vancouver	LinePro Equipment
Cornerstone Architecture	Quest Construction Products
Cornerstone Planning Group	Teck Resources Ltd.
FVB Energy Inc.	Telus
GableCraft Home	UBC
Gumstix	YVR Airport

## COOL RUNNINGS

Connor Fuller, Alexander Daniel, Namrata Gupta, Johnsen Tan, Theo Barasa

The Cool Runnings portable ice bath is to be used conveniently in any household bathroom as a personal recovery tool for athletes. Ice baths as a recovery method are a proven type of therapy used by elite athletes worldwide. Cold therapy reduces swelling, inflammation and tissue breakdown helping to speed up the recovery time of an athlete. The portable ice bath cools tap water to the required 10° C for an ice bath in a short period of time. The portable ice bath uses a vapour compression cycle as its cooling system. The system design is a shell and tube heat exchanger that will be integrated with the compression vapour cycle. The tap water is pumped from the bathtub at a higher temperature, passed through the cooling coils and the temperature is reduced to the required level.

## POSEIDON INDUSTRIES

George Liu, Spencer Pringle, Peter Cheng, Justin Mak

Poseidon Industries engages in providing innovative solutions to the consumer electronics sector. Our Ultrasonic Washing System is equipped with the capability to clean various fabrics and clothing pieces with nothing but sound waves. The design incorporates the latest sonic technologies found in automotive and electronics semiconductor cleaning industries, yet adapting fabric into its domain of washable materials. With sound induced cavitation carefully controlled in a specialized washing tank, this digital smart device features an ergonomics user interface, state of the art ceramics ultrasound emitters, and is designed with standard power / water supply connections. The objective of the design is to provide consumers the ultimate high speed, high quality washing system, while removing operating costs and environmental burdens of the regular mechanical machines. With absolutely no moving parts at its heart, the system is engineered to be yet the best of its kind.

## PORTABLE SPOT WELDER

Sahand Azad, Julian Zhang, Ian Lam, Hussein Abdo

This group designed a fully integrated handheld portable spot welder. A spot welder joins together two contacting metal surfaces by using heat obtained from resistance to electrical current; this process normally requires a significant amount of AC power. However, this group has optimized this process using DC current, making the device portable. Using a small DC battery and an Arduino microcontroller, the welder is able to send pulses of current through two copper electrodes to weld thin pieces of metal together. The unit is small enough to use with one hand and the timing of the electric pulse can be adjusted depending on the application. The uses of such a device are far reaching since portability has always been an issue with welders. Whether it be for emergency purposes, on-the-road applications, or situations with low maneuverability, a portable spot welder has plenty of real-life application and potential.

## KOOLCHAIR

Matthias Kempe, Leo Huang, Kyron Harvett, Clayton Bell, Derek Budde

On a hot summer day, a common pastime is to lie in the sun and enjoy the sun's warm rays. Outdoor lounge chairs are the ideal patio furniture for this activity because the user is off the ground and has the option to sit or lie down. However, the problem with current large loungers is that they are not very portable. It is inconvenient and impractical to bring a patio lounge chair camping or to the beach for the day. In addition, the sun heats up the surface of the chair very quickly and the user is likely to return to a scolding hot chair even after a short absence. The KoolchAIR is the solution.

Integrated Engineering is a moderately young discipline, with a focus on design and communication. Each year, students take courses in core subjects and elective courses in at least two of the traditional engineering disciplines. What makes IGEN unique, is the 2-term design course, where students work together to complete a project of their choosing. Industry Night serves as an event to showcase the completed projects, as well as a networking event for students and industry professionals.

The night will include an open floor project display, during which projects will be judged. Industry professionals are encouraged to browse the project booths and ask questions and interact with the students, since these students will soon be looking for employment opportunities. Refreshments and snacks will also be provided.

The University of British Columbia's innovative Integrated Engineering Program (IGEN) offers a multidisciplinary undergraduate engineering education. Students take courses in core subjects and elective courses in at least two of the traditional engineering disciplines offered at UBC.

IGEN provides design and project management experience by means of design project courses taken in each year of the program. Technical skills, communication skills, and the ability to work with others to complete challenging projects are emphasized in these courses.

## **ENCHIRIDION**

David Lee, Hans Seidemann, Sherwood Plant, Helen Wong

Drivers do not receive enough useful feedback on their unsafe driving habits. The goal for Enchiridion is to provide useful feedback to drivers on their performance, specifically in relation to their response times and following distance to lead vehicles.

The proposed solution involves using a dash-mounted monitoring device and an Android app. The device will collect GPS data including speed and location, and measure following distance from the next car.

A safe following distance can then be calculated using the General Motors model. At the end of the trip, the data will be transferred by bluetooth to an Android app where the information can be analysed and presented to the user.

## **CYCLANE**

Troy Palmer, Natasha Egan, Taryn McCrady, Chenel Georget, Chloe Carloni

Bike lanes have a textured coating for skid resistance and visibility. The coating application process is time consuming and labour intensive. Currently, the paint & aggregate coating is applied by manually masking, spraying, and brushing. The goal for team "Cyclane" was to design a machine with Quest Construction Products to spray bike lanes and brush the coating evenly across the lane, while maintaining a defined edge. The machine is self-propelled and travels behind a truck that provides the necessary power and supplies. The Cyclane machine is a scaled-down, proof of concept version of a machine to spray bike lanes at a constant rate.

## NEW SENSOR FOR TOOLS

Ruyu (Lucy) Bai, Brendan Gwyn Deere, Ivan Jovanovic, Kristian Plakaris, Thomas Smyth, Jimmie Tan

Occupational Safety and Health Administration has documented that from 2001 to 2010, table saw related injuries is accounted for 1.9 billion dollars in health care costs annually. In these injuries, 83% are due to operator's contact with the saw blade. The SafeShop team wants to explore the market potential of these operational safety issues and as a result, developed the SafeShop system. The SafeShop system is an economically advantageous and non-destructive safety system that prevents operator injuries due to unintentional blade contact. This system is made up of a sensory and a blade retraction mechanism. A sensor will detect the speed at which the operator's hand is approaching the saw blade. If the sensor predicts an injury, a signal will release the latch, and activate the mechanical component that retracts the saw blade below the working surface. Thus, the SafeShop system successfully prevents contact related table saw injuries.

## DOOR LOCK

Tristan Brett, Kevin Caza, Christopher Comparey, Taylor Gallivan, Matthew Karpa, Kent Lau, Matthew Readshaw

Our remote door lock control device allows the user to securely and wirelessly communicate with their door lock using an android smart phone. As quick and easy as the touch of a button, the user can let guests in or out, or simply check to ensure the door is locked for their own peace of mind, all while out and away from home. The mechanism can be fitted to most common deadbolt locks and standard doors and can be used for home, work, or anywhere where locks are needed.

A new tradition that had begun last year was to make the project design program a more competitive event to promote innovation and technical excellencies in engineering. The undergraduates of the Integrated Engineering program here at UBC are pushed to step outside of the box with their ideas. Tonight's award ceremony will introduce the following awards:

- Best Technical Project
- Most Innovative Project

In order to choose which team will receive the award, we ask for the help of tonight's industry night checked-in guest to fill out a ballot that will be handed to you at the Check-In table. Once complete there will be a drop box at the same desk in which you can place your ballot in. We would like to thank you in advance for your participation.

## Awarding Criteria:

- The best technical designs are selected according to form, functional and emotional aspects of the product;
- The innovative designs are considered for their degree of innovation, aesthetic qualities, functionality and usefulness in addition to ease of realization and realization efficiency, ergonomics and human interaction.

## SELF-ADJUSTING BOAT BUOY

Dave Daniels, Dunkan Keen, Ellinor Crux, Meng Nan (Mona) Li, Sydney Morfitt, Tadz Palys

When tides change, anchored boats tend to wander from their intended position due to slack in the anchor chain. Our self-adjusting boat buoy resolves this problem by varying the length of the anchor chain according to the tides. This innovation allows boats to be safely anchored more closely to each other and the shore, saving valuable space in crowded harbors. The self-adjusting boat buoy decreases the likelihood of collisions and keeps buoys from becoming submerged during high tides.

## HI-TIDE GOGGLES

Kiel Olver, Janice Musa, Angel Mak, Dylan Perdue, Tanika Chadha, Billy Li

When swimming or SCUBA diving with goggles, problematic condensation or fog can form due to the temperature difference between the diver's face and the swimming environment. Current band-aid solutions to the problem of condensation include application of chemical sprays, saliva, or wax, which can decrease visual clarity and must be reapplied often. The Hi-TiDe Goggles team hopes to produce a proof of concept device that eliminates condensation through the use of electrically conductive glass elements.

To follow along with the development of this exciting project check out the Hi-TiDe Goggle blog on the Integrated Engineering website.

## WIRELESS CHARGING MOUSEPAD

Sandy Colvine, Winken Chow, Tirajeh Mazaheri, Kieran Bjornson, Dazzar Gilmour, Chang Liu

The Wireless Charging Mouse Pad is a convenient device that has the ability to charge a wireless computer mouse while being used on its mouse pad. Similar devices, such as the 'Charging Dock', already exist, but there are no items in the market yet today which allow a user to simultaneously charge their mouse while utilizing it. The large tech-savvy community would greatly appreciate the increased convenience of this device as opposed to consistently having to change the batteries in a regular wireless mouse or even using a wired computer mouse.

## SPOT FINDER

Jacob Berman, Quoc Vu Danh, David Penny, Christien Querengesser, Jericho Velarde, Kenton Wong, Jin Qing Xiang

A well-known fact about Vancouver is that we are Canada's worst place for traffic congestion; drivers spend an extra 8 to 10 minutes on the road looking for parking on average. Most drivers search by aimlessly driving, however if drivers were informed of available parking they would spend less time searching, save money on gas, and reduce their carbon emissions.?? Spot Finder is a parking finding solution that integrates pre-existing market technology. By combining a mobile phone application and vehicle sensing technology, Spot Finder is able to transmit parking space availability to driver's mobile phone, allowing them to plan their trip prior to departure, or find the nearest, cheapest or most available parking at that moment.

## FORKLIFT SAFETY

Jeff Baker, Mathew Bonell, Benjamin Brooks, Mario Liverant, Gi-Hoon Yu, Yucheng Zhao, Michael Lam

Tip-over is one of the most prevalent and serious types of forklift accident. The Forksafe system is a retrofitable system which is designed to warn operators of forklifts of an impending tip-over, to permit them to react in time and stop the tip. To achieve this, the system takes into account the motion of the forklift, load height and load weight and calculates the lift's center of gravity in real time. This is compared to the maximum allowable center of gravity for the given conditions and causes a warning signal to be activated, warning the operator.

## BECOOOL

Kristoffer Hansen, Brady DeSantis, Eric Yang, Mark Li, Joshua Cheng, Alex Bayrak, Sirous Soltanolketabi

The hot interior of a vehicle has been proven to reach dangerous temperatures of 60°C when parked directly in sunlight. Currently, there hasn't been a widely accessible product to combat the dangerously high temperatures of a vehicle parked in direct sunlight on a hot day. BeCool is the solution to keeping the interior of a vehicle cool while parked so you can return to your vehicle with a comfortable interior temperature.

## COOLING MOTORCYCLIST JACKET

Daniel Paul Behrner, Nicholas Caros, Negin Jahan Afrooz, Ashley Marshall, Brendan Morgan, James Roberts, James Zago

Modern motorcyclists are faced with a tough decision while riding in warm climates: wear heavy, insulating protective gear and be uncomfortably warm, or risk personal safety and ride in lighter clothing. This project aims to provide riders with a third option: wear a protective jacket that regulates its own temperature, keeping the rider at a comfortable temperature. Several options currently exist, but are limited in cooling power, cooling time or severely inconvenience the rider. The presented design allows motorcyclists to stay comfortable for long periods of time in any climate with a minimal increase in weight. Using a heat pump and a specialized phase-change material built into the fabric, the jacket can be cooled at home or while riding and maintains cooling ability even after being disconnected from the heat pump. This new way of approaching the problem will encourage more riders to wear protective gear, reducing injuries incurred in case of an accident. It will also prevent overheating and hyperthermia in riders who choose to wear full gear. "Accidents hurt - safety doesn't."

## AERODYNAMIC HARDWARE

Brian Guo, Tibi Banica, Tom Howie, Marie De Zetter, Siddharth Swami, Shuyi Lu

The Aerodynamic Hardware team has designed and built a variable angle automotive spoiler that improves the handling of a car by producing aerodynamic down force on rear wheels. Using CFD and stress simulations, the team constructed a purely performance based design that provides optimal down force while reducing drag and withstanding the strong external forces that occur while driving. The final product includes the airfoil, actuator, mounting system, and a user interface. The airfoil consists of a carbon fiber shell with a foam core and a reinforcing carbon fiber rod. In addition, the actuator is used to adjust a flap at the end of the airfoil. By adjusting the flap, the spoiler's angle of attack can be changed based on the car's velocity and down force can be maximized. Aluminum mounts attach the spoiler to the truck of the car. The user interface is mounted on the steering wheel, allowing the driver to easily switch between manual, automatic, and off settings in accordance with preference and driving style.

## THERMAL ENERGY RECOVERY STIRLING ENGINE

Sara Flanagan, JR MacKenzie, Cody Reaume, Peter Lain, Imed Zitouni

Overheating of a computer's Central Processing Unit (CPU) is a common problem, and often a designated cooling system within the computer must run continuously to cool the chip. Excessive heat produced by the CPU can damage the chip permanently, causing the computer to crash continuously and, most severely, melting the chip. Our team's objective is to design and build a Stirling Engine powered by the excess heat from the CPU. A Stirling Engine takes advantage of temperature differentials and turns heat energy directly into mechanical motion. The primary application of our Stirling Engine will be to power a cooling fan for the CPU, creating an attractive, compact solution that reduces the computer's total power draw. As the CPU heats up, the Stirling powered fan will rotate faster, thus maintaining the temperature of the CPU at an ideal equilibrium. The Stirling Engine could also reclaim this waste heat energy to power small, low wattage devices that people use daily.

## SUPER CRUTCH

Cobi Yu, Sean Wharton, Jack Park, Tracy Liang, Nate Croft

The design purpose of the "spring-loaded crutch" is to create a more ergonomically safe and convenient way for recovering patients to ascend and descend a flight of stairs. This is done through the utilization of the "Squeeze Adjustment System" that is the main focus of our project. The SAS allows users to easily and conveniently adjust the length of a mechanism through a squeezing action produced by the user.

For the purposes of our project, the mechanism is to be incorporated into a standard medical crutch to improve usability and convenience. The SAS consists of a re-designed pin/notch system combined with miniature pulleys and a mechanical spring for quick expansion movement. Examples of where the SAS may be useful include chairs, music stands, tent systems, etc. The final purpose of the SAS is to replace mechanisms with the conventional pin and hole system such as the standard crutch where the pin system is clumsy and slow to use for length adjustment.

## MEDICAL GAS FLOW SENSOR AND ALARM

Patrick Crawford, Mathieu Haiart, Gabriel Lessard-Kragen, Mariel Plummer, Rhea Sideris, Oliver Xie

Our design project solves a significant problem in the medical environment; it will save lives and save hospitals money. We have built a medical gas flow-rate sensor and associated alerting system intended for use primarily within hospital and ambulance-based portable oxygen tank fleets. With the current systems, patient safety is at significant risk. Oxygen tanks run out on patients during transport and/or ambulatory procedures, and often no one will notice until patients are in medical distress. Our device measures the flow and ensures any degradation in oxygen flow alerts a medical professional within a moment's notice.

## BARRISTA BACKPACK

Sean Hudson, Mathew Chow, Stephan Halbedl, Thomas Elgie, Tyler Dickens, Riley Springer

The Barista Backpack is a coffee dispensing mechanism aimed at providing speed and convenience to the everyday coffee drinker. Using a pressurized tank and inline cream addition, the backpack will dispense coffee prepared to the customer's exact order. The backpack is ideally suited to serve a large volume of customers in crowded areas where speed and accuracy is key. A fresh cup of coffee served with just the right amount of cream and sugar is the Barista Backpack promise.

## CABLECAM

Bryson Dodwell, Tasha Coote, Scott Bennett, Alex Drover, Andrew Fong, Tasha Coote, Yicheng Lu

Market cable-cams are high cost systems designed for large and expensive video cameras: inaccessible and impractical for the amateur DIY market. Providing an easy to use, low cost alternative, the CableCam allows videographers to capture high-quality aerial tracking footage. Using infrared sensors paired with an emitting garment, the motorized rig follows its target, panning to ensure the target remains centred. This device was optimized for a GoPro video camera, to allow ease in development.

## GRETA - POST-GARBURATOR PARTICULATE FILTRATION AND DEWATERING SYSTEM

Tallis Kirby, Vaughn Richards, SeongJae Yoo, Hank Hsu

This project aims to create a device that will enable households with garburators, particularly those in multi-unit residences, to easily compost the food waste they currently put down the drain. This will divert a waste stream from entering combined sewage lines, where it represents a lost opportunity and puts stresses on sewage and sewage treatment infrastructure, to more productive uses such as compost fertilizer or energy. The device being developed is an under-sink filtration and dewatering system that neatly holds a week's worth of post-garburator food waste particulate for a typical household. The device allows the processed and dewatered particulate, which is ideal for composting, to be easily removed for collection.