Project title: Underwater Buoy Release System

Contact Person: John Tran, johntran@uvic.ca

Project description:

The Underwater Buoy Release System will be attached to underwater instruments at the bottom of a body of water. A signaling device on a boat will l activate a transducer, which will trigger the opening of an air tank valve, which will inflate the buoy and raise the underwater instruments to the surface. This system can be used in a wide variety of underwater research applications.

Project title: PillPoint (Pill Identification App)

Contact Person: Brent Nemeth, brentnem@uvic.ca

Project description:

Identification of unknown prescription medication. Possibly cross reference with medical records to provide personalized information/instructions.

Project title: Wireless Audio Cable

Contact Person: Max Gerrie, maxwellgerrie@gmail.com

Project description:

The wireless audio cable is a transmitter/receiver that allows a user to wirelessly connect any two devices with a standard 3.5mm stereo input/output. This tool transmits audio signals using 802.11 bands (standard Wi-Fi), but does not require a connection to a home network. This will enable the user to play audio on a set of speakers using any media device (smartphone, mp3 player, DVD player, etc.), without a physical connection between the two. Our product is an alternative to existing Bluetooth stereos, which require the media player to have built in Bluetooth functionality. It enables the wireless transmission of audio, regardless of capabilities built into the media player. The transmitter and receiver can also be used in the opposite way; The transmitter connects to a TV or stereo system, and the receiver can connect to any standard set of headphones; Giving wireless capability to any set of headphones. The wireless audio cable uses lossless transmissions technology, meaning there will be no degradation in quality of the transmitted audio. With multiple uses and an unsaturated market, we believe the wireless audio cable will be embraced by users everywhere!

Project title: Improvement of SHOAL – a dynamic web cache publishing tool

Contact Person: Anita Kanyange, ak.kanyange@gmail.com

Project title: Data-Spike

Contact Person: Chris Nogueira, nogueira@uvic.ca

Project description:

The Data-Spike is an ultra-portable weather station that can be easily carried out into the field of interest, and driving the pointed bottom end of the stick into the ground. The Data-Spike will utilize various meteorological sensors and have a battery for its power supply. Bluetooth and Iridium wireless technologies will be used to interface with the Data-Spike and provide a means of obtaining sensor values and configuration settings remotely. The Data-Spike is intended for a short term use of 4 – 12 weeks primarily in the summertime but it may also be used in the winter.

Project title: Portable USB Power Pack

Contact Person: Auran Gill, avgill@uvic.ca

Project title: True 3D Image Manipulator

Contact Person: Nelson Lee, een@uvic.ca

Project description:

It is our hope that we can create cheap and cost effective way of initial prototyping that does not require the user to spend lots of money on a solid prototype. Our solution to this problem is to create a 3D display that will present the model and allows the user to interact with it by simple hand gestures. We would also like to showcase the potential of this 3D image manipulator project by rebooting some of the classic games, such as Pong, Snakes, and/or Space Invaders, but adding a third dimension.

Project title: Thermoelectric Battery Charger

Contact Person: Lena Schmidt, lenschmi@uvic.ca

Project description:

ThermoCell Inc. will be designing the Phoenix Mark I, a compact thermoelectrically rechargeable battery pack with a USB output. The battery pack will use a thermoelectric tile (either a cooler or generator tile) to recharge the battery when it is in close proximity with a heat source. A thermoelectric generator (or Seebeck) tile is a device that is designed to use a temperature differential to generate a power, whereas a thermoelectric cooler (or Peltier) tile is a device that is designed to create a temperature differential when power is applied to it. If one side of the tile is cooled (by use of a heat sink for example) and the other side heated the device will generate power, which can then be used to charge a battery. Either type of tile can be used for this purpose; however the thermoelectric generator tiles are more efficient than thermoelectric cooler tiles when used in this manner. The USB output would then allow the user to charge devices, such as a smartphone, at their convenience using the energy stored in the battery pack. The device is targeted at backpackers and other outdoor enthusiasts who need to charge a USB device while on a trip.

Project title: 2D Platformer Video Game

Contact Person: Michael Atavine, matavine@uvic.ca

Project description:

The advent of online distribution services like Steam, Google's Play Store, and Apple's App Store, as well as the availability of software development tools for the masses, spawned an Independent Game Development movement, in which small teams could craft unique and creative gameplay experiences. Inspired by this movement, our project is to develop a video game (codenamed "Iris") for the PC market. Iris is a 2D Platformer game with a networking theme that explores the idea of what it would be like to navigate the internet as a piece of data or software. The story of the game involves a message being fragmented into pieces and scattered across the internet. The player's task is to traverse the network, collect the fragments, and recover the original message. The game will be developed using the Unity 3D game engine.

Project title: Solidworks Camera Manipulation

Contact Person: Kilian Loftis, kloftis@uvic.ca

Project description:

For many engineers, design and manipulation of objects in Computer Aided Design programs such as SolidWorks is a daily occurrence. However, manipulation of 3D objects using tools in a 2D plane is always extremely cumbersome. Instead, a 3D mode of control would be much more practical and intuitive. Moving a mouse in 2 dimensions to manipulate an object in 3 makes little sense, whereas moving an object in 3 dimensions allows for an intuitive, easy to use interface. This project will involve the design of a device designed to control and manipulate the view of an object in the SolidWorks program. By using a series of accelerometers and an e-compass as input, we can manipulate the camera in SolidWorks accordingly. Thus, a user can twist, turn, and rotate the object around by preforming exactly the same movement on the remote. We then have a 3 dimensional interface device which can manipulate an object in 3 dimensions. In addition, the remote will have buttons to allow the user to zoom in and out, adjust the sensitivity of the device, and disengage the device. Finally, a switch will allow the user to power off the device.

Project title: Quadcopter Urban Search and Rescue

Contact Person: Kirstie Lehman, kirstiel@uvic.ca

Project description:

In hazardous situations such as building collapses, people are often trapped and require the assistance of search and rescue teams. However, this puts Search and Rescue teams at risk as they often need to get close to access the situation or enter the building in order to guide survivors out. The goal of this project is to create a semi- autonomous quad copter that can be controlled it manually through a laptop base station which will allow rescue teams to get a close up view of the situation and decide the best course of action as well as potentially guiding survivors out of a building collapse situation without having to put rescue officials in danger. The hovering will be handled automatically and the user will be able to give commands such as up/down, rotate left/right, forward/back as well as a return to home command. Upon receiving the return to home command, the quad copter should automatically reverse and return to its original position following the path the user took to arrive at its current position. Ideally the quad copter would be able to find instances where its route overlapped and in the event a return to home command is given, the quad copter should use the quickest known path to return to its original position, however this is subject to time limitations. The quad copter will also have a live feed camera mounted on it so that the user can see where the quad copter is

at all times as well as assist with landing in exactly the same spot it began with as little error as possible. The camera should be mounted in a way where it is able to rotate; perhaps using a gimbal to shift its view to give SAR teams the best idea of the situation. A gimbal would also add to the stability of the video as otherwise, the vibration of the quad copters motors may cause the video to be shaky.

Project title: ENERGY HARVESTING

Contact Person: Jennifer Chang, jpchang@uvic.ca

Project description:

The team is proposing to develop a product capable of converting the kinetic energy of the moving human body into usable electrical energy. The design will utilize piezoelectric sensors, thermo sensors, electro active polymers (EAPs), or a combination. Every motion that the human body makes has the potential to be used to generate electricity with a very small effect to the person doing the moving. The motions of humans are not normally smooth and constant, but are quick, short in duration, and highly repetitive. This poses a challenge for energy harvesting and will increase the level of complexity for this product. The growing demand for battery operated devices is driving the innovation of ways to recharge them. This harvester will target the needs of customers who expect to be away from a regular power supplies, but who still need to operate their mobile electronic devices.

Project title: senseNet

Contact Person: Michel Kakulphimp, michelk@gmail.com

Project description:

This project aims to develop a self-configuring and self-healing wireless sensor network platform that may be used for any number of applications requiring the rapid deployment of a telemetry network. This platform is named senseNet. Envisioned is a network composed of nodes, dynamically discovering and connecting to other neighboring nodes to create a mesh network. Each node is fitted with a sensor bus that enables it to be configured for any purpose, whether it be temperature, humidity, sound, or even localization. Reactivity to dynamic events such as node displacement or deactivation would allow the network to maintain integrity in adverse conditions. An emphasis on low-cost and low-power would allow for a great number of nodes to be deployed in an environment with a degree of acceptable loss in case some nodes

are not recoverable. This would be especially useful where the nodes be exposed to hazardous conditions. Possible applications include: outdoor monitoring for use in ecological conservation, indoor monitoring for rapid building inspections, emergency data routing for disaster relief, and surveying areas with complex geography. With a strong focus on low-cost, low-power, and customizable deployment, this team plans on delivering a proof-of-concept system through microcontroller development platforms and circuit prototyped units with at least one type of telemetry to be gathered.

Project title: A Basic Visual Guidance Sensor Subsystem for Racing Robots

Contact Person: Elaine Yan, eyan@uvic.ca

Project description:

This project takes an existing Remote Controlled (RC) car that has been previously modified by a 499 group. This autonomous smart car was built with a Nintendo Wii camera, a microcontroller and infrared distance sensors that allowed it to avoid obstacles in its path, while following a user equipped with two IR light sources set a fixed distance apart. For our project, we will be replacing the Wii camera with a Raspberry Pi camera, the microcontroller with a Raspberry Pi B, and modifying the placement of the IR sensors. The new robot will then use information about its start location and the location of a set of pylons to navigate around the pylons in a pattern. It will be using a three axis accelerometer to maintain an idea of its location until it is in range of the next pylon where it will attempt to correct its location using the camera before rounding the pylon and heading to the next location.

Project title: Real Time Wireless ECG

Contact Person: Kevin Chu, kevin79@uvic.ca

Project description:

The objective of the project is to design and build a wireless personal ECG monitoring system capable of recording and transmitting a patient's ECG sensor signal wirelessly, in real time, to their smartphone, and further relaying it to an online monitoring center. The system consists of two parts: a disposable ECG sensor with a low energy Bluetooth transmitter, wearable by a patient; and a smartphone application, which will receive the ECG signal via Bluetooth, analyze it, and retransmit the ECG data over the internet to doctors, family members, monitoring centers, etc.

Project title: VISUALIZATION OF IMAGE STITCHING AND OBJECT RECOGNITION VISOR

Contact Person: Robert Prior, rprior@uvic.ca

Project description:

The VISOR (Visualization of Image Stitching and Object Recognition) team is working with the UVic AERO club to develop automatic image processing software. As the Unmanned Aerial Vehicle (UAV) flies over the competition field, it will capture images which will be passed to the VISOR software. VISOR will provide image stitching (combining individual images into a single blended visualization of the competition field) and object recognition (shape detection of colored poster boards scattered around the field). The objects which are recognized will be tagged with attributes such as the GPS location, shape, and color. We will provide a visualization of the entire field with outlined recognized objects in a graphical user interface.

Project title: Wireless Breaker Trip Unit

Contact Person: Neven Colak, ncolak@uvic.ca

Project description:

The wireless breaker trip unit will allow personnel working in high voltage environments to protect themselves from injury or death. The system will utilize wireless technology to allow a worker to trip a high voltage circuit from a large distance using their android powered smart phone, ensuring if there is any arc flash during the operation, no harm will come to them. This technology is useful in both industrial and commercial environments.

Project title: The Smart Hat

Contact Person: Garvin Ruus, gdruus@uvic.ca

Project description:

Safety is always a top priority around any job site. Managing the safety of hundreds of employees and contractors can be challenging. This is what motivates the development of the Smart Hat. The Smart Hat will be a hardhat with hardware built which will allow a variety of information to be transmitted to a receiver at a safety headquarters. The safety team and inspectors will be able to easily assess the transmitted information and react accordingly.

Project title: Portable USB Power Pack

Contact Person: Auran Gill, auran89@gmail.com

Project description:

Our objective for this project is to design a portable USB power pack. The motivation behind this project is to give people the ability to charge their phones when they are away from a USB source. This project is intended to address this issue by providing a portable power source with a USB output that can be charged before "heading out". The project has been divided into several tasks; an input voltage converter, battery charger and charge state sensor, output voltage converter, and control logic. Several milestones are anticipated. The first milestone is primarily planning based, determining the input and output specifications of the modules and finding suitable components. The second milestone requires that the initial circuits be designed. By the third milestone, PCBs should be designed and in the process of being manufactured. The fourth milestone will see the system fully prototyped. The final milestone will see the case built.

Project title: BraceLight

Contact Person: Erik Hammer, hammer32t@gmail.com

Project description:

The BraceLight is a transparent bracelet that uses LEDs to transform music frequencies into a wearable light show. The motivation behind this project is the lack of advanced real time audio to lighting control systems on the market. Current designs have no customizability as they only react to the loudness of the music; BraceLight solves this problem by detecting individual frequencies in the music and maps LED colours and brightness to these frequencies based on a unique algorithm. The bracelet contains a circuit with a microphone, gain stages, analog filters, and microcontrollers which performs these calculations in real-time. Other features for future development include a rechargeable battery and Bluetooth radio for a Smartphone App. Both members of the team have a personal interest in electronic music and see a promising market for BraceLight through artists and festivals.

Project title: Point-on-Wave Controller

Contact Person: Tyler Jukes, tjukes1@gmail.com

Project description:

The scope of this project will be to investigate the nature of reactive transient current in transformers, and then implement and demonstrate a Point-On-Wave control system for mitigating it that could be packaged and scaled up for real world high voltage use. This implementation will take the form of a first prototype product to prove the concept of Point-On-Wave switching. Real world factors such as mechanical operation delays will be taken into account so the design and testing is as close to a practical application as possible.

Project title: **Parking Use Monitor**

Contact Person: **Ebby David, eadavid@uvic.ca**

Project description:

The Parking Use Monitor project is meant to track and report on the utilization of special parking stalls. Special parking stalls include spaces such as handicap, restricted, and carpool designated spots. A video feed of the specific stall will be processed by software at a remote location to determine metrics relevant to the usage of the stall. The data will then be aggregated into useful metrics and reported on accordingly.