April 29, 2015 - ECE 2799 ECE Design

Appreciation

Thank you to Professors Stephen Bitar and Bill Michalson for hosting the Robert H. Grant Invention Awards in the ECE 2799 D-Term course. Thank you also to the veteran judging team, Bob Waite, '65 of Waitek, and Bob Barton of PowerSure Corp and David Kmetz for their long hours of pre-competition due-diligence on each invention, their questions, comments, and creative feedback during the competition.

Six teams presented in Atwater Kent 233. Three prizes were awarded, First Place: $1200, Second Place: $750, and Third Place $525 divided amongst team members.

The Design Challenge - Assistive Technology

Every day and all around us there are people waging private battles with some form of disability. Whether it's a family member or friend, each one of us probably knows someone who struggles with accomplishing even the simplest of tasks. This term's 2799 design challenge is to conceive, design and develop a device to assist people struggling with a disability of some type.

These may include, but are not limited to: The visually or hearing impaired and the physically challenged (including the elderly).

The product you design should target a specific task that a person with a disability has difficulty with and should make that task easier for the person. For example, if a person with severe arthritis finds it difficult or painful to operate a light switch; your solution might be to turn on the switch based on touch, sound, proximity, or something else that the person can do more easily. Some thoughts might be to think about things like hazard detection and notification, automating common household tasks, detecting proximity to people or objects, enabling better access to cell phones, laptops and other common items, and many other things. "Simple" things like turning a knob, flipping a switch, pushing a button, or answering a telephone can become very difficult (sometimes impossible) if your hearing, vision, dexterity, or mobility is impaired due to disease, age, injury, or other handicap. Assisting with these tasks can significantly improve a person's quality of life. Your project should include features that your market research deems necessary for a successful product (including an appropriate battery or power supply). Your design should also be cost effective and be priced according to what your market will bear. Your prototype cost should not exceed $50.

Congratulations

The First Place winners were: "Rear View Headset" by Scott Iwanicki, Vishal Rathi and Syed Shehroz Hussain "Ozzy". The Second Place winners were: "Vibrating Touch Glove" by Sean P. Murphy, Max Li and David LaPlante. The Third Place winners were: "Pointer (HOAPD System)" by Joe Agresta, Giselle Verbera and Sean Watson. Congratulations!

Honorable Mentions go to: Relapse Defender, safelyDance Wearable Alert Device and Anti-Wandering Assistive Technology.

The field of competitors was reduced from 23 teams in three classes down to six teams presenting in this challenge. Congratulations again to all of the teams that presented and built working prototypes.

Abstracts

Place Prizes

1st Place: Team 21 - Rear View Headset (Scott Iwanicki, Vishal Rathi, Syed Shehroz Hussain "Ozzy")

One of the biggest challenges for deaf people is to communicate with the surrounding environment. Deaf people are unaware of anything outside their field of vision, which means they are not aware of any alerting sounds such as a doorbell, a phone ringing, a car horn or someone calling them out from behind. The RearView Headset aims to help deaf people by giving them a sense of what is happening behind them or if there are any sounds they should pay attention to. Once a deaf person is alerted, he or she can then communicate or act accordingly once the source of the alert is in their field of vision. RearView Headset has two microphone sensors that listen for any sounds from two directions (left and right) and then alerts the user through the corresponding vibrating motor discs. If the sound is coming from the rear left side, the vibrating motor disc on the left will vibrate and if the sound is coming from the rear right side, then the vibrating motor disc on the right will vibrate. The RearView Headset can be worn around the head like a sports headset with microphones on the left and right ear-pieces. The vibrating motor disks gently touch the neck right below the ears to alert the user. The device can run a minimum of 14 hours with rechargeable battery, which means it can be worn all day.

2nd Place: Team 16 - Vibrating Touch Glove (Sean P. Murphy, Max Li, David LaPlante)

Team 16 has designed and developed a glove that will assist individuals who have lost the sensation of touch in the hands as a result of peripheral neuropathy, multiple sclerosis or the general aging process. The ability to sense touch is often taken for granted, and life without it is frustrating and difficult. The glove designed by Team 16 will assist in the restoration of the sense of touch by using vibration. Vibration aids the sense of touch in a similar fashion to how white noise aids the sense of hearing. Also, the glove will help the disabled persons detect hot surfaces using temperature sensing that will use noise to alert the user to dangerous temperatures.

3rd Place: Team 8 - Pointer (HOAPD System) (Joe Agresta, Giselle Verbera, Sean Watson)

Pointer, also known as the Head-Operated Assistive Pointing Device (HOAPD), enables users with physical disabilities to move and operate a computer mouse cursor without having to use their hands. Geared toward people with severe arthritis, Parkinson’s Disease, cerebral palsy, spinal injuries or other dexterity inhibiting disabilities, Pointer allows users to be more independent when using the computer. To use Pointer, the user simply plugs the system into the USB port of a computer and places the cap on their head when they are ready to use it. To move

the mouse cursor, the user simply moves their head toward one of several infrared (IR) sensors attached to the computer monitor and the cursor responds by moving in the direction of the sensor pointed to. Two oversized buttons are also provided to act as the left and right click buttons on a mouse. Even if the user does not have mobility of their hands, the oversized buttons are designed to be pushed down by the user's feet. To turn off the Pointer system, the user's computer can be simply turned off and the power provided to Pointer by the USB port will shut off as well. Since the device is powered through USB, no batteries or separate power supplies are required. Overall Pointer is an affordable and lightweight device designed to allow people with disabilities to use a computer normally.

Honorable Mentions

Team 25 - Relapse Defender (Daniel Hill, George Pytlik, Devon Bray)

(Judges Note: This team did an outstanding job with judging criteria and demonstrating a working prototype.)16.6 million adults in the United States suffer from alcohol use disorders (AUDs). Out of this population, only 1.3 million receive treatment at facilities specializing in AUDs. Even with specialized treatment, much of this population struggles with relapsing. The Relapse Defender aims to bridge the gap between a recovering alcoholic's support network and their home, providing a safety net for those who relapse. The Relapse Defender is all about helping those struggling with alcoholism on their road to recovery. Our product aims to monitor recovering alcoholics, with their permission and knowledge, in their own homes. The alcohol detector component (pictured above) is designed with a gas sensor that is sensitive to ethyl alcohol in the air. When alcohol is introduced to the home environment, some of it quickly evaporates. The sensor can detect these traces in the air. If a relapse is detected, the alcohol detector sends a transmission to the base station (pictured above) which can signal for help from the customer's support network using text messages and phone calls. Customer's will establish a network of alcohol detectors in their home. Like smoke detectors, each alcohol detector is only capable of sensing alcohol in a given area of the home. Base station modules are capable of receiving data from many different alcohol detectors, and with each added alcohol detector, the size of the area capable of being screened for alcohol increases. This network of alcohol detectors will be able to survey a large portion of the customer's home, defining a large area where relapses can be detected and summarily reported. The end goal of the Relapse Defender is to constantly monitor any one who struggles with an AUD and wishes to recover in a quick and discreet manner for the benefit of the customer.

Team 17 - SafelyDance - Wearable Alert System (Dylan Baranik, Sagar Mahurkar, James Whyte)

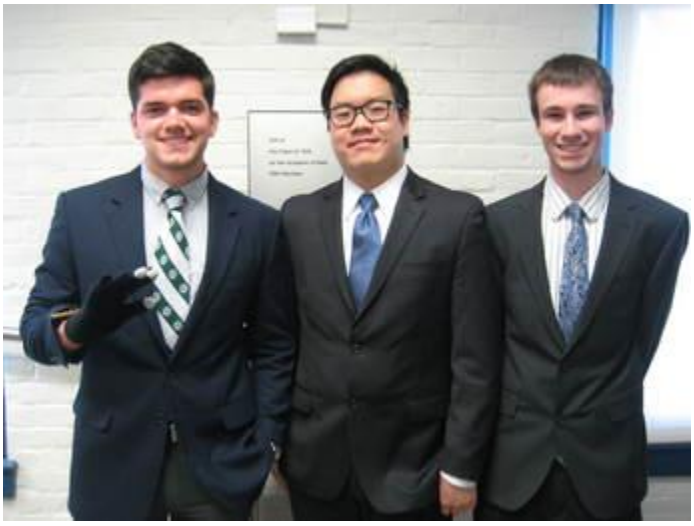
Falling is by far the largest risk of death by injury for the elderly population. The safelyDance medical alert device automatically detects falls. It allows the user to contact loved ones and emergency services in dire situations. Additionally, the device keeps track of heart rate. The safelyDance medical alert device stays with users day and night, including in the shower and while sleeping. Worn on the arm, it wirelessly transmits an alert in an emergency. The safelyDance lets users stay safe and active.

Team 1 - Anti-Wandering Assistive Technology (Alexander Arnold, Liam Perry, Sebastian Rojas)

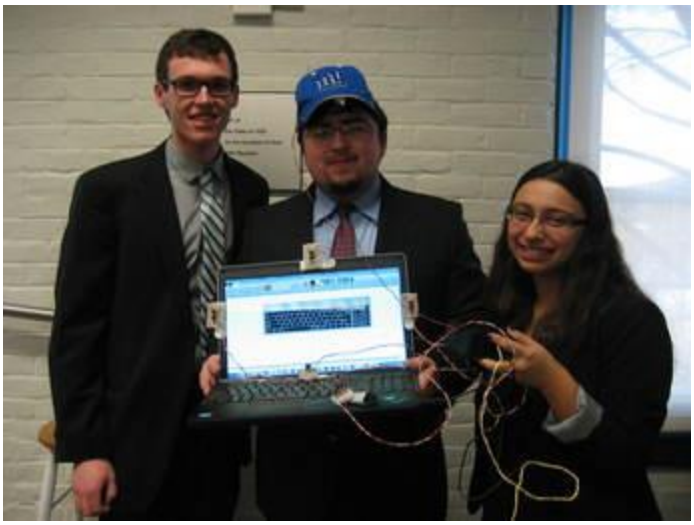
The anti-wandering assistive technology is a device to help monitor the activity of elderly people, in particular people with dementia. The device can be used to monitor external doors and send alerts to the caretaker when the patient attempts to wander by leaving the house at odd hours through monitored doors. The device can also be used with internal doors in order monitor the person's activity through a log. The wandering alert system in the device is great because it will monitor wandering and help prevent danger to the person attempting to wander. The activity log will allow the caregiver to monitor the person's activity and help them notice sudden changes in the person's behavior. The device has two major components, the door sensor system and the central monitoring hub. The door sensor system is battery powered and will be mounted on the door and whenever the door is opened it will transmit a unique identifier to the central monitoring hub. The unique identifier allows the central monitoring hub to differentiate between different doors. The central monitoring hub will be connected to an AC wall outlet and it will be continually listening for a message from the door sensor system. When the central hub receives a message it will decode the identifier and upload the activity to the log. If the activity is at an odd hour the device can send an immediate alert to the caretaker. Lastly, the device will periodically send the activity log to the caretaker.

Judges Bob Barton, Bob Waite '65 and David Kmetz

1st Place! Team 21 - Scott Iwanicki, Vishal Rathi, and Syed Shehroz Hussain "Ozzy" - RearView Headset



2nd Place! Team 16 - Sean P. Murphy, Max Li, and David LaPlante - Vibrating Touch Glove



3rd Place! Team 8 - Joe Agresta, Sean Watson and Giselle Verbera - Pointer (HOAPD System)