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Senior Design Day 2019

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Department of
BIOMEDICAL ENGINEERING

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Polar Solace- Back to Action Therapy Solutions

Team Members:

- Gabriella Bridges
- Daniel Ricano
- Caitlyn Conley
- Taylor Jones

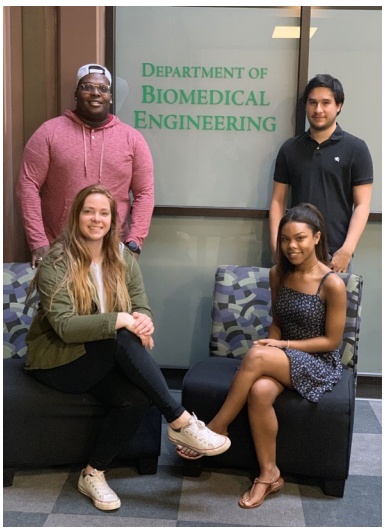
External Sponsors/Mentors:

Internal Sponsors/Mentors:

- University of North Texas Biomedical Engineering Department
- Dr. Logan Porter
- Dr. Stephen Black

Abstract:

Many athletes suffer from sports related injuries, such as muscle sprains and inflammation. There are heating and cooling therapy units on the market. However, these devices can be bulky, expensive, may not provide both heating/cooling, and may require external ice or water. This can limit their usage in terms of cost and location. The Polar Solace is an active heating and cooling therapy unit. This innovative device is affordable, contains a more compact design, and offers both heating and cooling mechanisms without the user having to provide external ice or water. The target market consists of athletes who are in need of immediate pain relief. The Polar Solace is also non-stationary and great for athletes to take on and off the field.



B.A.T.S. would like to say thank you to Jeff Smith and the UNT Athletic Department for testing coordination and Ariandokht Vakili for material purchase and procurement assistance.

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C-Again Glasses: Team BioThinX

Team Members:

- Mehdi Bennis
- Irving Chapa
- Cera Galecki
- Trey Grantham
- Blake Woodson

External Sponsors/Mentors:

- Cedric Atkins

Internal Sponsors/Mentors:

- Dr. Stephen Black
- Dr. Logan Porter

Abstract:

C-Again optical technology will restore a full visual field to people with blindness in one eye using a specially engineered lens to view a wide-angle live feed. Contained in 3D-printed frames, the device will allow users to capture snapshots and record video of their surroundings. The display of the device also adjusts to best accomodate each user. Although virtual reality has become widely available for entertainment purposes, this device demonstrates a digital environment as an assistive device with high-aesthetic design and low-cost materials.

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Casket Digital Footsteps – Blackstone Biomedical

Team Members:

- Leighton Doolittle
- Michael Joiner
- Chris Lang
- Brittany Schnell

External Sponsors/Mentors:

- Dr. Tom Black
- Dr. Jared Black

Internal Sponsors/Mentors:

- Dr. Stephen Black
- Dr. Logan Porter

Abstract:

Surgical tools caskets currently are manually and physically tagged, resulting in the problems of delayed use and validation of needed tools for surgeries. The Casket Digital Footsteps project primarily creates a method to track caskets in real time, gather locational information, store the information, and search the location of specific tools. This creates a faster and more efficient method for locating surgical tools needed for immediate use.

A special thanks to BlackTechIP, LLC for the opportunity to develop this project and University of North Texas, namely Dr. Vijay Vaidyanathan for the support and guidance through the years.

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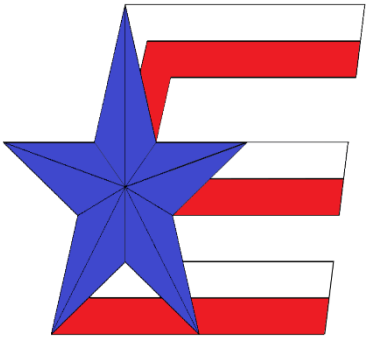

Etch Cart - Etchronics

Team Members:

- Sara Hoffman
- Sloan Uys
- Taylor Roof
- Bria Winn

External Sponsors/Mentors:

- Elvin Cherukunnathu, Parker Hannifin

Internal Sponsors/Mentors:

Abstract:

The main goal of the project is to build a working, functional cart that will be portable, easy to operate, and will produce minimal waste. The cart will need to be transported to three different areas on the production floor, depending on the size of the tubing. In one swift motion, once the tubing is extruded from the previous machine, the cart will directly accept the tubing and continue passing it through. All waste will be contained on the cart, with the water and alcohol solutions being filtered and recycled. This eliminates downtime on the production floor and the need to use different operators, therefore, increasing productivity.

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Sleep Steer - iCardioTech

Team Members:

- Leonie Quaye
- Juanette Boateng
- Aishat Muibi

External Sponsors/Mentors:

Internal Sponsors/Mentors:

- University of North Texas
- Dr. Logan Porter

Abstract:

The SleepSteer is a driver drowsiness alert system that is connected to a steering wheel of a vehicle. The SleepSteer alerts the driver's finger when they begin to experience fatigue. The goal of the SleepSteer is to lessen the rate of car accidents caused by drowsiness on the road. The main objective of the SleepSteer is to incorporate a distributed sensor network into the steering wheel, the sensor network is to be synced with a night vision camera, this combination allows for the calibration and determination of the driver's fatigue levels.

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Paw Scheme

PAW SCHEME

Team Members:

- Bunyong Dejanipont
- Fernando Chavira Moreno
- Harold Santiago Ramos
- Dan Do

External Sponsors/Mentors:

- April Becker, Ph.D, Department of Behavioral Analysis, UNT

Internal Sponsors/Mentors:

- Logan Porter, Ph.D, Department of Biomedical Engineering, UNT

Abstract:

The cylinder test is the most common analytical assisting tool used to help diagnose the condition of the rat's central nervous system. However, there are drawbacks to this method. This method currently requires researchers to rewatch pre-recordings of these rats, which takes away precious time that can be utilized elsewhere. To address this problem, our team "Paw Scheme" has created a test called "Paw Asymmetry Test" (PAT) to automate the task of the cylinder test. Through the use of Processing 3, an open graphical library, a color code was created that senses the rat's touches with the use of Raspberry Pi touchscreens. This process is then recorded and sent to Google Cloud's object detection services to translate, label, and detect the objects from the recording. Google Cloud's object classifier will detect objects, defined by pre-chosen colors of the touchscreens, that are being triggered by the rat's touch. Lastly, our Raspberry Pi counter script would then maintain a counter to quantify the number of contact points made while indicating which paw(s) made contact. PAT will be the new innovative test that replaces the cylinder test, consisting of Google Cloud's machine vision for training and evaluating customized models.

UNT TRiO student support services, UNT Department of Behavior Analysis, and the Texas state-wide program JAMP (Joint Admission Medical Program)

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PolyRegenEX – Hydrogel Drying Chamber

Team Members:

- Lauren Vandebrake
- Kris Bickham
- Victoria Glasco

External Sponsors/Mentors:

- Smith & Nephew

Internal Sponsors/Mentors:

- Biomedical Engineering

Abstract:

Smith & Nephew researchers have developed a liquid hydrogel compound that can be dried into a film and applied to the epidermis to clean and prevent infection in chronic wounds typically associated with diabetic patients, geriatric patients, and burn victims. Drying the liquid hydrogel in an open-air drying environment is a time-consuming and inefficient process which can take up to 72 hours. The hydrogel drying chamber (HDC) greatly decreases the amount of time it takes to dry the hydrogel. The HDC processes data from sensors within the chamber to determine the dryness of the film.

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Pecrus Excavatum surgical innovation – Xiphos

XIPHOS

Team Members:

- Meshach Jassal
- Andrew Bowley
- Austin Ridwaway
- Ray Habib

External Sponsors/Mentors:

- Dr. Tom Black

Internal Sponsors/Mentors:

- Dr. Stephen Black
- Dr. Logan Porter
- Dr. Vijay Vaidyanathan

Abstract:

Pectus excavatum is a birth defect affecting thousands of children across America. The most prevalent surgical technique requires long hospital stays post operation. Xiphos is designing a new technique that will move away from large, instantaneous force and towards a move a over time correction.

We would like to thank BlackTechIP, LLC for the opportunity to work closely with them and develop their ideas. We would also like to thank The University of North Texas Biomedical Engineering department, namely Dr. Vijay Vaidyanathan, Dr. Logan Porter, and Stephen Black for the support through the years.