XXV Twenty-Fifth Annual

ENGINEERING ■ DESIGN

expo

2018

Celebrating the next 25 years in engineering

Presented By:

Foundation
Micron®

University of Idaho
Engineering Outreach

2018 EXPO AWARD WINNERS

PEOPLE'S CHOICE AWARD WINNER

WIRELESS FORKLIFT HEIGHT ENCODER

The objective of the project is to develop a forklift sensor which displays the exact height of the forks to an operator. The interdisciplinary team has created a solution which measures the height of the forks, operates wirelessly while harvesting its own energy and transmitting data to the truck for display to the operator.

Brett Harned - Electrical & Computer Engineering
Matthew Harned - Mechanical Engineering
Austin Phillips - Mechanical Engineering
Preston Rhodes - Mechanical Engineering

CLIENT/SPONSOR
Hyster-Yale Group

ADVISOR
Matthew Swenson

BOOTH AND TECHNICAL PRESENTATION AWARD WINNERS

BIOCHAR PRODUCTION SYSTEM

Lumber mills produces hundreds of tons of waste woody biomass that has almost no economic value. Turning these bio waste to biochar is economically and environmentally beneficial. Our team's mission is to develop and prototype a scalable model to retrofit existing boilers in lumber mills to turn wood waste into valuable biochar.

Jake Hall - Mechanical Engineering
Adam O'Keeffe - Biological Engineering
Rachel Rosasco - Biological Engineering
Will Seegmiller - Mechanical Engineering
Joe Stanley - Electrical & Computer Engineering

CLIENT/SPONSOR
IAC - U.S. Department of Energy

ADVISOR(S)
Steven Beyerlein
Dev Shrestha

MENTOR
Brian Hanson

PROJECT A.R.M.: ASSISTIVE REHABILITATION MONITOR
Individuals recovering from post-stroke arm impairments can spend more time conducting therapeutic exercises at home than during supervised in-clinic sessions. To facilitate better qualitative and quantitative monitoring of therapy, the goal of the project is to develop a system that will track arm movements, including repetitions of prescribed exercises.

Matthew Holman - Computer Science
Jacob Middleton - Mechanical Engineering
Ruth Park - Computer Science
Quinton Reese - Mechanical Engineering
Alexanderia Rockwell - Biological Engineering

CLIENT/SPONSOR
U of I College of Engineering

ADVISOR(S)
Bruce Bolden
Joel Perry

MENTOR
Melissa Bogert

SIGHTLESS NAVIGATION AND PERCEPTION (S.N.A.P)
Our goal is to create an easily distributable standard testing environment for gathering data and metrics to find the best possible acoustic navigation algorithm.

Dylan Carlson - Computer Science
Dustin Fox - Computer Science
Andrew Rose - Computer Science

ADVISOR
Bruce Bolden

TATER (TAMPER ANALYSIS VIA TRANSIENT ELECTROMAGNETIC RESPONSES)
This project monitors and characterizes the electromagnetic emissions of a microprocessor during boot to determine potential foreign modification in either software and/or hardware. The product consists of a system with an antenna, amplified in conjunction with a data acquisition platform to a Linux machine for processing by a custom algorithm.

Roy Cochran - Electrical & Computer Engineering
Matthew Covalt - Electrical & Computer Engineering
Lydia Engerbretson - Computer Science
Hannah Pearson - Computer Science
Matthew Waltz - Computer Science

CLIENT/SPONSOR
Idaho Scientific

ADVISOR
Feng Li

BOOTH AWARD WINNERS

TEAM CRUMBLETECH'S TEMPERATURE ARRAY

Biomass needs size reduction as pre-treatment before converting it to ethanol for fuel. The crumble head can get too hot if too much biomass is fed or the teeth are worn out. Our team is sponsored by 'Forest Concepts LLC.' to develop a non-contact temperature sensor to monitor temperature rise in those crumble heads. The team has developed an IR sensor array to profile the temperature along the scrubber head.

Abdulaziz Alazemi - Mechanical Engineering
Feifan Deng - Electrical & Computer Engineering
Jake Miller - Mechanical Engineering
Anthony Ponzini - Biological Engineering

CLIENT/SPONSOR
Forest Concepts

ADVISOR
Dev Shrestha

USING NIR SPECTROSCOPY TO CONTROL COFFEE ROASTS

A person's sensory perceptions judge coffee roast level is subjective, causing difficulties in comparisons and control of roasted products. Near-infrared (NIR) spectroscopy feedback of beans in the roasting process could reduce roasting variabilities. An improved roaster control method using onboard NIR monitoring for home roasters has been developed.

Saad Alanazi - Chemical & Materials Engineering
Amanda Murdock - Chemical & Materials Engineering
Logan Peterson - Chemical & Materials Engineering
Austin Porter - Chemical & Materials Engineering

CLIENT/SPONSOR
U of I Department of Chemical & Material Engineering

ADVISOR(S)
Matthew Bernards
David Drown

MENTOR(S)
Charles Cornwall
David MacPherson
Nathan Yergenson

USTICK & LAKE INTERSECTION IMPROVEMENT

The City of Caldwell has planned to improve the intersection of Ustick Road and Lake Avenue in Caldwell, Idaho. The project objective is to design a larger capacity intersection to meet increasing traffic volume while improving traffic operations, safety, and accessibility.

Andrew Blanchard - Civil & Environmental Engineering
Sean Kelly - Civil & Environmental Engineering
Daniel Logan - Civil & Environmental Engineering
Braiden Markham - Civil & Environmental Engineering

CLIENT/SPONSOR
Six Mile Engineering

ADVISOR
Fritz Fiedler

WIRELESS FORKLIFT HEIGHT ENCODER
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Brett Harned - Electrical & Computer Engineering
Matthew Harned - Mechanical Engineering
Austin Phillips - Mechanical Engineering
Preston Rhodes - Mechanical Engineering

CLIENT/SPONSOR
Hyster-Yale Group

ADVISOR
Matthew Swenson

TECHNICAL PRESENTATION AWARD WINNERS

AN AERODYNAMIC STUDY OF BULK COMMODITY TRAILERS
Our mission is quantifying fuel economy impacts of different aerodynamic features on tractor trailers based on wind tunnel testing with scale models.

Jake Frost - Mechanical Engineering
Brandon Hilliard - Mechanical Engineering
Liam Johnson - Mechanical Engineering

CLIENT/SPONSOR
Western Trailers

ADVISOR
Steve Beyerlein

MENTOR
Sarah Willis

GYPSOS SULFATE REMOVAL FROM MINE IMPACTED WATERS
An intricate process was designed and constructed to demonstrate an economical and environmentally friendly system that can reduce the sulfate concentration in mine-impacted water from around 1800 mg/L to less than 250 mg/L. Implementing this process in the mining industry would prevent sulfate from negatively affecting the environment.

Abdullah Alnafisah - Chemical & Materials Engineering
Nigel Hebbeln - Chemical & Materials Engineering
Lillian Malloy - Chemical & Materials Engineering
Nathan Myers - Chemical & Materials Engineering
Sam Rasmussen - Chemical & Materials Engineering

CLIENT/SPONSOR
IEE/WERC Design Contest

ADVISOR
Matthew Bernards

MENTOR
David MacPherson

INCREASING POLYSTYRENE RECYCLING WITH SMALL SCALE DEPOLYMERIZATION REACTORS
Only six percent of plastic ever produced has been recycled. A problem with polystyrene recycling is its low density makes it not economically feasible to transport to recycling centers. A small scale depolymerization reactor which could be distributed widely throughout municipalities to increase recycling of polystyrene was fabricated and tested.

Hussain Aljasim - Chemical & Materials Engineering
Maichen Carnes - Chemical & Materials Engineering
Preston Goodall - Chemical & Materials Engineering

CLIENT/SPONSOR
KapStone

ADVISOR(S)
Matthew Bernards
David Drown

MENTOR(S)
Charles Cornwall
Connor Hill
David MacPherson

MITIGATING CYBERATTACKS CAUSED BY FAST ACTING HARDWARE
This project goal is to design a nearly undetectable hardware trojan capable of disabling targeted integrated circuits by breaking down the circuit at the transistor level and developing defensive schemes to prevent a widespread flash fatal trojan attack.

Hector Cruz - Electrical & Computer Engineering
Dustin Mallett - Electrical & Computer Engineering
Brenton Van Leeuwen - Electrical & Computer Engineering
Rafael Alves Watanabe - Electrical & Computer Engineering

CLIENT/SPONSOR
U of I Department of Electrical and Computer Engineering

ADVISOR(S)
Saied Hemati
Herbert Hess
Feng Li