

# ECE Newsletter – Spring 2014

## Tough Astronaut

In January the department was visited by a film crew from the “Daily Planet” show (from Discovery Channel Canada). Together with the department of Kinesiology and the department of Apparel and Textiles, ECE has been researching ways of instrumenting future astronauts to better predict fatigue on long duration extra-vehicular (EVA) activities, and to transmit that data to a lunar or Mars habitat site in real time. Our goal is to develop sensors and wireless communication methods to make the installation of these sensors



inside a space-suit as non-invasive as strapping on a wrist watch. But first, the best biosensors for fatigue prediction have to be determined and built and the unique wireless environment of the spacesuit has to be understood. These videos show some of what has been going on in the departments involved at K-State over the past couple years under a 3-year cooperative grant from NASA.

Segment on K-State work starts at 6 minutes 20 seconds into this excerpt from the program:

<http://watch.discoverychannel.ca/#clip1064995>

A companion video segment taken in the K-State communications lab can be found here:

<https://www.youtube.com/watch?v=bIAnUY0cC4Q>

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## Wind Turbine Controls Research

Fariba Fateh at the 15th annual Capitol Graduate Research Summit

A nonlinear adaptive control scheme for wind turbines has been developed. The role of the controller is to adaptively reach the maximum estimated power coefficient when the wind speed changes. The contribution of this work is that instead of using the dither signal used in previous investigations, the extremum seeking controller uses fluctuations in wind speed to adaptively maximize the output power. This control scheme has been verified using the National Renewable Energy Laboratory (NREL) 5MW reference turbine model.

This work was supported in part by the industry sponsored KSU Electric Power Affiliates Program and supervised by Dr. Don Gruenbacher and Dr. Warren N. White. Some of the findings of this ongoing research will also be presented at the American Control Conference, June 4-6, 2014, Portland, Oregon.



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### **Electronics Design Club Grows**

The Kansas State University Electronics Design Club has experienced immense growth this year. With so many young members, the club has focused on developing design skills so that the students can design new projects.

The club has sponsored five guest presentations by ECE faculty this year for all engineering students. Tim Sobering presented on the "Basics of Electronics" and on op amps. Dr. Dwight Day spoke about his design work with SSI and gave a lecture entitled "The Hidden Secrets of Matlab". Dr. David Soldan gave a lecture about amateur radio in conjunction with an Amateur Radio Testing session being held at K-State.

Experienced club members developed several electronics kits for the club to assemble, use, and learn from. The first kit is an easy to build 555 timer circuit that blinks LEDs. A simple bipolar power supply kit was developed to teach power supply design. A small audio

amplifier kit was made to give students an introduction to amplifiers. Finally, a simple LED matrix kit was used as an introduction to microcontrollers. Each of these kits feature a custom printed circuit board and all of the parts required to build the project.[Continue reading "Electronics Design Club Grows" →](#)

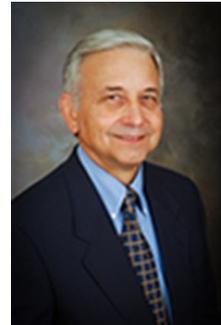
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## [Faculty Highlight – Dr. John Devore](#)

### **Embedded Systems & Digital Design**

Dr. John Devore has been a faculty member of ECE since 1984. His areas of expertise are embedded systems and digital design. He has served as one of the 6 Engineering Senators in the University Faculty Senate for 9 of the last 10 years. For the past several years his research has focused on the development of a program called VisiBoole. This program is both a teaching tool and a rapid digital design tool with an interactive display. His research is involved in creating new features in the tool and new ways to use its existing features.



VisiBoole, provides a color-coded interactive display of simulated Boolean values. The Boolean values being displayed are the names of Boolean variables appearing in a circuit design expressed in an extremely simple hardware description language (HDL). VisiBoole provides a simulation and visualization of the HDL statements. This HDL has only two-valued variables and two statement types. The statements are either a variable-list or a Boolean assignment. Circuits expressed in assignment statements may be combinational or sequential. Sequential circuits are created by appending a ".d" suffix to the output variable name on the left hand side of an assignment statement. Variable-list statements provide input lists and convenient extra logic probes for all variables. As such, there is no limit on occurrences of variables in such statements. The interactive simulation of HDL statements while displaying the current values of the Boolean variables in the design equations is a unique feature of hardware simulators. [Continue reading "Faculty Highlight – Dr. John Devore" →](#)

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## [ECE News and Updates](#)

### **NEWS:**

**Congratulations to Emily Schnell & Ankush Gakhar recipients of the Cancer Research Award.** The award program, which is open to Kansas State University undergraduate

students interested in doing cancer-relevant research, provides \$1,000 awards to about 50 students a year, and \$1,000 per student for research expenses.

### **Eta Kappa Nu named Chapter of the Year! Repeat!!**

### **Welcome new faculty member David Thompson and Project Coordinator Michelle Keating**

Dr. Thompson was born and raised in Kansas, and attended K-State as an undergraduate in electrical engineering, including minors in physics and Japanese. After traveling to Japan for a year on Fulbright scholarship, he attended graduate school at the University of Michigan, earning two Masters' degrees – one in EE, another in Biomedical Engineering – and a Ph.D in Biomedical Engineering. His dissertation work focused on brain-computer interfaces, a technology that can allow completely paralyzed people to communicate. His post-doctoral work, also at Michigan, focused on neural interfaces for advanced prosthetics. Future research areas include low-power implantable and wearable medical electronics, studies of neural function using EEG, and further work in brain-computer interfaces.

Hobbies include basketball, singing and playing guitar, and spending time with his wife and daughter.

[Dawson named College of Engineering Dean](#)

[Phase IV Building Update](#)

### **SAVE THE DATE:**

*Senior Breakfast April 30*

*Commencement: PhD, MS May 16; UG May 17*

*Fall Banquet Sept 26*

### **Upcoming Competition Dates:**

Wildcat Wind Team competes May 5 – 7 in Las Vegas

RCT team competes in the California Micromouse Competition (CMM) on May 11 in San Diego

UAS team competes in the AUVSI Student Unmanned Aerial System competition on June 18 – 22 at the Patuxent River Naval Air Station in Maryland

### **Alumni News:**

College of Engineering honoring 11 alumni for career success. [Navin Nagiah '95 & Stuart Gillen '97 from Electrical Engineering.](#)