



# VIRGINIA MOUNTAIN SECTION NEWSLETTER

IEEE Region 3, Council 09, Section 65

October 2002

Best Western Red Lion Inn, Blacksburg, VA, October 17

## *Enabling Technologies for Platoons of Cooperating Autonomous Underwater Vehicles*

**Dr. Daniel J. Stilwell**

**Bradley Department of Electrical & Computer Engineering  
Virginia Tech**

### Speaker

Dr. Stilwell joined the Virginia Tech faculty in the Bradley Department of Electrical and Computer Engineering in 2002. He teaches courses on systems and controls and directs the Autonomous Systems and Controls Laboratory, where he supervises and conducts research on autonomous underwater vehicles, advanced navigation and control, and the theory of multi-vehicle cooperation. Dr. Stilwell's previous appointment was on the faculty of the United States Naval Academy where he developed the Naval Academy's unmanned underwater vehicle program. Dr. Stilwell received the B.S. degree in computer engineering from the University of Massachusetts, Amherst, MA, in 1991, the M.S. degree in electrical engineering from Virginia Tech, Blacksburg, VA, in 1993, and Ph.D. degree in electrical engineering from Johns Hopkins University, Baltimore, MD, in 1999. His research

has been sponsored by the Office of Naval Research and industry. He holds an adjunct research appointment in the Mechanical Engineering Department at Johns Hopkins University, and regularly consults for both large and small businesses.

### Abstract

It has long been recognized that platoons of cooperating autonomous vehicles can perform certain missions more efficiently and robustly than single vehicle systems. Multi-vehicle systems enable rapid and adaptive large-area surveys, and they are robust to single-point failures. For underwater applications, cooperating vehicles also possess greater energy-efficiency than single vehicles. In this seminar, we discuss the utility of cooperating autonomous vehicles for underwater missions, and present an overview of our efforts to meet the engineering challenges posed by such a system. Topics will range from the practical design of a low-cost, fully autonomous,

miniature underwater vehicle to the mathematics of multi-vehicle cooperation.

### Reservations

Date: Thursday October 17, 2002

Social: 6:30 PM

Dinner: 7:00 PM

Talk: 8:00 PM

Cost: Member or Guest \$15.00

Student \$ 8.00

### Best Western Red Lion Inn

900 Plantation Rd., Blacksburg VA

Directions:

I81 Exit 118, 460W to Blacksburg, stay on by-pass, exit at Prices Fork Rd towards Prices Fork. Left at first traffic light (Plantation Road). Best Western is on the left.

Reserve by **5 PM Monday** Oct. 14

**Mark Shepard (540) 387-8710**

[msheward@ieee.org](mailto:msheward@ieee.org)

Please specify number of attendees.



**Meeting of the Joint Chapter of  
the Computer, Control and  
Industrial Applications Societies**

**Tuesday, October 22, 2002  
5-7 PM GE Cafeteria A  
1501 Roanoke Blvd, Salem VA**

***Rapidly-Deployable Broadband  
Wireless Networks  
For Disaster and Emergency  
Response***

**Dr. Scott Midkiff**

Professor of Electrical and Computer  
Engineering  
Virginia Tech

**Firefighters**, emergency medical teams, and others who respond to disasters and emergencies are becoming more and more reliant on information technology. But, in the hours and days following an event, communication is often limited because infrastructure was destroyed, or never existed. Voice telephone service may be interrupted. It may be impossible to communicate with agency headquarters and other field command centers. Access to remote databases, video conferencing tools, Web sites and Web-based applications may be impaired. Many believe that a rapidly deployable broadband wireless communication system can significantly improve the safety and effectiveness of the emergency response.

Researchers at Virginia Tech's Center for Wireless Telecommunications are addressing this need. In collaboration with industry partner SAIC and with funding from the National Science Foundation's Digital Government program, we are investigating such a system for disaster and emergency response. Our goal is to provide a 120-Mbps backbone network to link a hub and up to eight field units.

This talk will discuss three innovations that enable rapid deployment. First, a unique, low-cost broadband channel sounder is integrated into the hub and field units to allow "on-the-fly" channel measurements. Information from the sounder can be used to optimize the placement of the hub and field units. Second, a Geographic Information System tool is used to assess placement options. Together with the sounder, the GIS tool enables the hub and field units to be quickly put in place without first conducting a time-consuming site survey. Third, an adaptive link protocol adjusts error coding and error recovery schemes during operation. This proactive scheme utilizes sounder information to set link parameters based on channel conditions, thus making the system more robust to sub-optimal deployment and a changing environment.

In November 2001 and January 2002, we successfully demonstrated a prototype to federal, state, and local government officials. The prototype system used off-the-shelf modems and 28-GHz radios. The demonstrations included voice-over-IP telephony, VoIP push-to-talk communications, video conferencing, instant messaging, access to the E-Team Web-based emergency management system, and generic electronic mail and Web access.

**Scott F. Midkiff** is a Professor of Electrical and Computer Engineering at Virginia Tech. He teaches and conducts research in networking, especially wireless and mobile networking. Dr. Midkiff has spoken to the Chapter often, most recently on Mobile Internet Technologies in April 2000.

**Reservations are appreciated.** Call Dave Geer, 774-4905 or email [d.geer@ieee.org](mailto:d.geer@ieee.org) **before 5PM Monday, October 21.** You do not have to be an IEEE member to attend. There is no admission charge. Refreshments will be available.

**To get to GE:**  
From I-81 take exit for VA 419. Turn

Left (South). Go about 3.2 miles. Turn left at stoplight, at 419 and Roanoke Blvd. GE is on your left. Turn left at 2<sup>nd</sup> driveway. Go to the guard house to pick up a pass and meet your escort.

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**The VMS Web Site**

Browse to:  
<http://www.ewh.ieee.org/r3/virginia-mountain/>

It has a wealth of information about the Section and the IEEE not generally available through other sources.. Your feedback and input are always welcome. Send it to [mailto:bill\\_onesty@juno.com](mailto:bill_onesty@juno.com)

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**Newsletter Distribution**

General mailings of the Newsletter have been discontinued. Anyone wishing to receive e-mail notification of meetings should send their e-mail address to [ijacobs@vt.edu](mailto:ijacobs@vt.edu)

If you do not have e-mail, are an IEEE member, and wish to get postal mailings of the Newsletter, please call Ira Jacobs, 540-231-5620.

**EDITOR STILL  
NEEDED**

Now that the distribution of the Newsletter has been simplified considerably, wouldn't someone like to take this over? I (and other members of the VMS Executive Committee) will serve as Interim Editors until we get a volunteer. We really do need someone to step up and volunteer. Anyone interested please call (540) 231-5620 or <mailto:ijacobs@vt.edu>

**Ira Jacobs**  
*Temporary (I hope) Editor*

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**Update your IEEE Record**

When did you last update your records at IEEE? Have you moved, changed phone number, or e-mail address? There is a web based interactive "change of address" form at:  
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You can send an e-mail message to:  
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## 2002-2003 MEETING SCHEDULE

DATE	SPEAKER/TOPIC	MEETING PLACE
September 19	<b>Brian Lindholm</b> Six Sigma Methods at General Electric	Clarion Hotel Roanoke
October 17	<b>Daniel Stilwell</b> Enabling Technologies for Platoons of Cooperating Autonomous Underwater Vehicles	Best Western, Blacksburg
November 21	<b>David Stocker</b> LIDAR Technology for Fully Automatic Crane Operation	Clarion Hotel Roanoke
January 16	<b>Student Projects</b> Details: TBD	Clarion Hotel Roanoke
February 20	TBD	Clarion Hotel Roanoke
March 20 <b>Spouses' Night, 2003</b>	TBD	Clarion Hotel Roanoke
April 17	<b>John Bay</b> DARPA Information Exploitation Office (IXO) Programs	Clarion Hotel Roanoke
May 15	<b>Plant Tour</b>	<b>TBD</b>

### IEEE Virginia Mountain Section

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#### NEWSLETTER

**Interim Editor:** Ira Jacobs  
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**Anyone may submit material for the Newsletter**  
**Deadline:**

***Monday following each meeting***

Submit To: Editor

#### Change of Address

US Mail: IEEE Service Center  
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(Changes are forwarded to the Newsletter)

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