



VIRGINIA MOUNTAIN SECTION NEWSLETTER

IEEE Region 3, Council 09, Section 65

November 2002

November 21, Clarion Hotel Roanoke Airport

LIDAR Technology for Fully Automatic Crane Operation

David G. Stocker

GE TOSHIBA Automation Systems
Salem, VA

Speaker

David G. Stocker is a Senior Systems Engineer at GE TOSHIBA Automation Systems in Salem, Virginia. After receiving the BSEE degree from Purdue University in 1986 he joined GE Drive Systems as an Industrial Controls Engineer. At GE and GE TOSHIBA he has worked in the areas of Metal Rolling mill control and application engineering and in the product development group as a Design Engineer. In the design role he was system engineer through the development of the sensor system that was a key component in one of the world's first fully automated container crane stacking yards at the Port of Singapore. He is currently a Senior System Engineer for the Material Handling group at GE TOSHIBA Automation Systems, specializing in the development of crane automation and logistics systems for container terminals and other heavy industrial crane applications around the world. He is a member of the IEEE, and an instrument rated private pilot.

Abstract

LIDAR (Light Distance And Ranging) technology is the optical equivalent of RADAR. Non-contact sensors based on the time-of-flight measurement principle of laser light have been available for several years. Initially LIDAR devices required highly reflective targets, however they can now provide highly accurate measurements of natural targets in cost effective packages that are suitable for outdoor and industrial environments. The simplest LIDAR sensors are one-dimensional rangefinders, but the technology has been extended into two and three dimensions via rotating mirrors or lenses integrated into the sensor. While multi-dimensional LIDAR technology has been used in military systems and scientific research for many years, it is only recently that cost effective, robust and eye-safe devices suitable for use in commercial and industrial applications have become available.

GE TOSHIBA Automation Systems has utilized multi-dimensional LIDAR sensors in several crane automation

applications. Examples include unmanned container stacking cranes at a major Asian seaport and fully automatic cranes serving a slab yard at a large European hot strip steel mill.

After a short introduction and overview of LIDAR technology, this talk will focus on the LIDAR based sensor systems on these cranes and how they are integrated into the overall crane control system.

Reservations

Date: Thursday November 21, 2002
Social: 6:30 PM
Dinner: 7:00 PM
Talk: 8:00 PM
Cost: Member or Guest \$15.00
Student \$ 8.00
Reserve by 5 PM **Monday** Nov. 18

Mark Shepard (540) 387-8710
mshepard@ieee.org
Please specify number of attendees.

**Directions to
Clarion Hotel Roanoke Airport**

2727 Ferndale Drive NW
1581 Exit 3 Hershberger Rd West
1st Rt. onto Ordway Drive,
¼ mile, Rt. Into Parking Lot.

CHAIRMAN'S CHAT ROOM

I am writing for our November Newsletter issue, which will be the last for 2002. Our November program will be held on November 21 at the Clarion Hotel in Roanoke. It will feature David Stocker discussing "Fully Automatic Crane Operation." Please mark the date and plan on coming. It will be most interesting. There will not be a December meeting, but the programs and the Newsletter will resume in January with the Student Papers Contest.

This is thus my last opportunity to write as your 2002 Chairman. A new slate of Officers will be nominated for 2003. Please watch for your ballot, vote, and return the document to the Secretary for counting. We look forward to a very active 2003, so consider a volunteer role in the Virginia Mountain Section by responding to the Nominating Committee or call me to pass along your name.

I want to thank the Officers, Executive Committee Members, Chapter Chairs, and volunteers who worked with me during 2002. Your support was great. We put together an active mix of programs and activities including closer linkages with our student members. I look forward to an even more successful year in 2003. Be a part of it – volunteer and participate. In the meantime, see you November 21st!

Howard Moses

The VMS Web Site

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

Feedback and input are always welcome. Send it to bill_onesty@juno.com



**Computer / Control /
Industrial Electronics Chapter**

MEETING REPORT

Dr. Scott Midkiff

Professor of Electrical & Computer
Engineering, Virginia Tech
*Rapidly Deployable Broadband
Wireless Networks for Disaster &
Emergency Response*

It took seven days to provide internet service to fire fighters, police, and other first responders at the Pentagon after September 11, 2001. Seven Days! The Pentagon!! Unacceptable!!! Yet, if you tried to reach friends or family in the DC area on that day you can understand why. Dr. Scott Midkiff, Dr. Charles Bostian, and others at the Center for Wireless Telecommunications at Virginia Tech are trying to provide a solution.

The goal for the system they are developing is to provide a 120 Mb/s wireless backbone that is robust and can be rapidly deployed. The hub and up to eight field units contain a unique channel sounder that provides on-the-fly channel parameter measurements. A Geographic Information System supplies information on propagation obstacles such as buildings and natural terrain. Using these two tools, the hub and field units can be rapidly put in place without a site survey. Finally, an adaptive link protocol adjusts error coding and recovery schemes to during operation. The number of forward error correction bits, and the number of outstanding messages allowed before an acknowledgement is required is dynamically adjusted to optimize data thrupt during changing channel conditions.

The system operates in the 28-31 GHz spectrum licensed by Tech in 1998.

Propagation is line-of-sight and is affected by heavy rain and foliage.

The project is funded in part by the NSF. Successful demonstrations were held in November 2001 and January 2002, using primarily off-the-shelf hardware. Services demonstrated include voice over IP, video conferencing, instant messaging, and access to a web-based emergency management system, as well as email and generic web access.

To learn about the project, visit www.cwt.vt.edu.
...Dave Geer

**IEEE-USA Releases Unemployment
Survey Results**

The 2002 IEEE-USA Unemployment Survey results are now available online at <http://www.ieeeusa.org/careers/survey/2002results.pdf>. The survey reveals that older electrical and electronics engineers are unemployed longer than their younger counterparts. Furthermore, respondents who reported age as a barrier to reentering the workforce faced longer lengths of unemployment (55 weeks) than those who did not say age prevented them from obtaining jobs (30 weeks).

Several members have questioned whether IEEE-VMS could help those who are seeking employment in our region. This is being discussed by the VMS Executive Committee, but in the interim if there are local companies seeking full or part-time professional employees, please communicate this information to the Newsletter Editor.

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 jjacobs@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.

2002-2003 MEETING SCHEDULE

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

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Anyone may submit material for the Newsletter
Deadline:

Monday following each meeting

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(Changes are forwarded to the Newsletter)

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