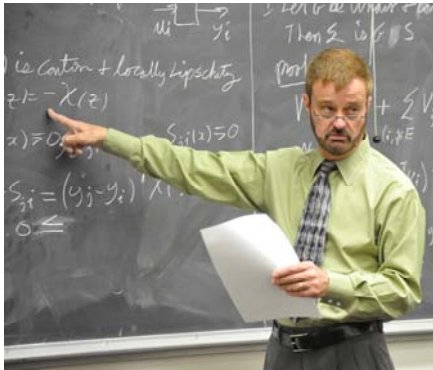


Moncrief-O'Donnell  
Endowed Chair  
2012 Annual Report



F. L. Lewis, Ph.D., Moncrief-O'Donnell Endowed Chair  
Fellow IEEE, Fellow IFAC  
Fellow U.K. Inst. Meas. & Control  
Prof. Engineer Texas, Chartered Eng. UK Eng. Council  
University Distinguished Scholar Professor  
University Distinguished Teaching Professor  
UTA Research Institute, University of Texas at Arlington  
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The **Moncrief-O'Donnell Endowed Chair in Robotics** was filled in October of 1990 with the hiring of Dr. Frank L. Lewis. Dr. Lewis established the Advanced Controls and Sensors Group (ACS) of the UTA Research Institute immediately on his arrival.

### ACS PROGRAM OVERVIEW

The UTARI Advanced Controls and Sensors (ACS) Group consists of Dr. Lewis, 4 Ph.D. students, masters and undergraduate students, and often international visiting research faculty. The primary thrusts of ACS are research in controls design for robotic, aerospace, and autonomous systems, intelligent control, cooperative control of networked teams, sensor networks, and real-time control implementation.

Lewis has graduated 40 PhD students. Most of these students have won international and local awards for their work, and several have written books and received US patents. Three are NSF Career Awardees and one is a Dept. of Homeland Security Career Awardee.

### Current NSF Funding

ACS has received 77 competitive research grants since 1990 for a total of more than \$8M. Lewis has been continually funded by NSF since 1982. Current funding:

**National Science Foundation (NSF) Grant.** F.L. Lewis, "Adaptive Dynamic Programming for Real-Time Cooperative Multi-Player Games and Graphical Games," NSF Grant, \$272,000 for 3 years, July 2011.

### SBIR Contracts

ACS has received 11 Small Business Innovation Research SBIR contracts to work with small companies, including two Phase II SBIR. Funding has been from US Army, US Navy, Dept. of Energy, DARPA. In a recent DoE SBIR through SignalPro, Inc., with Dr. Weijun Lee in EE Dept., ACS developed wireless sensors for prognostics and health monitoring of rotating machinery.

### IEEE CIS Neural Network Pioneer Award

Dr. Lewis received the 2012 IEEE Computational Intelligence Society NN Pioneer Award. This award recognizes significant contributions to early concepts and sustained developments in the field of neural networks, including fundamental understanding and engineering application.

Lewis will deliver a Plenary Talk at Int. Joint Conference on Neural Networks in Dallas, 5 August 2013 to accept the Award.

### Opening Plenary Talk at FIRA RoboWorld Soccer Cup & Congress

Dr. Lewis delivered the Opening Plenary Talk at FIRA RoboWorld Soccer Cup in Bristol, England in August 2012. FIRA Robo World Cup began in 1995 and is a world renowned event where international university teams take part in a robotics football competition. FIRA shares ideas and future directions of robotics technologies to enlarge human networks in robotics.



### UTA Academy of Distinguished Teachers

Dr Lewis has inducted into the UTA Academy of Distinguished Teachers in 2012.



## Top Cited Journal Papers

Four of our journal papers were listed as among most cited papers:

*Automatica*, H. Zhang and F.L. Lewis, 3<sup>rd</sup> most downloaded *Automatica* paper, Aug 2012.

*Automatica*, H. Xu, S. Jagannathan, and F.L. Lewis paper on stochastic optimal control, 2<sup>nd</sup> most downloaded *Automatica* paper, Aug 2012.

*IEEE Trans. Systems, Man, and Cybernetics, Part B*, A. Al-Tamimi, F.L. Lewis, and M. Abu-Khalaf, and F.L. Lewis, paper on nonlinear HJB solutions. Top cited paper in topic, July 2012.

*Neural Networks*, Draguna Vrabe and F.L. Lewis, paper on actor-critic adaptive control. 15<sup>th</sup> top cited paper in topic, May 2012.

## Opening Plenary Talk at IEEE MSC 2012

Dr Lewis delivered the Opening Plenary Talk at IEEE Multi-Conference on Systems and Controls, Dubrovnik, in October 2012. IEEE MSC is one of the two main conferences of the IEEE Control Systems Society, and focuses on applications and intelligent learning methods in Automation Feedback Control Systems.



## International Invited Lectures

Lewis was invited to deliver Talks and Workshops internationally:

Faculty 20<sup>th</sup> Anniversary Distinguished Lecture, Dept. of Mechanical and Automation Engineering, Chinese University of Hong Kong, Nov. 2011.

Plenary Panel Chair, Int. Symposium on Neural Networks ISNN, Shenyang, China, July 2012.

Plenary Talk, Conference on Industrial Informatics INDIN, Beijing, July 2012.

## Two Books Published This Year

Ognjen Kuljaca graduated in 2003. His work at UTA on Learning Methods for Industrial Control Processes was published as a book this year.



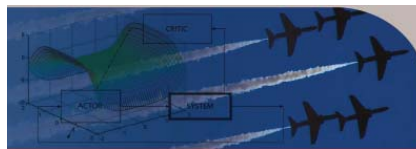
Ognjen Kuljaca  
Frank Lewis  
Krunoslav Horvat

**Intelligent control of industrial and power systems**

Adaptive Neural Network and Fuzzy Systems



Draguna Vrabe and Kyriakos Vamvoudakis graduated in 2009, 2011. Their work at UTA on reinforcement learning for feedback control is published as a book this year by IET Press.



**Optimal Adaptive Control and Differential Games by Reinforcement Learning Principles**

Draguna Vrabe, Kyriakos G. Vamvoudakis and Frank L. Lewis

## Visiting Professors and Students

This year ACS has five long term Visitors for Research.

Dr. P. Muthukumar, India

Reza Modares, Iran

Bahare Kiomarsi, Iran

Lemei Zhu, Beijing, China

Giulio Binetti, Bari, Italy

The photo of Dr. Lewis' research group is on the first page.

## President of Istanbul's Bogaziki University

**Kadri Ozcaldiran**

Lewis's first PhD student Kadri Ozcaldiran (red sweater) just stepped down after serving for 5 years as President of Bogaziki University, one of the top universities in Turkey. Also shown in the tam-o-shanter is Bob Newcomb, the adviser of Ed Kamen, Lewis's adviser.



## DFW LOCAL IMPACT

*Leadership in the Local Scientific Community*

ACS has contributed to the reputation within the scientific community of both UTA and Dallas/Ft. Worth. Lewis is listed in the Ft. Worth Business Press top 200 Leaders. He served as Founding Chairman of the DFW IEEE Control Systems Chapter, which won the national IEEE best chapter award in 1994. He was selected as Fort Worth Engineer of the Year by the IEEE Section in 1995. He received the IEEE Region Five Outstanding Engineering Educator Award in 2010.

We have received significant funding from NSF, AFOSR, ARO, Texas State, and the DoD SBIR program to work with local and national industry. This has enhanced the competitiveness of DFW and U.S. companies in the area of feedback control systems, automation, MEMS, and Wireless Sensor Networks.