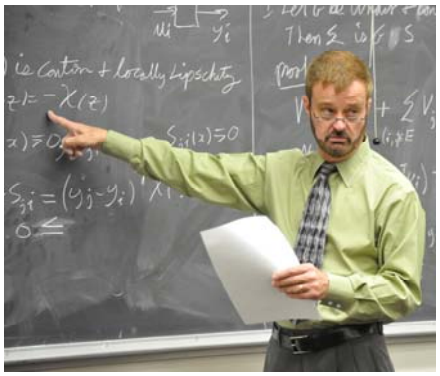
Moncrief-O'Donnell Endowed Chair 2015 Annual Report



F. L. Lewis, Ph.D., Moncrief-O'Donnell Endowed Chair
National Academy of Inventors
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
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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, 5 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 44 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.

Funding of $9M

ACS has received 80 competitive research grants since 1990 for a total of more than $9M. Lewis has been continually funded by NSF since 1982. His recent funding is from NSF, Army TARDEC, Office of Naval Research, and Air Force Office of Scientific Research.

New Funding Received-

A. Davoudi, F.L. Lewis, and C.S. Edrington, "Organic Distributed Decision-making for Hetero-geneous Energy Systems," Office of Naval Research, $557,000, 2014-2018.

Minority and Female Master's Students

Many Master's students work in the UTARI Autonomous Systems Lab. This year we graduated these students:

Chaitanya Rani, female, "System Security and Threat Detection Measures of Autonomous Systems"

Nnennaya Udochu, female minority, "Joint Behavioral Control in Human-Robot Interaction"

Etse Akpaibor, minority, "Voice Recognition and Control of Autonomous Ground and Aerial Vehicles"

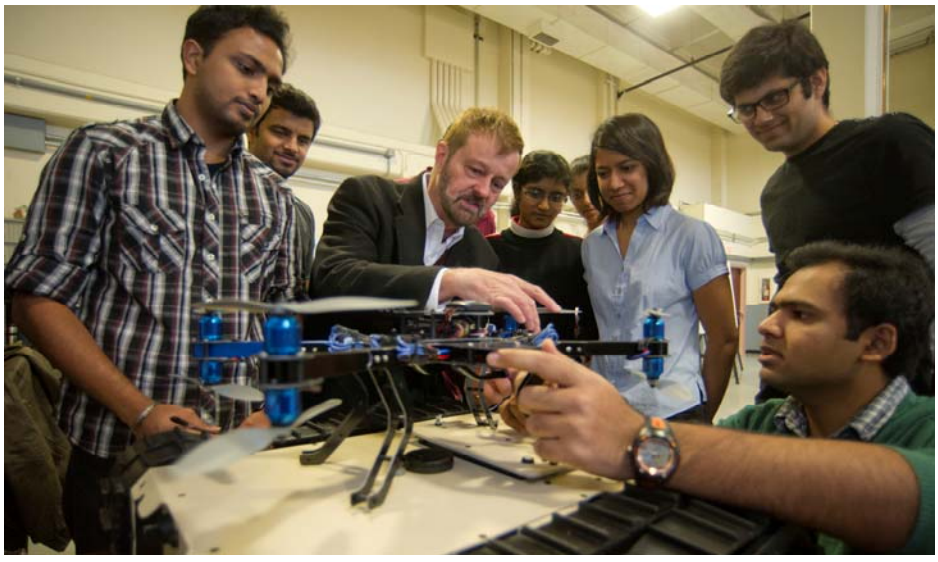
Karthik Arunachalam, "Control of Multiple Micro-air vehicles for Autonomous Teams"

New Patent Received

We have received 7 US patents. We received a new patent this year about our research on using cognitive psychology methods for online learning of feedback control systems. These systems have guaranteed stability, give good control performance, and minimize energy and fuel.

K. Vamvoudakis, D. Vrabie, and F.L. Lewis, "Control methodology for online adaptation to optimal feedback controller using integral reinforcement learning," US patent 9,134,707 issued 15 Sept. 2015.

Students in UTARI Autonomous Systems Lab



Top Ranked Students

UTARI ACS Former Students Are Now World Leaders

Kadri Ozcaldiran, President, Bosporus University, Turkey, 2007-2012

Chaouki Abdallah, Provost, University of New Mexico

Vassilis Syrmos, Vice Chancellor for Research, Hawaii University System

Asma Al-Tamimi, Chairman, Department of Electrical Engineering, Hashemite University, Jordan

Draguna Vrabie, Senior Scientist, United Technologies Research Center, East Hartford, Connecticut

Murad Abu-Khalaf, Executive Director, Kuwait-MIT Center for Natural Resources.

PhD Student Awards

Two PhD students graduating this year won major UTA Awards:

Reza Modares received the UTA N. M. Stelmakh outstanding student research award and the UTA Graduate School Dissertation Fellowship.

Vahid Nasirian was awarded the UTA Graduate School Dissertation Fellowship.

International Invited Lectures

Lewis delivered 6 International Invited and Plenary Talks this year including these:

Keynote Speaker, Int. Symposium on Resilient Control Systems, Philadelphia

Invited Talk, Carnegie Mellon Pacific Campus, NASA Ames, Cal.

Opening Invited Speaker, Workshop on Robotics and Biotechnology, Hong Kong City University

Invited Talk, South China University of Technology, Guangzhou, China,

Collaboration with Ali Davoudi in Renewable Energy Microgrid Control

Lewis is collaborating with Dr. Ali Davoudi in the UTA Department of Electrical Engineering. This is a highly successful team that develops distributed efficient control systems for renewable energy microgrids. Recent results together include:

- 3 PhD students graduated this year
- Office of Naval Research Funding of $557K
- NSF funding of $370K
- New Book in progress about Renewable Energy Microgrids
- US Patent submitted
- New Book Series in Microgrid Control started for Taylor & Francis
- 8 journal papers together this year.

New Major Book Series on Automation & Control

International Research Leadership

Lewis and Davoudi are Editors in Chief of the new Taylor & Francis/CRC Press Book Series on Microgrids and Active Power Distribution Networks This series focuses on publishing application-oriented quality textbooks and research monographs in the area of control of renewable energy microgrids

3 PhD Students Graduate

Lewis has graduated 46 PhD students, many of whom have won national or international awards. This year, 3 PhD students graduated:

Reza Modares, *Reinforcement Learning in Multi-Agent Systems.* Reza is shown with his wife, current Ph.D. student Bahare Kiumarsi.

Vahid Nasirian, whose main adviser is Dr. Ali Davoudi in UTA Dept. of EE. *Control Paradigms in Emerging Energy Hubs.*

Giulio Binetti, visiting student from Bari Institute of technology in Italy. Coadvised by Lewis and Davoudi while he visited UTA for 1 year. His main adviser is Dr. David Naso in Bari, *Distributed Decision and Consensus.*