IEEE Robotics and Automation Society Chapter (Washington Section)

December 12, 2007

Chair: Raj Madhavan, Ph.D.
raj.madhavan@ieee.org
Research Staff Member
Oak Ridge National Laboratory (ORNL)
&
Guest Researcher
National Institute of Standards and Technology (NIST)

Vice Chair: Leon Escobar
leonescobarm@ieee.org
Research Associate
Norbert Wiener Center of Harmonic Analysis (UMCP)
&
Automation and Controls Project Engineer
Nestlé-Dreyer's Ice Cream Factory (Laurel, MD)

Treasurer: Jason Gorman, Ph.D.
jason.gorman@nist.gov
Guest Researcher
National Institute of Standards and Technology (NIST)

Outline

- Chapter Grants
- Chapter-related News
- RAS Chapter Website
- IEEE Concentration Banking
- RAS-NIC Update

- **Member Speaker Series Kickoff @ 7:00 PM**

- *Please add name, email, and signature on the signup sheet*

Chapter Grants

- **Annual Mobile Robotics Competition**
  - **Administrators:**
    - **Melanie Vida (Booz Allen Hamilton)**
    - **John Palmisano (Naval Research Laboratory) &**
    - **Raj Madhavan (ORNL/NIST)**
  - *To provide a semi-formal IEEE-RAS Robotics and Automation competition open to members as well as to the general public with the end-goals to increase member participation, recruit new members, and to grow core-capabilities*
  - *To educate members, University students, and the like in a deeper appreciation of the state-of-the art and the challenges that are currently the focus in Robotics and Automation*

Chapter Website *http://ewh.ieee.org/r2/washsec/ras*

Chapter-related News

- **Chapter Annual Report**
- **Treasurer (Dr. Jason Gorman)**
  - IEEE Concentration Banking Application Submitted
- **IEEE Washington Section**
  - Treasurer-Elect (2008): Raj Madhavan

CapSci'08

www.washacadsci.org/capsci08/Index.htm

- Capitol Science 2008: Washington Academy of Science's Biennial Conference
- To be held March 29-30, 2008 at the National Science Foundation in Arlington, VA

- For RAS Members, registration free for accepted papers
- Students (IEEE Members): Registration Free

Report on New Initiatives Competition

PIs: Stephen Balakirsky, Raj Madhavan, Chris Scrapper

RAS New Initiatives Competition

- ***Advancing Robotic Research through an Open Source High-Fidelity Simulation Framework and Competition***
  - ***PIs: Stephen Balakirsky, Raj Madhavan, Chris Scrapper***
  - Manufacturing Automation Regional Competition
  - One of the 10 proposals that was funded out of 33 submitted

- 7 teams were selected
  - Morgan State University, George Washington University, University of Maryland Eastern Shore, George Mason University & Hood College
  - Faculty: 7 & Students: 11
  - Tutorial & Workshop held at NIST on Oct. 18th & 19th

Motivation & Benefits

- **We believe that this joint effort between RAS and NIST will**
  - Immensely benefit students/researchers especially those from minority institutes of higher learning
  - Lower the entry barrier for robotics research through the use of simulation systems and open source software
  - Serve as a good education model for future competitions
  - Facilitate interdisciplinary research among other robotics & automation fields

Acknowledgments

- IEEE Robotics and Automation Society
- NIST
  - Additional Funding, Staff Support, Meeting Space, …

Accepted Teams

University (Dept.)	Faculty	Student(s)	Email
GMU (CS)	1. Zoran Duric	1. Eugene Yu	*zduric@cs.gmu.edu*
GWU (CS)	2. Rahul Simha	2. Darby Thompson 3. Alex Stefanovski	*simha@gwu.edu*
~~GWU (MAE)~~	~~James D. Lee~~	~~Xiaowei Zeng~~	~~*xwzeng@gwu.edu*~~
UMES (EAS)	3. Ali Eydgahi 4. Payam Matin	4. Mark Bivens 5. Chris Epps 6. Lee Long	*aeydgahi@umes.edu*
Hood College (CS)	5. George Dimitoglou 6. Xinlian Liu	7. Brandon Burger 8. Kristopher Reese 9. Eric Walton	*dimitoglou@hood.edu*
~~**Morgan State (ME)**~~	~~7. Keith Hargrove~~	~~10. Therese Andeme~~ ~~11. Kashun Davis~~	~~*hargrove@eng.morgan.edu*~~

All participating teams received:

- Linux Machines with USARSim & MOAST
- A Dell Computer & Monitor
- Mouse, Keyboard & Joystick
- Unreal Game Engine

Group Photo & Tutorial Day

Competition Basics

- **Teams will be composed of 3 autonomous unit loader vehicles**
- **Task will be factory logistics**
  - Move packages from a distribution point to several dispersed locations
  - Multiple paths to destination, some large enough for two-way traffic, others only large enough for a single vehicle
  - Largest number of correctly delivered packages wins
- **Preliminary tasks**
  - Become familiar with code base
  - Dock with roller tables for package loading and unloading
  - Traffic management
  - Route planning
  - Fine path following to fit in narrow spaces

Beyond this Competition …

- The finalists of the RAS-NIC Competition will be invited to demo their results at **ICRA 2008** (*http://www.icra2008.org/)*
  - To be held in Pasadena, CA from May 19-23 in conjunction with the ICRA Robot Challenge (*http://icra.wustl.edu/)*
  - Discussions with Bill Smart (approved)
- **ICRA 2008 Robot Competition Workshop**
  - *http://icra.wustl.edu/icra07-workshop/*
- **ICRA 2009** (Kobe, Japan)
  - Competition
- **General Motors**
- **NIST**
  - Implementation on real robots in factory settings

Timeline

- Updates & Discussions via Google Newsgroup
  - http://groups.google.com/group/ras-man-comp
- Final Competition: April 18, 2008 (a month before ICRA'08)
- Present Research & Outcomes
  - Special Session at the Performance Metrics for Intelligent Systems Workshop (Raj Madhavan: Program Chair): August'08
  - Follow-up Competition: September'08

Discussion

- **Questions/Suggestions**
- **…**

Member Speaker Series

IEEE

RAS Chapter (Washington Section) Member Speaker Series

Date: December 12th, 2007
Time: 7:00 PM
Location:
Univ. of Maryland, College Park, Kim Engineering Bldg. (PepCo Rm. #1105)

Contact Information

Raj Madhavan, Ph.D.
Chair
raj.madhavan@ieee.org
301-975-2865

Intelligent Systems Division
NIST
Gaithersburg, MD 20899.

Design of a Biomimetic Controlled–Curvature Robotic Pectoral Fin

Mr. John Palmisano
Naval Research Laboratory, Washington D.C.
http://www.societyofrobots.com/

Summary
The design, construction, and testing of a biomimetic pectoral (side) fin with actively controlled curvature for UUV propulsion will be discussed. First, a 3D unsteady computational fluid dynamics (CFD) analysis tool has been adapted to computationally optimize any fin design, followed by a full parametric study based on our findings. Second, this said fin has been constructed, and our working optimized mechanical design is offered. We demonstrate an experimental vs. computational result comparison for thrust, lift, and flapping moment data – showing that a UUV with this technology can have dramatic improvements in low-speed propulsion and control over traditional thruster methods. Lastly, pectoral fin control theory using a prototype UUV will be discussed.

Speaker Biography
John Palmisano has a strong research interest in designing and studying unique forms of robot chassis design and locomotion. A graduate in Mechanical Engineering of Carnegie Mellon University and alumni member of the CMU NanoRobotics Lab, he now does research on robotic fish design at the Naval Research Laboratory in Washington, DC. John also has interests in real-time sensing and control using limited processing power, directly applying those concepts in his current research. John is the author of the popular robot hobbyist website *www.societyofrobots.com*.