

# FCRAR 2003 Advance Program

( Version 3.0 5/1/03 )

## Day 1 – Thursday 5/8/03

### **8:00 – 9:00 AM Registration**

9:00 – 10:15 AM Sessions TA1 and TA2

#### **Session TA1: Mobile Robots**

9:00 – 9:15 AM W. Dubel, H. Gongora, K. Bechtold and D. Diaz (FIU)  
“An Autonomous Firefighting Robot”

9:15 – 9:30 AM B. Landon, D. Martin, D. Morris, M. Morris, J. Railsback and M. Spies (FAU)  
“Walking Robot”

9:30 – 9:45 AM J. Reinhart, V. Khandwala, T. Shah, F. Angus, J. Burford, J. Young, L. Ross, R. Delica, B. Lynch and R. Pollard (FAU)  
“Design and Implementation of Fully Autonomous Fire-Fighting Robot for a Small House Model”

9:45 – 10:00 AM A. Simon and M. Adjouadi (FIU)  
“Implementation of a High Impedance Solid State Relay for Interfacing a Robotic Platform to a Computer”

10:00 – 10:15 AM J. Blanch and S. Tosunoglu (FIU)  
“RC-Servo and IR-Sensor Control on Mobile Platforms”

#### **Session TA2: Control Systems**

9:00 – 9:15 AM

9:15 – 9:30 AM A. Zadegan and A. Zilouchian (FAU)  
“Model Reduction of Large-scale Systems Using Perturbed Frequency Domain Balanced Structure”

9:30 – 9:45 AM C. Popescu, Y. Wang and H. Zhuang (FAU)  
“Stability of Delayed Networked Nonlinear systems”

9:45 – 10:00 AM K. Walchko, D. Novick and M. Nechyba (UF)  
“Development of a Sliding Mode Control System with Extended Kalman Filter Estimation for Subjugator”

10:00 – 10:15 AM J. Plew, A. Arroyo and E. Schwartz (UF)  
“Advances in the Application of the Evolvable Hardware Method to Autonomous Robot Design”

### **10:15 – 10:30 AM Coffee Break**

10:30 – 12:00 AM Sessions TA3 and TA4

#### **Session TA3: Autonomous Vehicles**

10:30 – 10:45 AM J. Grzywna, J. Plew, M. Nechyba and P. Ifju (UF)  
“Enabling Autonomous MAV Flight”

10:45 – 11:00 AM I. Le Goff and A. Leonessa (FAU)

- 11:00 – 11:15 AM “Design, Implementation and Testing of a Bio-Inspired Propulsion System for Autonomous Underwater Vehicles”  
K. Walchko, M. Nechyba, A. Arroyo and E. Schwartz (UF)  
“Embedded Low Cost Inertial Navigation System”
- 11:15 – 11:30 AM A. Leonessa, Y. Morel, M. Vidal and J. Mandello (FAU)  
“Design of a Small Multi-Purpose Autonomous Surface Vehicle”
- 11:30 – 11:45 AM C. Frey and S. Woods (FIT)  
“Development of an Autonomous Underwater Vehicle for Sub-Ice Environmental Monitoring in Prudhoe Bay Alaska”
- 11:45 AM – 12:00 W. MacKunis and D. Raviv (FAU)  
“ A Simplistic Approach to reactive Multi-Robot Navigation in Unknown Environments”

**Session TA4: Kinematics and Dynamics**

- 10:30 – 10:45 AM B. Zhang and C. Crane (UF)  
“Development of a Passive Parallel Platform for Force Control Applications”
- 10:45 – 11:00 AM R. Roberts and T. Shirey (FAMU-FSU)  
“Hybrid Connections of Simple Compliances”
- 11:00 – 11:15 AM M. Marshall and C. Crane (UF)  
“Analysis of a Hybrid Tensegrity Based Parallel Platform”
- 11:15 - 11:30 AM S. Ridgeway and C. Crane (UF)  
“Optimized Kinematics of a 6-6 Parallel Mechanism Considering Position and Orientation Errors”
- 11:30 – 11:45 AM C. Merino and S. Tosunoglu (FIU)  
“Gait design and Balance of Modular Robot”
- 11:45 AM – 12:00 D. Rincon and J. Sotelo (FIU)  
“Simulation and Optimization for Inchworm Like Robot Locomotion”

**12:00 – 1:30 PM Lunch Break**

**1:30 – 2:45 PM : Plenary Session**

- 1:30 – 1:35 PM Welcoming Note by Dean K. Stevens (FAU)
- 1:35 – 1:45 PM Conference Announcements and Introduction of Keynote Speaker (Z. Roth – FAU)

**1:45 – 2:45 PM Invited Keynote Presentation**

**Dr. Mark H. Costin (General Motors Proving Ground, Milford MI)**

**“Automotive Engine Diagnostics”**

- 2:45 – 3:45 PM Sessions TP1 and TP2

**Session TP1: Vision 1**

- 2:45 – 3:00 PM D. MacArthur, E. Zawodny, M. Nechyba and C. Crane (UF)  
“A Robust Boundary Line Extraction Algorithm”
- 3:00 – 3:15 PM J. Martiney, U. Rodriguez and M. Nechyba (UF)

- 3:15 – 3:30 PM “An Automatable Implementation of Beamlets to Classify Frames of Triggered Lightning”  
S. Darmajian, A. Arroyo and E. Schwartz (UF)
- 3:30 – 3:45 PM “An Alternative Real-Time Image Processing Tool”  
D. Antolovic (Chatham College), B. Himebaugh and S. Johnson (Indiana U.)  
“The Skyball Tracking Project”

**Session TP2: Soft Computing**

- 2:45 – 3:00 PM S. Darmanjian, S. Kim, M. Nechyba, S. Morrison, J. Principe, J. Wessberg and M. Nicolelis (UF)  
“Bimodal Brain-Machine Interface for Motor Control of Robotic Prosthetic”
- 3:00 – 3:15 PM T. Landrin and A. Zilouchian (FAU)  
“Implementation of IIR Digital Filters with LabVIEW Using Neural Networks”
- 3:15 – 3:30 PM Y. Zhao and E. Collins (FAMU-FSU)  
“Fuzzy Logic Control of Autonomous Vehicles for parallel Parking Maneuver”
- 3:30 – 3:45 PM H. Zhuang, S. Wongsoontorn and Y. Zhao (FAU)  
“A Fuzzy-Logic Based Trust Model and its Optimization for e-Commerce”

**3:45 – 4:00 PM Coffee Break**

4:00 – 5:30 PM Sessions TP3 , TP4 and TP5

**Session TP3: Teleoperation and Telerobotics**

- 4:00 – 4:15 PM
- 4:15 – 4:30 PM J. Cui and S. Tosunoglu (FIU), R. Roberts (FAMU-FSU) and D. Repperger (WPAFB, Ohio)  
“A Review of Teleoperation System Control”
- 4:30 – 4:45 PM L. Miller, J. Plew, K. Allen, D. Rodriguez, M. Makeev and E. Schwartz (UF)  
“Firebot: Design of an Autonomous Fire Fighting Robot”

**Session TP4: Education**

- 4:45 – 5:00 PM D. Raviv (FAU)  
“Learning Systematic Problem Solving: Case Studies”
- 5:00 – 5:15 PM I. Arroyo, A. Arroyo and E. Schwartz (UF)  
“The Integration of Robotics in Grade School to Promote Interest in Math and Science”

5:15 – 5:30 PM

**Session TP5: Robot Design for Special Applications**

- 4:00 – 4:15 PM D. Cox (UNF)  
“Recent Advances on the Design of a Pool-Playing Robot”
- 4:15 – 4:30 PM J. Martiney and A. Arroyo (UF)  
“(T)ango (R)omeo (O)scar (Y)anke “Greetings, My Name is TROY...””

- 4:30 – 4:45 PM R. Chandler, A. Arroyo and M. Nechyba (UF)  
“Robot Navigation and Textural Analysis”
- 4:45 – 5:00 PM A. Jain, A. Arroyo, E. Schwartz and M. Nechyba (UF)  
“Our First Robot Soccer Player: Pele2”
- 5:00 – 5:15 PM E. Martinson, M. Miller and S. Wasi (FAU)  
“Improvements in the Design of Pipe Inspection Robots”
- 5:15 – 5:30 PM D. Schoenfeld, J. Tulenko, J. Kurtz and M. Keefe (UF)  
“Wireless Communications for Robotics in Radiation Environments”

**5:30 – 6:00 PM Demonstration of High School Team Robotics Projects**  
Garry Ardizzone (Motorola) and the SigmaC@T Team (Dillard and Taravella High Schools) – FIRST Competition  
Tom Kelly (FAU) and the Demolition Team (North Broward Preparatory High School, St. Andrews Academy and Coral Springs Christian High School) – FIRST Competition

**6:00 – 6:30 PM Tour of SeaTech Labs (Mr. Douglas Briggs)**

**7:00 PM – Group Dinner**

### Day 2, Friday 5/9/03

- 8:00 – 9:00 AM Sessions FA1 and FA2
- Session FA1: Sensors, Sensory Data Integration and Instrumentation**
- 8:00 – 8:15 AM D. Sadhukhan and C. Moore (FAMU-FSU)  
“On-Line Terrain Estimation Using Internal Sensors”
- 8:15 – 8:30 AM O. Masory (FAU), J. Benoit (IFMA, France), B. Wright (Palm Beach Sheriff Office and W. Bartlett (Mech. Forensics Eng. Serv., LLC)  
“Data Extraction from Sensory Data Obtained During Driving in Closed Course”
- 8:30 – 8:45 AM T. Choi, M. Nechyba, E. Schwartz and A. Arroyo (UF)  
“Creation and Analysis of a Scenario Based Universal Sensory Driver Layer with Real-Time Fault Tolerant Properties”
- 8:45 – 9:00 AM D. Schoenfeld, J. Tulenko and J. Wang (UF)  
“A Radiation-Hardened Encoder for Robotics in Radiation Environments”
- Session FA2: Vision 2**
- 8:00 – 8:15 AM J. Anderson, M. Nechyba, A. Arroyo and E. Schwartz (UF)  
“Using a Bayes Classifier to Draw the First Down Line on a Football Field”
- 8:15 – 8:30 AM V. Trinh, A. Arroyo and E. Schwartz (UF)  
“A Color Detection Method for Introductory Robotics”
- 8:30 – 8:45 AM S. Todorovic, M. Nechyba and A. Arroyo (UF)

- 8:45 – 9:00 AM “Image Multiresolution Discriminant Analysis for Vision-Guided Stability of Micro Air Vehicles”  
A. Silverman, L. Jimenez, M. Nechyba, A. Arroyo and E. Schwartz (UF)  
“Hand Writing Recognition System for Musical Notes”
- 9:00 – 9:15 AM Coffee Break**
- 9:15 – 10:30 AM Plenary Session**  
9:15 – 9:20 AM Greetings (Dr. Stewart Glegg, Chairman, FAU Ocean Engineering Department)  
9:20 – 9:30 AM Announcements and Keynote Speaker Introduction (Z. Roth – FAU)
- 9:30 – 10:30 AM Invited Keynote Presentation**  
**Prof. Andrew A. Goldenberg (University of Toronto)**  
**“Robotics and Mechatronics: Some Applications and Related Research”**
- 10:30 AM – 11:45 AM Sessions FA3 and FA4
- Session FA3: Multi-Agent Robotics**
- 10:30 – 10:45 AM M. Selekwa and E. Collins (FAMU-FSU)  
“Intelligent Fuzzy Behavior Robotics”
- 10:45 – 11:00 AM K. Puthur and C. Crane (UF)  
“Controlled Deployment of a Self-Deployable Tensegrity Structure”
- 11:00 – 11:15 AM L. Zamstein, A. Arroyo and M. Nechyba (UF)  
“{Hebrew} Letter recognition for Autonomous Agents”
- 11:15 – 11:30 AM A. Arroyo (UF)  
“A Prototype Natural Language Processing System for Small Autonomous Agents”
- 11:30 – 11:45 AM R. Panez, M. Makeev, A. Arroyo and E. Schwartz (UF)  
“A Centralized Associative Behavioral Robotic System”
- Session FA4: Underactuated Systems and Robot Control**
- 10:30 – 10:45 AM A. Jayakaran and C. Crane (UF)  
“Enhanced Trailer Backing and Control”
- 10:45 – 11:00 AM C. Popescu, Y. Wang and Z. Roth (FAU)  
“Passivity Based Control of Spring Coupled Underactuated Horizontal Double Pendulum”
- 11:00 – 11:15 AM J. Clerc and G. Wiens (UF)  
“Design of Reconfigurable Multi-Agent Robots for Urban reconnaissance”
- 11:15 – 11:30 AM Y. Morel and A. Leonessa (FAU)  
“Adaptive Nonlinear Tracking Control of an Autonomous Underwater Vehicle Equipped with a Vectored Thruster”
- 11:30 – 11:45 AM Z. Qu and J. Wang (UCF)

“A New Analytical Solution to Mobile Robot Trajectory  
Generation in the Presence of Moving Obstacles”

**11:45 AM – 12:00 Noon Wrap-up Session**

We gratefully acknowledge Dr. Stevens (FAU Dean of Engineering) and the FAU College of Engineering for sponsoring the event.