

CONTACT INFORMATION	University of Massachusetts Lowell Department of Mechanical Engineering Autonomous Robotic Systems Laboratory One University Avenue Perry Hall 214A Lowell, Massachusetts 01854 U.S.A.	<i>Tel:</i> +1(978) 934-4972 <i>E-mail:</i> Ioannis_Raptis@uml.edu
RESEARCH INTERESTS	<ul style="list-style-type: none">• Fault diagnosis and failure prognosis• Cyber-physical systems• Distributed sensor networks• Multi-agent dynamic systems• Autonomous vehicles• Path planning and trajectory generation• Nonlinear dynamic systems theory and control design	
EDUCATION	University of South Florida , Tampa, Florida USA Ph.D., Electrical Engineering (graduation date: May 2010) <ul style="list-style-type: none">• Dissertation: Linear and nonlinear control of unmanned rotorcraft• Advisors: Professors Kimon P. Valavanis and Wilfrido A. Moreno• Area of Study: Nonlinear control, attitude control, helicopter control and system identification The Ohio State University , Columbus, Ohio USA M.S., Electrical and Computer Engineering (graduation date: June 2006) <ul style="list-style-type: none">• Advisors: Professors Eric R. Westervelt and Stephen Yurkovich• Area of Study: Nonlinear control, bipedal locomotion, robotics, hybrid systems Aristotle University of Thessaloniki , Thessaloniki, Greece Dipl. Ing., Electrical and Computer Engineering (graduation date: November 2003) <ul style="list-style-type: none">• Area of Study: Electronics and computer engineering	
ACADEMIC POSITIONS	University of Massachusetts Lowell , Lowell, Massachusetts USA Assistant Professor <ul style="list-style-type: none">• Department: Mechanical Engineering <i>Autonomous Robotic Systems Laboratory</i> Georgia Institute of Technology , Atlanta, Georgia USA Postdoctoral Research Fellow <ul style="list-style-type: none">• Department: Aerospace Engineering/Electrical and Computer Engineering <i>Aerospace Systems Design Laboratory/ Intelligent Control Systems Laboratory</i> Georgia Institute of Technology , Atlanta, Georgia USA Postdoctoral Research Fellow <ul style="list-style-type: none">• Department: Electrical and Computer Engineering <i>Intelligent Control Systems Laboratory</i>	Sep 12-Present Jun 11-Aug 12 Feb 10-May 11

University of South Florida, Tampa, Florida USA

Research Assistant

Aug 06-Dec 09

- Department: Computer Science and Engineering
Unmanned Systems Laboratory

The Ohio State University, Columbus, Ohio USA

Graduate Student

Jun 05-Jun 06

- Department: Mechanical Engineering
Locomotion and Biomechanics Laboratory

PUBLICATIONS

Book

I.A. Raptis and K.P. Valavanis. *Linear and Nonlinear Control of Small-Scale Unmanned Helicopters*. Springer, 2011.

Book chapter

I.A. Raptis and K.P. Valavanis. Airplane basic equations of motion and open-loop dynamics. K.P. Valavanis, editor, *Advances in Unmanned Aerial Vehicles: State of the Art and the Road to Autonomy*, chapter 3, pp. 49-72, Springer, 2007.

Journal

E. Noursadeghi and I.A. Raptis. Reduced-order distributed fault diagnosis for large-scale nonlinear stochastic systems. *IEEE Transactions on Systems, Man, and Cybernetics: Systems* Submitted November 2016, under review.

E. Noursadeghi and I.A. Raptis. A particle-filtering based approach for distributed fault diagnosis of interconnected nonlinear systems with remote sensors. *IEEE Transactions on Systems, Man, and Cybernetics: Systems*, Submitted December 2015, under review.

C. Sconyers, Y. Lee, K. Kim, S. Oh, D. Mavris, N. Oza, R. Mah, R. Martin, I.A. Raptis, G.J. Vachtsevanos. Diagnosis of fault modes masked by control loops with an application to autonomous hovercraft systems. *International Journal of Prognostics and Health Management*, 4(1):15 pp., 2013.

I.A. Raptis, K.P. Valavanis, and G.J. Vachtsevanos. Linear tracking control for small-scale unmanned helicopters. *IEEE Transactions on Control Systems Technology*, 20(4):995-1010, July 2012.

I.A. Raptis, K.P. Valavanis, and W.A. Moreno. A novel backstepping controller design for miniature rotorcraft using the rotation matrix. *IEEE Transactions on Control Systems Technology*, 19(2):465 -473, March 2011.

I.A. Raptis, K.P. Valavanis, A. Kandel and W.A. Moreno. System identification for a miniature helicopter at hover using fuzzy models. *Journal of Intelligent and Robotic Systems*, 56(3):345-362, October 2009.

I.A. Raptis, K.P. Valavanis, and W.A. Moreno. System identification and discrete nonlinear control of miniature helicopters using backstepping. *Journal of Intelligent and Robotic Systems*, 55(2-3):223-243, July 2009.

S. Srinivasan, I.A. Raptis, and E.R. Westervelt. A low-dimensional sagittal plane model for normal human walking. *ASME Journal of Biomechanical Engineering*, 130(5):430-441, October 2008.

Conference Proceedings

E. Noursadeghi and I.A. Raptis. A particle filtering-based approach for distributed fault diagnosis and estimation of multi-robot systems. *ASME Dynamic Systems and Control Conference*, Minneapolis, Minnesota, October 2016, Accepted.

- E. Noursadeghi and I.A. Raptis. Full-order distributed fault diagnosis for large-scale nonlinear stochastic systems. *ASME Dynamics Systems and Control Conference*, pp. V002T19A004-V002T19A004, Columbus, Ohio, October 2015.
- M.A. Guney and I.A. Raptis. Task-allocation and control of a ground robots collective for warehouse automation. *ASME Dynamics Systems and Control Conference*, pp. V002T30A006-V002T30A006, Columbus, Ohio, October 2015.
- M.A. Guney and I.A. Raptis. A robotic experimental platform for testing and validating warehouse automation algorithms. *IEEE International Conference for Practical Robot Applications*, pp. 1-6, Boston, MA, May 2015.
- D. Fyler, B. Sullivan and I.A. Raptis. Distributed object manipulation using a mobile multi-agent system. *IEEE International Conference for Practical Robot Applications*, pp. 1-6, Boston, MA, May 2015.
- M. Sinclair and I.A. Raptis. Dynamic end target part conveyance using an autonomous morphing surface. *IEEE International Conference for Practical Robot Applications*, pp. 1-6, Woburn, MA, May 2015.
- Z. Liu, Z. Li, B. Liu, X. Fu, I.A. Raptis and K. Ren. Rise of mini-drones: applications and issues. *Proceedings of the 2015 ACM Workshop on Privacy-Aware Mobile Computing*, pp. 7-12, Hangzhou, China, June 2015.
- E. Noursadeghi and I.A. Raptis. Distributed fault detection of nonlinear large-scale dynamic systems. *International Conference on Cyber-Physical Systems*, pp. 51-59, Seattle, WA, April 2015.
- M. Sinclair and I.A. Raptis. Object conveyance control algorithms with spatially changeable end target location using large-scale actuator networks. *International Conference on Robotics and Automation*, pp. 6052-6057, Seattle, WA, May 2015.
- M. Sinclair and I.A. Raptis. Distributed manipulation using cyber-physical systems. *IEEE International Conference on Systems, Man, and Cybernetics*, pp. 3097-3102, San Diego, CA, October 2014.
- D. Laird, J. Price and I.A. Raptis. Design and validation of a centimeter-scale robot collective. *IEEE International Conference on Systems, Man, and Cybernetics*, pp. 918-923, San Diego, CA, October 2014.
- M. Sinclair and I.A. Raptis. Implementation of a large-scale actuator network for distributed manipulation. *ASME Dynamics Systems and Control Conference*, pp. V001T14A006-V001T14A006, San Antonio, TX, October 2014.
- D. Laird, J. Price and I.A. Raptis. Spider-Bots: A low cost platform for testing and validating cooperative control algorithms. *ASME Dynamics Systems and Control Conference*, pp. V001T14A005-V001T14A005, San Antonio, TX, October 2014.
- M. Sinclair and I.A. Raptis. Distributed manipulation using large-scale actuator networks. *2014 Zone 1 Conference of the American Society of Engineering Education*, Bridgeport, CT, April 2014. **Undergraduate student honorable mention.**
- D. Laird, J. Price and I.A. Raptis. Spider-Bots: A low cost cooperative robotics platform. *2014 Zone 1 Conference of the American Society of Engineering Education*, Bridgeport, CT, April 2014.
- I.A. Raptis, C. Sconyers, R. Martin, R. Mah, N. Oza, D. Mavris, G.J. Vachtsevanos. A particle filtering-based framework for real-time fault diagnosis of autonomous vehicles. *Annual Conference of the Prognostics and Health Management Society*, New Orleans, LA, October 2013.

I.A. Raptis and G.J. Vachtsevanos. An adaptive particle filtering-based framework for real-time fault diagnosis and failure prognosis of environmental control systems. *Annual Conference of the Prognostics and Health Management Society*, Montreal, Quebec, Canada, September 2011.

I.A. Raptis and G.J. Vachtsevanos. A health management framework for environmental control systems. In *Proceedings of the 19th Mediterranean Conference on Control and Automation*, pp. 964-969, Corfu, Greece, June 20-23, 2011.

C. Sconyers, I.A. Raptis and G.J. Vachtsevanos. Rotorcraft control and trajectory generation for target tracking. In *Proceedings of the 19th Mediterranean Conference on Control and Automation*, pp. 1235 - 1240, Corfu, Greece, June 20-23, 2011.

I.A. Raptis and K.P. Valavanis. Velocity and heading tracking control for small-scale unmanned helicopters. In *Proceedings of the IEEE American Control Conference (ACC)*, pp. 1579-1586, San Francisco, USA, June 29, 2011.

I.A. Raptis, K.P. Valavanis, and W.A. Moreno. Backstepping control design for miniature rotorcraft using the rotation matrix. In *Proceedings of the 17th Mediterranean Conference on Control and Automation*, pp. 1227-1232, Thessaloniki, June 24, 2009.

PRESENTATIONS

Kiva Systems (Amazon Robotics), *Cooperative Control of Small-Scale Robot Collectives and Distributed Fault Detection of Large-Scale Systems*, North Reading, MA, October 15, 2014.
Vecna, *A Robotic Experimental Platform for Testing and Validating Warehouse Automation Algorithms*, Cambridge, MA, July 10, 2015
Canberra Industries, *Wireless Detection Networks*, Meriden, CT, August 3, 2015

GRANTS AND CONTRACTS

Fellowships

U.S. Air Force Summer Faculty Fellowship Program (SFFP), “*Distributed Change Diagnosis for Networked Robotic Systems*”, Wright-Patterson AFB, 2016.

As Principal Investigator

Robotic Radiation Detectors, UMass Lowell seed grant. \$7,000.

As Co-Principal Investigator

Robotic Radiation Detectors, Canberra Industries, \$15,000.

Quantitative Sensing of Bridges, Railways, and Tunnels with Autonomous Unmanned Aerial Vehicles, Department of Transportation, \$1,417,808, PI: TzuYang Yu, August 2014-August 2016, effort: 0.3 months/year.

GRADUATE STUDENTS

Elaheh Noursadeghi, Ph.D. student, *Distributed Fault Detection of Nonlinear Large-Scale Dynamic Systems*. Fall 2013-Present.

Mehmet Ali Guney, Ph.D. student, *Control of a Ground Robots Collective for Warehouse Automation*, Fall 2014-Present.

TEACHING EXPERIENCE

University of Massachusetts Lowell, Lowell, Massachusetts USA

ME 22.554 *Dynamic Systems and Controls*

Fall 2014-16

- Position: Instructor
- Department: Mechanical Engineering
- Responsibilities: Course Instructor

ME 22.530 *Autonomous Robotic Systems*

Spring 2014-16

- Position: Instructor
- Department: Mechanical Engineering
- Responsibilities: Course Instructor

ME 22.213 *Dynamics*

Spring 2013-Fall 2015, Fall 2016

- Position: Instructor
- Department: Mechanical Engineering
- Responsibilities: Course Instructor

ME 22.451 *Dynamic Systems Analysis*

Fall 2012

- Position: Instructor
- Department: Mechanical Engineering
- Responsibilities: Course Instructor

University of South Florida, Tampa, Florida USA

EEL 4657 *Linear Control Laboratory*

Fall 2006-Fall 2007, Fall 2009

- Position: Instructor
- Department: Electrical Engineering
- Responsibilities: Lecturing weekly laboratory, laboratory supervising, grading laboratory reports and projects

EEL 4743 *Microprocessor Laboratory*

Summer 2008

- Position: Instructor
- Department: Electrical Engineering
- Responsibilities: Lecturing weekly laboratory, laboratory supervising, grading laboratory reports and projects

CAP 6455 *Advanced Robotic Systems*

Spring 2008

- Position: Teaching Assistant
- Department: Computer Science and Engineering
- Responsibilities: Supervised student projects

CDA 3103 *Computer Organization*

Spring 2008

- Position: Teaching Assistant
- Department: Computer Science and Engineering
- Responsibilities: Graded exams, quizzes and projects

The Ohio State University, Columbus, Ohio USA

ME H680 *Digital Data Acquisition and Signal Processing*

Spring 2006

- Position: Laboratory instructor
- Department: Mechanical Engineering
- Responsibilities: Lecturing weekly laboratory, laboratory supervising, grading homework and laboratory reports

SERVICE

Paper Refereeing

- Journal of Intelligent and Robotic Systems
- International Journal of Robust and Nonlinear Control
- Automatica
- IET Control Theory and Applications
- Chinese Journal of Aeronautics
- Mechanical Sciences
- Mathematical Problems in Engineering
- IEEE Transactions on Aerospace and Electronic Systems
- IEEE Transaction on Control Systems Technology
- IEEE Transactions on Systems, Man, and Cybernetics: Systems
- IEEE Robotics and Automation Letters
- IEEE Conference on Decision and Control 2009-2013
- IEEE American Control Conference 2011-2012, 2015

- IEEE International Conference on Intelligent Robots and Systems 2014
- IEEE International Conference on Robotics and Automation 2016

Other

- Robotics Minor coordinator at the department of Mechanical Engineering, University of Massachusetts Lowell, February 13-Present.
- Faculty Senator, University of Massachusetts Lowell, March 2014-March 2016.
- Session Co-Chair (Distributed Control) ASME 2014 Dynamic Systems and Control Conference.
- Session Co-Chair (Navigation) IEEE 2015 International Conference for Practical Robot Applications.
- Session Co-Chair (Cooperative Manipulators) IEEE 2015 International Conference on Robotics and Automation.
- Session Co-Chair (Diagnostics and Detection) ASME 2015 Dynamic Systems and Control Conference.
- Steering committee member, International Conference for Practical Robot Applications.

PROFESSIONAL DEVELOPMENT

Seminars

Attended the short course “*Modeling of Six Degrees of Freedom: Missile and Aircraft Simulations*” organized by the American Institute of Aeronautics & Astronautics

TECHNICAL SKILLS

Operating systems: Microsoft Windows

Specialized software: MATLAB, SIMULINK, X-Plane (Flight Simulator), CIPHER (Comprehensive Identification from Frequency Response)

Programming: C, Matlab

Office productivity: T_EX, L_AT_EX, B_IB_TE_X, Microsoft Office

Data acquisition and control: dSPACE software, Simulink, LabVIEW

REFERENCES

Dr. Clark Taylor

Position: Senior Electronics Engineer at the US Air Force Research Laboratory

Address: AFRL/RY Wright-Patterson AFB, 2241 Avionics Circle, Dayton, OH 45433-7320

Tel: +1(937) 713-8184

E-mail: clark.taylor.3@us.af.mil

Dr. Dimitri Mavris

Position: Professor, Department of Aerospace Engineering, Georgia Institute of Technology

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Tel: +1(404) 894-1557

E-mail: dimitri.mavris@aerospace.gatech.edu

Dr. Andrea Serrani

Position: Professor, Department of Electrical and Computer Engineering, The Ohio State University

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Tel: +1(614) 292-4976

E-mail: serrani@ece.osu.edu

Dr. Wilfrido A. Moreno

Position: Professor, Department of Electrical Engineering, University of South Florida

Address: ENB 254, 4202 E. Fowler Avenue, Tampa, FL 33620

Tel: +1(813) 974-4775

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