JURIS VAGNERS

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Current Position

Professor Emeritus, Aeronautics and Astronautics, 2002 – present

Employment history, University of Washington

Acting Assistant Professor, Aeronautics and Astronautics	1967 – 1969
Assistant Professor, Aeronautics and Astronautics	1969 – 1973
Associate Professor, Aeronautics and Astronautics	1973 – 1980
Professor, Aeronautics and Astronautics	1980 – 2002
Professor, Applied Mathematics	1982 – 1990
Adjunct Professor, Electrical Engineering	1994 – 2002

Industrial employment

Lockheed Missiles and Space Company, Sunnyvale, CA 1961- 1965

Consulting

Mathematical Sciences Northwest, Inc., Bellevue, WA Mathematical modeling, systems analysis.
Boeing Computer Services, Inc., Seattle, WA Optimization theory and applications, estimation, systems analysis, avionics algorithm design.
Sundstrand Data Control, Inc., Redmond, WA Instrument testing and design.
Boeing Military Airplanes, Seattle, WA. Control systems design, navigation filter design, flight test data analysis, numerical methods development.
Insitu, Inc. Bingen, WA. UAV guidance, navigation and control.

Education

University of Washington	BSAA, 1961
Stanford University	MSAA, 1963
Stanford University	PhD. AA 1967

Awards

UW College of Engineering Outstanding Faculty Award, 1997
Academic Engineer of the Year, Puget Sound Engineering Council, 1997
Professor of the Year, Aeronautics and Astronautics, 1995,2000

Background

Professor Vagners completed his undergraduate studies at the University of Washington in Aeronautical Engineering in 1961. He then went to Lockheed Missiles and Space Company to work on satellite programs and pursue graduate studies at Stanford University under the Honors Cooperative Program. He received his doctorate degree from Stanford in Aeronautical and Astronautical Sciences in 1967. Professor Vagners joined the faculty at the University of Washington in the Department of Aeronautics and Astronautics in 1967. From 1982 to 1990, he held a joint appointment in the Applied Mathematics Department, and was Adjunct Professor in Electrical Engineering from 1994 to 2002. Professor Vagners retired from full time teaching duties September, 2002, and remains active on various research projects.

Research Activities

Professor Vagners' teaching interests included dynamics, classical control systems analysis and synthesis, and optimal control and estimation. His research interests have been in the application of unconventional control techniques, i.e., artificial neural networks, fuzzy logic and evolutionary programming, to control systems design. Most recently, his research has focused on autonomous and semi-autonomous Uninhabited Aerial Vehicles (UAVs). In 1998 he collaborated with The Insitu Group on the first crossing of the North Atlantic by a robotic aircraft. The Aerosonde Laima , at ten foot wing span and gross take-off weight of 29 lbs, was not only the first, but by far the smallest aircraft to accomplish such a historic feat. The crossing took 26 hours and 45 minutes and consumed one and a half gallons of aviation gasoline. Since then he has been working on cooperative path and mission planning for multiple UAVs. Another current area of interest is collaboration between UAVs and Unmanned Ground Vehicles (UGVs) and Unmanned Surface Vehicles (USVs).

Selected Publications

1. T. McGeer and J. Vagners, **Historic crossing: an unmanned aircraft's Atlantic flight**. GPS World 10(2): 24-30, February 1999.

2. D. Thayer, M. Campbell, J. Vagners, **Six Axis Vibration Isolation Using Modern Control Techniques**, 22nd Annual AAS Guidance and Control Conference, Breckenridge, CO. Feb. 4-8, 1999

3. T.McGeer, J. Vagners, **Wide-scale use of long-range miniature Aerosondes over the world's oceans**, Proc. AUVSI 26th Annual Symposium, Association for Unmanned Vehicle Systems International, Baltimore, Md, July, 1999

4. K. Bohringer, M. Campbell, J. Vagners **AI Based Satellite Constellations**, American Association for Artificial Intelligence (AAAI) Spring Symposium Series, March, 1999

5. J. Vagners, T. McGeer, L. Newcombe, **Quantitative Risk Management as a Regulatory Approach to Civil UAVs**, International Workshop on UAV Certification, Paris, France, June, 1999

6. T. McGeer, J.Vagners, and G. Holland. **The Aerosonde: opportunities for miniature robotic aircraft following the 1998 Atlantic Crossing**. 4th Annual Airborne Remote Sensing Conference and Exhibition/21st Canadian Symposium on Remote Sensing, Ottawa, Ontario, 21-24 June 1999

7. Q.Y.J. Smithwick, E.J. Seibel, P.G. Reinhall, and J. Vagners, **Control Aspects of the Scanning Single Fiber Endoscope**, Proceeding of SPIE Volume 4253 International Symposium on BiOS 2001, Optical Fibers and Sensors for Medical Applications, 4253:176-188, 2001

8. B. Capozzi, J. Vagners, **Navigating Annoying Environments Through Evolution**, 40th IEEE Conference on Decision and Control, Orlando, Florida , December 4-7, 2001,

9. B. Capozzi, J. Vagners. **Evolving (Semi) Autonomous Vehicles**, AIAA 2001 Guidance, Navigation and Control Conf. Montreal, Canada, Aug. 2001

10. A. Pongpunwattana, R. Rysdyk, J. Vagners, D. Rathbun, **Market-based Co-evolution Planning for Multiple Autonomous Vehicles**, 2nd AIAA Unmanned Systems Conf. San Diego, CA Sept 2003

11. Q.Y.I. Smithwick, P.G. Reinhall, J. Vagners, E.J. Seibel, **A Nonlinear State-Space Model of a Resonating Single Fiber Scanner for Tracking Control: Theory and Experiment**, ASME Journal of Dynamic Systems, Measurement and Control, Vol 126, March, 2004

12. D. Jia, J. Vagners, **Parallel Evolutionary Algorithms for UAV Path Planning", AIAA 3rd "Unmanned Unlimited** Technical Conference, Chicago, IL September 20 -23, 2004,

13. J.C. Rubio, J. Vagners, R. Rysdyk, **Adaptive Path Planning for Autonomous UAV Oceanic Search Missions**, AIAA 3rd "Unmanned Unlimited" Technical Conference, Chicago, IL September 20 -23, 2004

14. R.T. Rysdyk, C.W. Lum, and J. Vagners, **"Autonomous Orbit Coordination for Two Unmanned Aerial Vehicles"** *Proceedings of the AIAA Guidance, Navigation, and Control Conference*, August 2005

15. C.W. Lum and J. Vagners, **"A Modular Algorithm for Exhaustive Map Searching Using Occupancy Based Maps"** *Accepted to the AIAA Infotech@Aerospace Conference*, April 2009

16. C.W. Lum, R.T. Rysdyk, and J. Vagners, **"A Search Algorithm for Teams of Heterogeneous Agents with Coverage Guarantees"** *Submitted to the AIAA Journal of Aerospace Computing, Information, and Communication*

17. C.W. Lum, R.T. Rysdyk, and J. Vagners, **"Rapid Verification and Validation of Strategic Autonomous Algorithms Using Human-in-the-Loop Architectures"** *Submitted to the AIAA Journal of Aircraft*

Selected workshops:

DARPA Workshop on Human Control of Semi-Autonomous UAV Systems, University of Washington, Seattle, WA March 15 - 16, 2001

DARPA Mixed Initiative Control of Automa teams (MICA) Variable Initiative Workshop, University of Washington, Seattle, WA. March 27 – 28, 2002

AFOSR Workshop on Future Directions in Control, Arlington, VA, April 26 – 27, 2002

AFOSR Workshop on UAV Testbeds and Simulation, August 12, 2004

DARPA ISAT Study Group on Embedded Humans, Woods Hole, MA. August 22 – 26, 2005
National Academies of Science Decadal Survey of Civil Aeronautics, Panel D, Dynamics, Navigation, Control and Avionics, Washington, DC, November 14, 2005

Professional Society Memberships

AIAA, IEEE