Karl D. von Ellenrieder

Professor ING-INF/04 (Automatica)
Faculty of Science and Technology
Free University of Bolzano, Piazza Università 1, 39100 Bolzano BZ, Italy

EDUCATION/EMPLOYMENT HISTORY

Education and Training

1998 Ph.D. Aeronautics & Astronautics, Stanford University, Stanford, CA

1992 M.S. Aeronautics & Astronautics, Stanford University, Stanford, CA

1991 B.S. Aeronautics & Astronautics, Massachusetts Institute of Technology, Cambridge, MA

1998-2002 Postdoctoral Research Fellow, Monash University, Melbourne, Australia.

Professional Experience

2016-Present Professor, Faculty of Science and Technology, Free University of Bolzano

Research in the design and control of autonomous systems: unmanned vehicle dynamics and control; design and testing of unmanned vehicle platforms.

2014-2016 Professor, Associate Director of SeaTech Institute for Ocean Systems Engineering, Department of Ocean & Mechanical Engineering, Florida Atlantic University

2008-2014 Assoc. Professor, Ocean & Mechanical Engineering, Florida Atlantic University

2003-2008 Assistant Professor, Ocean Engineering, Florida Atlantic University

2012-2016 Marine Systems Engineering Fort Lauderdale, FL
Consultant – Development of sensor for measuring waterbird drift characteristics.

2007 EdgeTech, LLC Boca Raton, FL
Consultant – design of a side scan sonar towfish.

2006-2007 GALUS Marine, LLC Boynton Beach, FL
Consultant – hydrofoil vessel design.

HONORS AND AWARDS

2015-2016 FAU University Researcher of the Year – Professor Level
1st Place Poster, "An Unmanned Surface Vehicle Robotic Bridge Inspection System," 3rd Annual Florida Automated Vehicles Summit (December 2015)
Associate Editor, IEEE Journal of Oceanic Engineering (2014-present)
Special Advisor, Link Foundation Board of Trustees (2014-present)
Administrator, Link Foundation Ph.D. Fellowships in Ocean Engineering & Instrumentation (2011-present)
ONR-ASEE Summer Faculty Fellowship (2010, 2011)
Dean's Faculty Award, College of Engineering, Florida Atlantic University (2005)
NASA-ASEE Faculty Fellowship Program (2004)

SCHOLARSHIP/RESEARCH/CREATIVE ACTIVITY

Peer Refereed Publications in print
Journal Articles

1. Klinger, W. Bertaska, I. R. and von Ellenrieder, K. D. Adaptive Control of an Unmanned Surface Vehicle with Uncertain Displacement and Drag. *IEEE J. Oceanic Engineering*. (In press – DOI:10.1109/JOE.2016.2571158).

2. Shah, B. C. Svec, P. Bertaska, I. R. Sinisterra, A. J. Klinger, W. B. von Ellenrieder, K. D. Dhanak, M. and Gupta, S. K. Resolution-Adaptive Risk-Aware Trajectory Planning for Surface Vehicles Operating in Congested Civilian Traffic. *J. Autonomous Robots*. Online First access – http://link.springer.com/article/10.1007%2Fs10514-015-9529-x

3. I. R. Bertaska, B. C. Shah, K. D. von Ellenrieder, P. Svec, A. J. Sinisterra, M. R. Dhanak, and S. K. Gupta. (2015) Experimental evaluation of automatically-generated behaviors for USV operations. *J. Ocean Engineering*. **106**:496-514.

4. Duerr, P. and von Ellenrieder, K. D. (2015) Scaling and Numerical Analysis of Nonuniform Waterjet Pump Inflows. *IEEE J. Oceanic Engineering*. **40**(3):701-709.

5. Valentine, W. and von Ellenrieder, K. D. (2015) A Scaling Procedure for Marine Hydrokinetic Systems. *IEEE J. of Oceanic Engineering.* **40**(1): 27-36.

6. Marquardt, J. G. Alvarez, J. and von Ellenrieder, K. D. (2014) Characterization and System Identification of an Unmanned Amphibious Tracked Vehicle. *IEEE J. Oceanic Engineering*. **39**(4):641-661.

7. Finkel, C. L. and von Ellenrieder, K. D. (2014) Synchronization and phase dynamics of oscillating foils. *Journal of Fluid Mechanics* **752**:5–21.

8. VanZwieten, J. H. Seibert, M. G. and von Ellenrieder, K. D. (2014) Anchor Selection Study for Ocean Current Turbines. *J. Marine Engineering & Technology* **13**(1):59-73.

9. von Ellenrieder, K. D. (2013) Free Running Tests of a Waterjet Propelled Unmanned Surface Vehicle. *Journal of Marine Engineering & Technology* **12**(1):1-9.

10. Rynne, P. F. and von Ellenrieder, K. D. (2010) Development and preliminary experimental validation of a wind & solar powered autonomous surface vehicle. *IEEE J. Oceanic of Engineering* **35**(4):971-983.

11. Tall, M. H. Rynne, P. F. Lorio J. M. and von Ellenrieder K. D. (2010) Visual-Based Navigation of an Autonomous Tugboat, *Marine Technology Society J.*, **44**(2):37-45.

12. Rynne, P.F. and von Ellenrieder, K. D. (2009) Unmanned Autonomous Sailing: Current Status and Future Role in Sustained Ocean Observations, *Marine Technology Society Journal*, **43**(1): 21-30.

13. von Ellenrieder, K. D. Parker, K and Soria, J. (2008) Fluid mechanics of flapping wings. *Experimental Thermal Fluid Sciences* **32**(8): 1578-1589.

14. von Ellenrieder, K. D. and Pothos, S. (2008) PIV measurements of the asymmetric wake of a two dimensional heaving airfoil. *Experiments in Fluids* **44**(5): 733–745.

15. Parker, K. von Ellenrieder, K. D. and Soria, J. (2007) Morphology of the forced oscillatory flow past a finite-span wing at low Reynolds number. *Journal of Fluid Mechanics* **571**:327–357.

16. Parker, K. Soria, J. and von Ellenrieder, K. D. (2007) Thrust measurements from a finite-span flapping wing. *AIAA Journal* **45**(1):58–70.

17. Parker, K. Soria, J. and von Ellenrieder, K. D. (2005) Using Stereo Multigrid DPIV (SMDPIV) measurements to investigate the vertical skeleton behind a finite-span flapping wing. *Experiments in Fluids* **39**(2):281-298.

18. von Ellenrieder, K. D. Parker, K. and Soria, J. (2003) Flow structures behind a heaving and pitching finite-span wing. *Journal of Fluid Mechanics* **490**:129-138.

19. Parker, K. von Ellenrieder, K. D. and Soria, J. (2003) Flow visualization of the effect of pitch amplitude changes on the vortical signatures behind a three dimensional flapping airfoil. *Proceedings SPIE* **5058**:331-343.

20. von Ellenrieder, K. D. Kostas, J. and Soria, J. (2001) Measurements of a wall-bounded, turbulent, separated flow using HPIV. *Journal of Turbulence* **2**:004.

21. von Ellenrieder, K. D. and Cantwell, B. J. (2000) Self-similar, slightly compressible, free vortices. *Journal of Fluid Mechanics* **423**:293-315.

Journal Articles Submitted and Under Review

1. Qu, H. and von Ellenrieder, K. D. Lyapunov-based adaptive wind feedforward control for unmanned surface vehicle station keeping. *IEEE/ASME Transactions on Mechatronics* (submitted, under review).

2. Sarda, E. I., Qu, H., Bertaska, I. R. and von Ellenrieder, K. D. Station-keeping Position and Heading Control of an Unmanned Surface Vehicle exposed to Wind and Current Disturbances. *J. Ocean Engineering.*

3. Sinisterra, A. J. Dhanak, M. and von Ellenrieder, K. D. Stereovision-Based Target Tracking System for USV Operations. *J. Ocean Engineering*

Book Chapters

1. von Ellenrieder, K. D. and Dhanak, M. R. (2017) Ch. 7 Hydromechanics. In M. R. Dhanak & N. I. Xiros (Ed.), *Springer Handbook of Ocean Engineering, Part A: Fundamentals.* (pp. 127-175) Springer Science & Business Media. (In Press – DOI: 10.1007/978-3-319-16649-0, ISBN: 978-3-319-16648-3).

Refereed Presentations and Proceedings
International Conferences

1. **MTS/IEEE Oceans '15 Washington DC (October 2015).** "Adaptive Wind Feedforward Control of an Unmanned Surface Vehicle for Station Keeping," H. Qu and K. D. von Ellenrieder.

2. **MTS/IEEE Oceans '15 Washington DC (October 2015).** "Supervisory Switching Control of an Unmanned Surface Vehicle," I. R. Bertaska and K. D. von Ellenrieder.

3. **MTS/IEEE Oceans '15 Washington DC (October 2015).** "Development of a USV-Based Bridge Inspection System," K. D. von Ellenrieder.

4. **MTS/IEEE Oceans '15 Genova (May 2015).** "Development of a USV Station-Keeping Controller," E. I. Sarda, I. R. Bertaska, H. Qu and K. D. von Ellenrieder.

5. **MTS/IEEE Oceans '15 Genova (May 2015).** "Wind Feed-forward Control of a USV," H. Qu, E. I. Sarda, I. R. Bertaska and K. D. von Ellenrieder.

6. **IEEE/OES 11th Current, Waves and Turbulence Measurement Workshop (March 2015)** "Experimental evaluation of motion compensated ADV water velocity measurements applicable to ocean current energy projects," J. H. Van Zwieten, M. N. Egeland, K. D. von Ellenrieder, J. W. Lovenbury.

7. **ASNE Launch & Recovery 2014 (November 2014)**. "Concept for a USV–based autonomous launch and recovery system," E. Sarda, M. Dhanak, and K. D. von Ellenrieder.

8. **2014 IEEE/OES Autonomous Underwater Vehicles (October 2014)**. "High-Level Fuzzy Logic Guidance System for an Unmanned Surface Vehicle (USV) tasked to perform Autonomous Launch and Recovery (ALR) of an Autonomous Underwater Vehicle (AUV)" D. Pearson, P.-C. An, P. P. Beaujean, K. D. von Ellenrieder and M. D. Dhanak.

9. **MTS/IEEE Oceans (September 2014).** "Experimental Testing of an Adaptive Controller for USVs with Uncertain Displacement and Drag," W. B. Klinger and K. D. von Ellenrieder.

10. **IEEE/RSJ International Conference on Intelligent Robots and Systems (September 2014).** "Trajectory planning with adaptive control primitives for autonomous surface vehicles operating in congested civilian traffic," B. C. Shah, P. Svec, I. R. Bertaska, K. Wilhelm, A. J. Sinisterra, K. D. von Ellenrieder, M. R. Dhanak, and S. K. Gupta.

11. **RSS 2014 Workshop on Autonomous Control, Adaptation, and Learning for Underwater Vehicles (July 2014)**. "Field Testing of Dynamics-Aware COLREGs-Compliant Behaviors for USVs," Bertaska, I. R. Sinisterra, A. Shah, B. C. Švec, P. von Ellenrieder, K. D. Dhanak, M. D. and Gupta, S. K.

12. **33rd Intl Conference on Ocean, Offshore, and Arctic Engineering OMAE2014 (July 2014)**. "Experimental evaluation of motion compensated ADV measurements

applicable to ocean current energy projects," Egeland, M. N. Van Zwieten, J. H. von Ellenrieder, K. D. and Lovenbury, J. W.

13. **ICRA 2014 Workshop on Persistent Autonomy for Marine Robotics (June 2014).** "Adaptive sampling based COLREGs-compliant obstacle avoidance for autonomous surface vehicles," Svec, P. Shah, B. C. Bertaska, I.R. Klinger, W. B. Sinisterra, A. J. von Ellenrieder, K. D. Dhanak, M. D. and Gupta, S. K.

14. **IEEE/RSJ International Conference on Intelligent Robots and Systems (November 2013).** "Dynamics-Aware Target Following for an Autonomous Surface Vehicle Operating under COLREGS in Civilian Traffic," P. Svec, B. C. Shah, I. R. Bertaska, J. Alvarez, A. J. Sinisterra, K. D. von Ellenrieder, M. R. Dhanak, and S. K. Gupta.

15. **ASME Dynamic Systems and Control Conference (October 2013).** "Experimental Evaluation of Approach Behavior for Autonomous Surface Vehicles," I. R. Bertaska, J. Alvarez, A. J. Sinisterra, K. D. von Ellenrieder, M. R. Dhanak, B. C. Shah, P. Svec, and S. K. Gupta.

16. **ASME Dynamic Systems and Control Conference (October 2013).** "Nonlinear control of an unmanned amphibious vehicle," J. Alvarez, I. R. Bertaska, and K. D. von Ellenrieder.

17. **MTS/IEEE Oceans (September 2013).** "Modeling and Simulation of an AUV-towfish System," K. D. von Ellenrieder and L. Miller.

18. **MTS/IEEE Oceans (September 2013).** "Investigation of Non-uniform Waterjet Pump Inflow for a Range of Ship Speeds," P. S. Duerr and K. D. von Ellenrieder.

19. **MTS/IEEE Oceans (September 2013).** "Controller Design and Simulation of a Waterjet Propelled Unmanned Surface Vehicle with Uncertain Drag and Mass Properties," W. B. Klinger and K. D. von Ellenrieder.

20. **ASME Offshore Mechanics and Arctic Engineering (July 2013).** "Seakeeping characteristics of a Wave-Adaptive Modular Unmanned Surface Vehicle," M. D. Dhanak, P. Ananthakrishnan, and K. D. von Ellenrieder.

21. **5th & 6th MARINELIVE Workshop on Ship Power Management Systems (June 2013)** "A planing-hull propulsion model with induction motor, speed control, direct shaft drive and surface piercing propeller." P. R. Medranda, N. I. Xiros and K. D. von Ellenrieder.

22. **MTS/IEEE Oceans (October 2012).** "Design and Analysis of an Ocean Current Turbine Performance Assessment System," M. T., Young, J. H. Van Zwieten, and K. D. von Ellenrieder.

23. **MTS/IEEE Oceans (October 2012).** "Characterizing Magnetic Sensors and Magnetic Noise of AUVs," D. Tilley, M. D. Dhanak, E. An, and K. D. von Ellenrieder.

24. **1st International MARINELIVE Conference on the All Electric Ship (June 2012)** "A modular dynamical simulation model for all-electric ship powertrain with surface piercing propeller," N. I. Xiros, Z. S. Zisman, and K. D. von Ellenrieder.

25. **ASNE Day 2012: Naval Warfare - Critical Engineering Challenges (February 2012)** "UV Sentry: A Collaborative Approach to Creating a Collaborative System." C. Sarles, et al.

26. **Ocean Renewable Energy Symposium at the 2011 OMAE Conference (June 2011)** "Wave height measurements behind submerged lens-shaped structures" A. Bloxom, M. Anderson, R. Mieras, S. Weidle, and K. D. von Ellenrieder

27. **29th American Towing Tank Conference (August 2010)** "Open Water Tow Tank Testing of a Surface Piercing Propeller" K. D von Ellenrieder, J. M. Lorio and L. M. Altamirano

28. **MTS/IEEE Oceans (October 2009).** "A Wind-Propelled Small Waterplane Area Spar" Rynne, P. F. and von Ellenrieder, K. D.

29. **MTS/IEEE Oceans (October 2009).** "Design, Construction, and Initial Testing of an Autonomous Surface Vehicle for Riverine and Coastal Reconnaissance" J. E. Dusek, T. C. Furfaro, and K. D. von Ellenrieder

30. **MTS/IEEE Oceans (October 2009).** "Visual-Based Navigation of an Autonomous Tugboat" M. H. Tall, P. F Rynne, J. M. Lorio and K. D von Ellenrieder – resulted in a publication in the *Marine Technology Society Journal* – Associated poster tied for 3rd Place, Best Student Poster.

31. **MTS/IEEE Oceans (October 2009).** "Design and Functional Testing of a Next Generation Surface Piercing Propeller Test Stand" J. M. Lorio, L. M. Altamirano and K. D. von Ellenrieder – Associated poster tied for 3rd Place, Best Student Poster.

32. **Marelec (June 2009)** "Coastal Mixing and Magnetics Project: A Quantified Approach to an Accelerated Research Initiative," Holmes, J., Venezia, W., von Ellenrieder, K. D.

33. **MTS/IEEE Oceans (September 2008).** "A Wind and Solar-Powered Autonomous Surface Vehicle for Sea Surface Measurements" Rynne, P. F., von Ellenrieder, K. D.

34. **Australian Fluids Mechanics Workshop (December 2006).** "Dynamical systems analysis of flapping wing propulsion" von Ellenrieder, K. D.

35. **MTS/IEEE Oceans (September 2006).** "Force/flow measurements on a low-speed, vector-thruster propelled UUV" von Ellenrieder, K. D. and Ackermann, L. E. J.

36. **6th International Symposium on Particle Image Velocimetry (September 2005).** "High resolution PIV measurements of the wake structure behind a 2D oscillating wing at the zero drag/thrust limit" von Ellenrieder, K. D. Buzard, A. J. and Pothos, S.

37. **43rd AIAA Aerospace Sciences Meeting & Exhibit (January 2005).** "Visualization and analysis of the flow behind a modified Schmidt wave propeller" Buzard, A. J. Bull, H. H. and von Ellenrieder, K. D.

38. **11th International Symposium on Flow Visualization (August 2004).** "Experimental observation of the vortex pattern behind a heaving airfoil" Buzard, A. J., von Ellenrieder, K. D.

39. **7th Asian Symposium on Visualization (November 2003).** "Image processing and feature extraction techniques for PIV measurements of Talyor-Couette flow" von Ellenrieder, K. D. Soria, J. Lim, T.T. and Chew, Y. T.

40. **International Workshop on Holographic Metrology in Fluid Mechanics (May 2003)** "Examination of the particle depth of field in digital holography" von Ellenrieder, K.D. and Soria, J.

41. **3rd Australian Conference on Laser Diagnostics in Fluid Mech. and Combustion (Dec. 2002). (keynote presentation)** "The application of laser diagnostic techniques in the Laboratory for Turbulence Research in Aerospace and Combustion" D. R. Honnery and K.D. von Ellenrieder

42. **3rd Australian Conference on Laser Diagnostics in Fluid Mech. and Combustion (Dec. 2002).** "PIV measurements of second Taylor vortex flow" von Ellenrieder, K. D. Lim, T.T. and Soria, J.

43. **40th AIAA Aerospace Sciences Meeting (January 2002).** "Visualization of the three dimensional flow behind oscillating foils" von Ellenrieder, K. D. Parker, K. and Soria, J. AIAA Paper 2002-0696

44. **14th Australasian Fluid Mechanics Conference (December 2001).** "Stability of Taylor-Couette flow with axial flow" Tan, W. von Ellenrieder, K. Lim, T. & Soria, J.

45. **4th International Workshop on Particle Image Velocimetry (September 2001).** "Measuring 3-C velocity fields in a 3-D flow domain with HPIV and HI" Arroyo, M. P. von Ellenrieder, and Soria, J.

46. **8th European Turbulence Conference (June 2000).** "Study of a turbulent separated flow using HPIV" von Ellenrieder, K. D. Kostas, J. and Soria, J.

47. **3rd International Workshop on Particle Image Velocimetry (September 1999).** "Holographic PIV measurements of a separated flow" von Ellenrieder, K. D. Kostas, J. and Soria, J.

48. **13th Australasian Fluid Mechanics Conference (December 1998).** "The self-similar, slightly-compressible, Taylor vortex" von Ellenrieder, K. D. & Cantwell, B. J.

49. **American Society of Mechanical Engineers, Fluids Engineering Division Meeting (July 1996).** "Approximate non-reflecting boundary conditions for cylindrical acoustic waves" von Ellenrieder, K. D. and Cantwell, B. J.

50. **34th AIAA Aerospace Sciences Meeting (January 1996).** "Physical analysis of two-dimensional, compressible, vortex-shock interaction" Kao, C. T. von Ellenrieder, K. D. MacCormack, R. W. and Bershader, D. B. AIAA Paper 96-0044

51. **20th International Symposium on Shock Waves (July 1995).** "Physics of a shock-generated, freely-moving, compressible vortex" von Ellenrieder, K. D. Kao, C. T. and Bershader, D. B.

52. **45th Annual Forum of the American Helicopter Society (May 1989).** "Active control of gust- and interference-induced vibration of tilt-rotor aircraft." Ham, N. D. Wereley, N. M. and von Ellenrieder, K.

Non-Refereed Publications, Presentations and Proceedings
Presentations and proceedings

1. 3rd Annual Florida Automated Vehicles Summit (December 2015) Invited Speaker "Applications for Unmanned Systems: Unmanned Surface Vehicles" Karl von Ellenrieder

2. 3rd Annual Florida Automated Vehicles Summit (December 2015) "An Unmanned Surface Vehicle Robotic Bridge Inspection System" Karl von Ellenrieder – 1st Place Poster

3. 2015 National Robotics Initiative (NRI) PI Meeting (November 2015) "Enabling Risk-Aware Decision Making in Human-Guided Unmanned Surface Vehicle Teams" S. K. Gupta and K. D. von Ellenrieder

4. 66th Annual Meeting of the APS Division of Fluid Dynamics (November 2013) "Synchronization and Phase Dynamics of Oscillating Foils." C. Finkel and K. D. von Ellenrieder

5. 66th Annual Meeting of the APS Division of Fluid Dynamics (November 2013) "Model Scaling of Hydrokinetic Ocean Renewable Energy Systems." K. D. von Ellenrieder and W. Valentine

6. 66th Annual Meeting of the APS Division of Fluid Dynamics (November 2013) "Drag Coefficients of Drifting Waterbirds." K. D. von Ellenrieder, K. Kenow, H. Qu, T.-C. Su

7. 62nd Annual Meeting of the APS Division of Fluid Dynamics (November 2009) "Experimental Study of Synchronization and Phase Dynamics in Flapping Wing Propulsion." C. Finkel and K. D. von Ellenrieder *Bulletin of the American Physical Society* Volume 54, Number 19 Abstract: BT.00006

8. 57th Annual Meeting of the APS Division of Fluid Dynamics (November 2004) "Biomimetic thrust production with a modified Schmidt wave propeller." K. D. von Ellenrieder, A. J. Buzard, H. Bull. *Bulletin of the American Physical Society* Abstract: KD.001

9. 50th Annual Meeting of the APS Division of Fluid Dynamics (November 1997) "Self-similar compressible free vortices." K. D. von Ellenrieder and B. J. Cantwell. *Bulletin of the American Physical Society* Abstract: Dh.07

Presentations/Invited Talks

1. "Scaling relations for the model scale testing of hydrokinetic ocean renewable energy systems." Valentine, W. and von Ellenrieder, K. D. 2014 Florida Energy Systems Consortium Workshop, (May 2014)

2. "Development and Testing of Amphibious and Wave-Mitigating Unmanned Surface Vehicle Systems" Invited Talk E201 Ocean Engineering Seminar Series, University of California, Berkeley March 8, 2013.

3. "Development of a small autonomous unmanned surface vehicle" Presentation to the WAM-V Working Group Meeting, Naval Surface Warfare Center Carderock Division, West Bethesda, MD May 17-18, 2012.

4. "Experimental evaluation of automatically generated behaviors for autonomous USV operations" Presentation at the Unmanned Sea Surface Vehicles PI Meeting, Arlington, VA. June 5-7, 2012.

5. "Wave Adaptive Modular Vessel Work at FAU" Presentation at the WAM-V Coordination Meeting, Virginia Tech, Blacksburg, VA. October 11-12, 2012.

6. "ACCeSS-Related USV Activity at FAU" Presentation to the Atlantic Center for Design and Control of Small Ships Meeting, London, U.K. November 30, 2012.

7. "Unmanned Sea Surface Vessel Activities at FAU" Presentation to the Atlantic Center for Design and Control of Small Ships Meeting (ACCESS IV), US Naval Academy, March 12, 2012.

8. "Experimental Testing of a Waterjet Propulsion System" Presentation at the ONR T-Craft Tools Conference, Dania Beach, FL January 11, 2012.

9. "UV Sentry: Anti-Piracy USV Design Concept." Presentation at the Final Program Review for the ONR-ASEE Summer Faculty Fellowship Program, Maritime Technology Information Center (MTIC) NSWC, Carderock, MD, July 21, 2011.

10. "Unmanned Autonomous Surface Vehicle Research at FAU" Presentation to the Lockheed Martin Unmanned Systems Focus Group, December 13, 2010.

11. "Design and Instrumentation for Direct Thrust Measurements from a Waterjet-Propelled Unmanned Surface Vessel" presentation to the Atlantic Center for Design and Control of Small Ships Meeting (ACCESS III), February 25, 2011.

12. "OE Senior Design Projects 2010-2011" (with J. Nolte and B. Watson) Presentation to the Atlantic Center for Design and Control of Small Ships Meeting (ACCESS III), February 25, 2011.

13. "Marine Hydrodynamics & Vehicle Design" Presentation to the Hydromechanics research group at the Naval Surface Warfare Center Panama City, October 1, 2010.

14. "Water Wave Focusing With Submerged Lens-shaped Structures" Presentation at the OME Senior Seminar Series, February 2, 2011.

15. “Research activities at the FAU Institute for Ocean and Systems Engineering” Presentation to the Technical Director, Naval Surface Warfare Center, Carderock Division, March 8, 2011.

16. “Focused wave energy scavenging” presentation to the Center for Innovative Ship Design Final Design Review Meeting, Maritime Technology Information Center, Carderock, MD, July 20, 2010

17. “Open Water Testing of Surface Piercing Propellers” presentation to ONR T-Craft Tools Review Meeting, FAU SeaTech Campus, Dania Beach, FL February 17, 2010

18. “Unmanned Surface Vehicle Senior Design Projects at FAU” presentation to the ONR Atlantic Center for the Innovative Design and Control of Small Ships Kickoff Meeting, Stevens Institute of Technology, June 4, 2010

19. “Marine Hydrodynamics & Vehicle Design” presentation to ONR SubTech group, FAU SeaTech Campus, Dania Beach, FL, January 20, 2009

20. “Open Water Testing of Surface Piercing Propellers” presentation to ONR T-Craft Tools Review Meeting, FAU SeaTech Campus, Dania Beach, FL, February 4, 2009

21. “Marine Hydrodynamics & Vehicle Design” presentation to ONR Chief of Naval Operations Unmanned Underwater Vehicle Strategic Studies Group, FAU SeaTech Campus, Dania Beach, FL, March 18, 2009

22. “Unmanned Surface Vehicle Systems Development at FAU” presentation at the NATO Undersea Research Center, La Spezia, Italy, June 30, 2009

Creative Activities and Achievements

Technical Reports

1. Groden, M. Koch, G. and von Ellenrieder, K. D. (2011) UV Sentry: Anti-Piracy USV Design Concept. NSWCCD-CISD Ship Systems Integration & Design Department Technical Report, Naval Surface Warfare Center, Carderock Division, West Bethesda, MD.

2. Anderson, M. Bloxom, A. Mieras, R. Weidle, S. and von Ellenrieder, K. D. Focused wave energy scavenging. Ship Systems Integration & Design Department Technical Report NSWCCD-CISD-2010/009 (July 2010)

Public Outreach - Television

1. Beanfield Productions Miami, FL (July 2007)
   Flow visualization of an ocean current turbine; aired on the Discovery Science Channel’s ‘Eco-Tech’ program. With student assistance, designed and constructed a tow carriage model of an ocean current turbine; performed demonstrations of the model in action and was interviewed about the hydrodynamic processes involved.

2. National Geographic Television & Film Washington, D.C. (2007)
   Flow visualization of crocodilian locomotion; aired on National Geographic Explorer ‘The Ultimate Croc’. With student assistance, designed and constructed a high-speed model of a feeding alligator’s head; performed demonstrations of the model in action; created short video clips of the flow visualizations.

GRANTS

Externally Funded Grants

1. PI: von Ellenrieder, K. D. "NRI: Collaborative Research: Enabling Risk-Aware Decision Making in Human-Guided Unmanned Surface Vehicle Teams" $450K National Science Foundation (2015-2018).

2. PI: von Ellenrieder, K. D. "Unmanned Surface Vessel (USV) systems for bridge inspection" $180K Florida Department of Transportation (2015-2016).

3. co-PI: Dhanak, M. D., Venezia, W. von Ellenrieder, K. D. and Beaujean, P.-P. "Electromagnetic Observatory in the Straits of Florida: Oceanographic Perspective" $800K Office of Naval Research (2015-2016).

4. PI: von Ellenrieder, K. D. and Nataraj, C. "STEM student development through participation at the 2014 Maritime RobotX Challenge" $25K Office of Naval Research (2014).

5. PI: von Ellenrieder, K. D. and Dhanak, M. "Experimental Evaluation of Automatically Generated Behaviors for Autonomous USV Operations" $200K Office of Naval Research (2012-2014).

6. PI: von Ellenrieder, K. D. "Systems identification and control of an autonomous amphibious vehicle" $200K Office of Naval Research (2011-2013).

7. co-PI: Dhanak, M. von Ellenrieder, K. D. Ananthakrishnan, P. Su, T.-C. and An, E. "Naval Engineering Education Consortium (NEEC)" with University of Michigan and others $1,446,469 Naval Sea Systems Command (2010- 2015).

8. co-PI: Dhanak, M., von Ellenrieder, K. and An, A. "Precision ASV-AUV Cooperative Autonomy Using an Advanced-Hull ASV Including Automated Launch and Recovery (ACCESS)" $913K Office of Naval Research (2010-2014)

9. co-PI: Kajiura, S. von Ellenrieder, K. D. and Korey, S. "Assessment of shark attraction to underwater towed arrays" $80K Petroleum Geo-Services (2010)

10. PI: von Ellenrieder, K.D. ONR-ASEE Summer Faculty Fellowship "Design of submerged structures for wave focusing" $16K (2010)

11. co-PI: Dhanak, M. von Ellenrieder, K. D. An, E. Frisk, G. Venezia, W. Soloviev, A. Dodge, R. "Characterization of the impact of oceanographic features on the electromagnetic fields in coastal waters" $2M Office of Naval Research (2010-2013).

12. PI: von Ellenrieder, K. D. "Experimental testing of a SES (surface effect ship) waterjet propulsion system" $299K Office of Naval Research (2010-2014).

13. co-PI: Dhanak, M., Ananthakrishnan, P., An, P. vonEllenrieder, K. "Design of Energy-Efficient Autonomous Support Ships (WAM-V)" $750K Office of Naval Research (2009-2012)

14. co-PI: An, E. Beaujean, P. and von Ellenrieder, K. D. "MRI: Acquisition of Two REMUS Autonomous Underwater Vehicles for Multiple Cooperative Marine Vehicle Research" National Science Foundation $701K (2009-2012)

15. PI: von Ellenrieder, K. D. “Open water testing of a surface piercing propeller (SPP)” $233K Office of Naval Research (2007-2010).

16. PI: von Ellenrieder, K. D. “Experimental study of synchronization and phase dynamics in flapping wing propulsion” $58.5K Air Force Office of Scientific Research (2007-2008).

17. co-PI: Motta, P. Martin, A. Hueter, R. Kajiura, S and von Ellenrieder, K. D. “Collaborative Research: The function and evolution of the hammerhead shark cephalofoil” $30K National Science Foundation (2007-2009).

18. co-PI: Driscoll, F.R. von Ellenrieder, K. D. and Dhanak, M. “Optimization of the horizontal transit mode and vertical operations mode of a rapidly-deployable stable platform” $150K Office of Naval Research (2007-2008).

19. co-PI: von Ellenrieder, K. D. “Hydrodynamic design and integration of an UUV hull form and control surfaces” Part of the Center for Coastline Security Technology Project. $180K U.S. Office of Naval Research (2005-2008).

20. co-PI: Driscoll, F. von Ellenrieder, K. D. and Granata, R. “A proposal to implement a Research Experience for Undergraduates Site in Ocean Engineering at FAU” $230K National Science Foundation (2004-2008).

Internally Funded Grants

1. PI: von Ellenrieder, K. D. “Pilot Study: A wind and solar powered autonomous surface vehicle for oceanographic measurements” $10K New Project Development Award, FAU Division of Sponsored Research (2007-2008).

COURSES TAUGHT AT FAU

1. EGN 3321 Dynamics (Spring 2015)

2. EOC 3130 Ocean Engineering Laboratory (Spring 2005- 2007)

3. EOC 4422 Ocean Wave Mechanics (Fall 2014, 2015)

4. EOC 4804 Ocean Engineering Systems Control & Design (Fall/Spring 2007- 2014)

5. EOC 4930 Ocean Engineering Research Experience (Summer 2005, 2007)

6. EOC 5172 Mathematical Methods in Ocean Engineering I (Fall 2005-2007)

7. EOC 6185 Advanced Hydrodynamics I (Fall 2003-2015)

8. EOC 6515 Hydrodynamic Aspects of Ship Design (Spring 2015, 2016)

9. EOC 6934* Autonomous Maritime Systems Control (Spring 2012) – New course

10. EOC 6934* Applied Ocean Engineering (Summer 2012) – New course

11. EOC 6934* Elements of High Speed Marine Vehicle Design (Spring 2008, 2011) – New course

*The designation EOC6934 is given to graduate-level courses in the Ocean Engineering Program that are either taught as special topics courses, or that have been proposed and are still under consideration for inclusion as regular courses.

EOC 4804/4804L Ocean Engineering Systems Control and Design - Senior Design Projects

Additional information is provided as this course requires a substantial component of design, implementation, field testing and reporting that is not found in most other courses. Over the span of an academic year, students work in 8- to 9-person teams to analyze and test the performance of a marine system that they develop from concept to fabrication and implementation. The multidisciplinary projects involve all aspects of ocean systems engineering, including naval architecture, hydrodynamics, powering, materials selection, mechanical design, electronics, software, navigation and control, as well as, project management and budgeting. A critical component of the course is the involvement of engineers from industry and government labs. At the end of the fall semester, a panel of professionals helps to conduct a critical design review of each project to provide feedback and comments on the students' designs before the fabrication and implementation stage. At the end of the following spring semester a final design presentation is conducted with the industry/government review panel to provide feedback on the overall realization of each project. Projects marked with the * symbol have been continued as graduate student thesis efforts, those marked with a † have been presented at conferences and those marked with a ‡ ultimately resulted in peer-reviewed journal publications.

2013-2014 (Sole Instructor)
1) Biomimetic Station Keeping UUV
2) A Hybrid AUV/ROV System
3) Wave Energy Converter

2012-2013 (Sole Instructor)
1) Surface Piercing Propeller (SPP) Driven All-Electric Ship
2) Trajectory Tracking Unmanned Surface Vehicle (USV)
3) Biomimetically propelled Unmanned Underwater Vehicle (UUV)

2011-2012 (Sole Instructor)
1) ARES – Renewable energy scavanging ship
2) VBASS – USV with vision-based navigation[*,†]
3) Vertipro – Offshore autonomous profiling system

2010-2011 (Sole Instructor)
1) CoRE – Coastal Ocean Renewable Energy spar buoy platform[†]
2) SeaBass – SEA BASe aerial Support (SEABASS) Vehicle[†]

2009-2010 (Co-Instructor with N. Xiros)
1) Daedalus – Unmanned aerial vehicle launch and retrieval system
2) DUCKW-Ling – Control of Unmanned Amphibious Container Carrying Systems[*,†,‡]

2008-2009 (Co-Instructor with F. Driscoll)
1) Nereus – Autonomous Surface Vehicle for Riverine Surveillance[†]
2) ROC – Remotely Operated CTD

2007-2008 (Co-Instructor with N. Xiros)
1) ACT – Acoustic Cooperative Towline
2) WASP – Wind and Solar-Powered Autonomous Surface Vehicle[*,†,‡]

Completed Ph.D. Theses (Advisor):

1. Finkel, C. L. (2013) Synchronization and phase dynamics of oscillating foils.

2. Duerr, P. (2014) Numerical characterization of waterjet performance.

3. Qu, H. (2016) Adaptive, feed-forward control of a USV.

4. Bertaska, I. R. (2016) Supervisory switching control of USV systems.

Ph.D. Thesis in Progress (Advisor):

1. Wampler, J. (*anticipated* 2018) USV-based bridge inspection.

Completed M.S. Theses (Advisor):

1. Buzard, Alan J. (2005) Experimental study of the wake-modes for propulsion of two-dimensional heaving airfoils.

2. Ackermann, Lloyd E. J. (2007) Thrust response of a vectored-thruster unmanned underwater vehicle.

3. Rynne, Patrick F. (2008) Design and performance of a wind and solar-powered autonomous surface vehicle.

4. Barousse, Julien (2009) Hydrodynamic functions of the wing-shaped heads of hammerhead sharks.

5. Lorio, Justin M. (2010) Open water testing of a surface-piercing propeller with varying submergence, yaw angle and inclination angle.

6. Altamirano, L. (2010) Flow visualization of the ventilated cavities generated by a surface piercing propeller.

7. Miller, Lea G. (2011) Simulating the dynamic interaction of an AUV and towed magnetometer.

8. Furfaro, Thomas C. (2012) A modular guidance, navigation and control system for unmanned surface vehicles.

9. Marquardt, J. G. (2012) Development and experimental testing of an amphibious vehicle.

10. Valentine, William M. (2012) Design of hydrodynamic test facility and scaling procedure for ocean current renewable energy devices.

11. Alvarez, Jose (2013) Nonlinear control of an unmanned amphibious vehicle.

12. Grimes, J. (2013) Design and implementation of a measurement system for direct thrust measurements of a waterjet propelled surface vehicle.

13. Klinger, W. (2014) Adaptive controller design for an autonomous twin-hulled surface vessel with uncertain displacement and drag.

14. Dill, T. (2014) Modeling the performance of a laser for tracking an underwater dynamic target.

Completed M.S. Theses (Co-Advisor):

1. Seibert, Michael G. (2011) Determining anchoring systems for marine renewable energy devices moored in a western boundary current.

2. Young, Matt T. (2012) Design and analysis of an ocean current turbine performance assessment system.

3. Lovenbury, James W. (2013) Evaluation and testing of an Acoustic Doppler Velocimeter for turbulence measurements in an open ocean environment.

4. Egeland, M. (2014) Use of a towed acoustic Doppler velocimeter for ocean turbulence measurements.

Advising Activities

Faculty Advisor: Society of Naval Architects and Marine Engineers/Marine Technology Society Student Club (2011-2016)

Faculty Advisor: FAU-Villanova University RobotX Maritime Challenge Team (2013-2016) One of three teams selected to represent the United States in an international unmanned surface vehicle (robotic boat) student competition held in Singapore in October 2014.

Faculty Advisor: AUVSI Roboboat Autonomous Surface Vehicle Student Team (2008-2016). Team placed 2nd in 2015 and in 2008. The "Chameleon-Eye Navigation System" developed for the 2009 competition was presented in a paper at the MTS/IEEE Oceans Conference in 2009; an extended version of the conference paper was also published in the Marine Technology Society Journal.

Faculty Advisor: FAU SCUBA Club (2012-2013)

Faculty Advisor: FAU Ocean Renewable Energy Generation Team, Megawatt Ventures Start-up Competition (2012)

SERVICE AND PROFESSIONAL DEVELOPMENT

Service to the Discipline/Profession

Associate Editor, IEEE Journal of Oceanic Engineering (2014-present)

Special Advisor, Link Foundation Board of Trustees (2014-present)

Administrator, Link Foundation Ph.D. Fellowships in Ocean Engineering & Instrumentation (2011-present). Organization of the fellowship program on behalf of the Link Foundation, including: advertising, soliciting applications, processing

applications, answering program-related questions, assembling an application review panel, reviewing applications, monitoring the progress of fellows, and managing the program's budget. In 2012, oversaw the development of a completely, on-line, web-based application website. Currently overseeing the development of on-line application websites for the other two Link Foundation Ph.D. fellowship programs: Energy and Simulation & Training.

FAU Faculty Research Mentoring Award Program (2013) – Mentoring an assistant professor (Dr. Oscar Curet) on career and research program development.

National Defense Science and Engineering Graduate Fellowship Evaluation Panelist (2013)

Manuscript Reviewer

AIAA Journal of Aircraft
European J. of Mechanics - Fluid Mechanics
Experiments in Fluids
Experimental Thermal Fluid Science
IEEE Journal of Oceanic Engineering
IEEE RAS Magazine
Intelligent Service Robotics
Journal of the AIAA
Journal of Fluid Mechanics
Measurement Science and Technology
Physics of Fluids

Proposal Reviewer

American Association for the Advancement of Science
Australian Research Council
Marine Science and Technology Foundation
Maryland Industrial Partnership Program
MIT SeaGrant
NOAA SBIR
U.S. National Science Foundation

Book Reviewer

Engineering Design 5th Ed. – Dieter & Schmidt

Service to the Institution
Department/School Service

Ocean Engineering ABET Committee (2009-2010)
Ocean & Mechanical Engineering Chair-Search Committee (2009-2010)
Ocean Engineering Computing Committee (2003-2008)
Ocean Engineering Faculty Secretary (2003-2008)
Ocean Engineering Graduate Curriculum Committee (2003-2005)
Ocean & Mechanical Engineering Graduate Curriculum Committee (2011-2012)
Ocean Engineering Recruitment Committee (2005-2009)
Ocean Engineering Research Committee (2006-2009)
Ocean Engineering Undergraduate Curriculum Committee (2008-2010)
Ocean & Mechanical Engineering Undergraduate Curriculum Committee (2010-2011)

College service

FAU College of Engineering & Computer Science, Policy & Development Committee (2010-2014) Committee Chair (2013-2015) – passed new bylaws for College of Engineering and Computer Science

Dept. Civil Engineering and Geomatics Engineering Interim Chair Search Committee (2013)

University service

FAU/Harbor Branch Oceanographic Institute Partnership Task Force (2010)

Service to the Community/Public

Faculty Mentor: South Broward High School (2004-2006)
BSA Cub Scout Pack 608 Committee Chair (2012-2015)
BSA Cub Scout Pack 608 Assistant Cubmaster (2013)

Professional Development

Specialized Training/Certifications
American Association of Underwater Scientists – Scientific Diver
Florida Boat Operator's Safety Training Certification

Professional Societies
IEEE Control System Society
IEEE Oceanic Engineering Society