

Kristof Richmond

Summary

Control Systems Engineer with experience in a wide variety of field robotics applications. Particularly interested in sensing, control and reasoning for unmanned vehicles operating in unstructured, remote, and extreme environments. Focus is on integrating disparate systems to achieve optimal performance, incremental development, and real-world operations.

Education

Stanford University, Stanford, California

- Ph.D., Mechanical Engineering, April 2009.
Thesis: Real-time Visual Mosaicking and Navigation on the Seafloor.
Adviser: Steve Rock.
- M.S., Mechanical Engineering, June 2001.

Rice University, Houston, Texas

- B.A., German, May 1997, *cum laude*.
- B.S. Mechanical Engineering, May 1997, *cum laude*.

Experience

Lead Control Systems Engineer *and* Partner

Frontier Astronautics, LLC

Chugwater, WY

2007-Present

- *For Stone Aerospace, LLC*: Upgraded, developed and deployed navigation and control system components for ENDURANCE autonomous underwater vehicle. Provided engineering field support for 2008 and 2009 Antarctic field campaigns.
- *For Sensing Systems, Inc.*: Developed general-purpose real-time visual tracking system prototype for video streams and provided recommendations for real-time visual mosaicking.
- *For SpeedUp and Masten Space Systems, Inc.*: Developed and deployed guidance and control systems for VTVL rocket vehicles.

Research Assistant

Stanford University, Aerospace Robotics Lab

Stanford, California

2001-2007

- Developed and deployed novel sea floor mapping and navigation system for routine use with remotely operated underwater vehicles of the Monterey Bay Aquarium Research Institute.
- Developed automation and control systems for underwater vehicles.
- Developed low-level real-time communications, vision, and driver software for laboratory robotic systems.

Teaching Assistant

Stanford University

Stanford, California

Spring, 2002

- Assisted Prof. Sanjay Lall with ENGR207b: Modern Control.
- Held lectures in professor's absence, assisted in developing and grading coursework.

Technician

SRI International, Sondrestrom Atmospheric Research Facility

Kangerlussuaq, Greenland

1997-2000

- Responsible with three other site crewmembers for operations, maintenance, and repairs of one-of-a-kind scientific instruments and other facility equipment.
- Developed and implemented steering control system for 32-m scientific radar antenna as part of facility upgrade.

Scientific Assistant

German Aerospace Research Establishment (DLR)

Oberpfaffenhofen, Germany

Summer, 1995

- Wrote programs to estimate and display data on atmospheric effects of aircraft emissions.

Publications

(Translator, from German) **Mechatronic Systems Design.** Klaus Janschek. Springer-Verlag, 2012.

Sub-ice exploration of an Antarctic lake: results from the ENDURANCE project. Kristof Richmond, Alessandro Febretti, Shilpa Gulati, Christopher Flesher, Bartholomew P. Hogan, Aniket Murarka, Greg Kuhlmann, Mohan Sridharan, Andrew Johnson, William C. Stone, John Priscu, Peter Doran. In *Proceedings of the Unmanned Untethered Submersible Technology Conference (UUST)*, Durham, New Hampshire, August 21–23 2011. AUSI.

Design and deployment of a four-degrees-of-freedom hovering autonomous underwater vehicle for sub-ice exploration and mapping. William Stone, Bart Hogan, Christopher Flesher, Shilpa Gulati, Kristof Richmond, Aniket Murarka, Greg Kuhlman, Mohan Sridharan, Victoria Siegel, Rachel Price and Peter Doran, and John Priscu. *Journal of Engineering for the Maritime Environment*, 224(M4):341–361, 2010.

Toward Autonomous Scientific Exploration of Ice-covered Lakes—Field Experiments with the ENDURANCE AUV in an Antarctic Dry Valley. Shilpa Gulati, Kristof Richmond, Christopher Flesher, Bartholomew P. Hogan, Aniket Murarka, Gregory Kuhlmann, Mohan Sridharan, William C. Stone, and Peter T. Doran. In *Proceedings of International Conference on Robotics and Automation (ICRA)*, Anchorage, AK, May 2010. IEEE.

Navigation, control, and recovery of the ENDURANCE under-ice hovering AUV. Kristof Richmond, Shilpa Gulati, Christopher Flesher, Bartholomew P. Hogan, and William C. Stone. In *Proceedings of the Unmanned Untethered Submersible Technology Conference (UUST)*, Durham, NH, Aug 2009. AUSI.

Real-time visual mosaicking and navigation of the USS Macon. Kristof Richmond and Stephen Rock. In *Proceedings of the Unmanned Untethered Submersible Technology Conference (UUST)*, Durham, NH, Aug 2007. AUSA.

An operational real-time large-scale visual mosaicking and navigation system. Kristof Richmond and Stephen Rock. In *Proceedings of the MTS/IEEE OCEANS Conference*, Boston, Sept 2006. IEEE.

A real-time visual mosaicking and navigation system. Kristof Richmond and Stephen Rock. In *Proceedings of the Unmanned Untethered Submersible Technology Conference (UUST)*, Durham, NH, Aug 2005. AUSA.

Automatic determination of vision lock on the seafloor in the presence of dust. Kristof Richmond, David Black-Schaffer and Stephen Rock. In *Proceedings of the Unmanned Untethered Submersible Technology Conference (UUST)*, Durham, NH, Aug 2003. AUSA.

Honors & Professional Associations

- Tau Beta Pi
- Member, IEEE.

Languages

- Fluent English, German.
- Proficient French.
- Working Danish, Turkish.

Computer Skills

- C, C++, Java, Tcl/Tk, Python, Object Pascal, Fortran, and Basic programming languages.
- Matlab, Mathematica and IDL mathematics packages.
- Simulink and Constellation simulation and real-time development environments.
- Windows, UNIX, Linux, Mac OS X, VxWorks and xPC operating systems.
- Ethernet networking installation and maintenance.
- LaTeX document formatting system.
- Dreamweaver and HTML web design.

Activities & Interests

- Treasurer, Iowa City Friends of the Animal Center Foundation.
- Past President and Professional Member, Stanford Chapter of Engineers for a Sustainable World, a student organization helping developing communities in a sustainable manner.
- Co-founder, Friends of Anatolia, a non-profit organization promoting cultural and development ties between the US and Turkey.
- Participant and Leader, Stanford Young Astronauts, a program teaching science and engineering to 3rd and 4th graders.
- Volleyball, backpacking, woodworking, gardening.