

Kimberly J. Shillcutt

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Objective: Lead in the design and development of human-assistant, orbital and planetary robots

Education

Doctor of Philosophy in Robotics expected Sept. 2000
Thesis: Navigational planning for robotic explorers utilizing solar and wind power
Carnegie Mellon University, Pittsburgh, PA

Master of Science in Robotics June 1998
Carnegie Mellon University, Pittsburgh, PA

Master of Librarianship March 1996
University of Washington, Seattle, WA

Bachelor of Science in Physics and Astronomy, and June 1992
Bachelor of Arts in Music
University of Washington, Seattle, WA
magna cum laude, and with college honors

Experience

Carnegie Mellon University, Robotics Institute - Pittsburgh, PA 1996 – Present

Graduate Research Assistant

Robotic Antarctic Meteorite Search, with Dr. Red Whittaker

- Member of Antarctic expedition team for six weeks in December 1999 to February 2000, during which the Nomad robot successfully identified 5 meteorites autonomously
- Wrote, implemented and field tested software for robot's navigational and mission planners, image processing algorithms for rock detection, telemetry logging, and communication between modules
 - Mission planner evaluates tasks based on power and time considerations, and sequences required tasks when performing autonomous searches
 - Navigational planner produces various coverage patterns, waypoint and maneuver plans
- Performed preliminary studies of the costs and benefits of multiple robotic configurations for the meteorite search

Haughton-Mars Project, sponsored by NASA Ames Research Center

- Member of field team for two weeks during the summer of 1999 at Haughton Crater, in the Canadian Arctic
- Observed and worked with biologists and others to study possibilities for the use of robots as assistants in exploration of remote areas

Research projects, with Dr. Howie Choset

- Study of the orbital mechanics involved in maneuvers between two bodies co-orbiting a third body
- Research in 3-dimensional coverage and path planning for a space robot
- Research in autonomous search techniques for meteorites and mines

Lunar Optical Interferometer Telescope Project, with Dr. Eric Krotkov

- Set up equipment for a laser alignment procedure
- Developed image processing code for detecting targeted laser light
- Performed experimental trials to autonomously align laser with a retro reflector target

Robotics Ph.D. program classes

- Analyzed lunar south pole environment and orbital dynamics of the Moon-Earth-Sun system, as part of a group to design a mobile robot to search for ice at the lunar south pole
- Researched kinematic and dynamic attributes of free-flying underwater and space robots
- Researched geometry involved in deploying a circular telescope array on a spherical surface such as the Moon

Metrica, Inc. - NASA Johnson Space Center, Houston, TX summer 1997

Researcher

- Developed and implemented a 2-dimensional path planner for the air-bearing table version of AERCam, a free-flying robot for servicing the outside of space structures and vehicles
- Developed code for robot station-keeping with respect to an object

Human Interface Technology Laboratory - Seattle, WA 1995 – 1996

Library Assistant

- Created, updated, and assisted others in creating web pages
- Collected virtual reality resources

Lunar and Planetary Institute - Houston, TX summer 1995

Library Assistant

- Updated computer system
- Staffed information desk and responded to information requests
- Selected, ordered and classified new material, and maintained and re-organized current collection

Engineering Library, University of Washington - Seattle, WA 1994 – 1995

Library Technical Assistant

- Maintained computer system records and current collection
- Reviewed journal holdings

Seattle Girls Choir, Kent Branch - Kent, WA 1993 – 1994

Pianist

- Played piano for rehearsals and concert performances
- Taught music theory to choir members

Institute for Astronomy, University of Hawaii - Honolulu, HI 1992

Graduate Research Assistant

- Processed infrared images and did photometry of star forming regions, with Dr. Klaus Hodapp
- Processed optical images and did photometry of asteroids and comets, with Dr. David Jewitt

Skills

- Experienced in implementation and testing of software on robotic platforms
- Proficient in computer programming in C, C++ and Basic, on Sun SparcStations and PCs, and in using Unix, Linux, dos, and Windows operating systems
- Talented in technical writing and editing
- Skilled with Matlab, Framemaker, Microsoft Word, Excel, Access, PowerPoint, emacs, vi, and others; capable of troubleshooting and installing hardware
- Knowledgeable of NDDS, TCA, and 3T architectures and inter-process communication protocols
- Experienced with preparation and presentation of technical material in conferences
- Capable of leading teams and working in groups, and self-motivated when working alone

Honors and Memberships

- Phi Beta Kappa admitted 1992
- Member, Society of Women Engineers
- NASA Graduate Student Fellowship 1999 – present
From NASA Headquarters, \$22,000 per year
- Amelia Earhart Fellowship 1999
From the Zonta Foundation, \$6,000
- Pennsylvania Space Grant Fellowship 1996 – 1998
Total of \$7,500
- Genevieve C. Cobb Scholarship 1994 – 1995
From Graduate School of Library and Information Science, University of Washington
- Anderson Scholarship 1991 – 1992
From Physics Department, University of Washington, 1 year tuition
- Seafirst Merit Scholar Award 1987 – 1991
From Seafirst Bank, Seattle, WA, 4 years tuition
- Honors Council scholarships 1990 – 1991
From University of Washington, total of \$1000
- Multiple high school music contest awards 1986 – 1987
Placed in top four in several state-wide piano competitions

Publications

- "Solar Power Expert for Remote Robotic Explorers," Shillcutt, Kimberly and William Whittaker, *International Symposium on Artificial Intelligence, Robotics and Automation in Space*, Noordwijk, the Netherlands, June 1-3, 1999.
- "Patterned Search Planning and Testing for the Robotic Antarctic Meteorite Search," Shillcutt, Kimberly, Dimitrios Apostolopoulos, and William Whittaker, *1999 International Topical Meeting on Robotics and Remote Systems for the Nuclear Industry*, American Nuclear Society, Pittsburgh, PA, April 25-29, 1999.
- "Modular Optimization for Robotic Explorers," Shillcutt, Kimberly and William Whittaker, *Integrated Planning for Autonomous Agent Architectures, AAAI Fall Symposium*, Orlando, FL, October 23-25, 1998.
- "Path Planning for Orbital Motions," Shillcutt, Kimberly, *Proceedings of the Third ASCE Specialty Conference on Robotics for Challenging Environments (Robotics '98)*, Albuquerque, NM, April 26-30, 1998, pp.57-63.
- "A Concept for Robotic Lunar South Pole Exploration," Deans, Matthew, Stewart Moorehead, Ben Shamah, Kimberly Shillcutt, and William "Red" Whittaker, *Proceedings of the Sixth International Conference and Exposition on Engineering, Construction, and Operations in Space (Space '98)*, Albuquerque, NM, April 26-30, 1998, pp.333-339.

Personal Activities

- Hobbies include reading, writing fiction, flying small airplanes, hiking, camping, needlework, and playing the piano
- Actively involved in local church, and have been the primary pianist at various churches from 1998 to the present
- Support of our university's sponsorship of a local high school in the national FIRST robotics competition since 1996: I have been in charge of the financial, logistical and organizational aspects of the competition for our team at various times, and have worked on the design and building of the robot