

Stephen D. Fleischer

EDUCATION

Ph.D., Aeronautics and Astronautics, Expected 2000

Stanford University

Thesis: "Bounded-Error Vision-Based Navigation of Autonomous Underwater Vehicles"

- Developed an empirical error model for correlation-based vision measurement techniques
- Derived the theory for an algorithm which uses optimal estimation techniques to reduce the image alignment errors within a mosaic, or composite image map
- Implemented and verified experimentally a vision sensor which provides real-time vehicle global position updates, while simultaneously creating a mosaic of the ocean floor
- Demonstrated experimentally the autonomous navigation of an underwater vehicle from vision

M.S., Aeronautics and Astronautics, June 1993

Stanford University

GPA: 3.85/4.00

B.S.E., Mechanical and Aerospace Engineering, June 1992

Princeton University

GPA: 3.71/4.00, graduated Magna Cum Laude

Senior Independent Work: "Artificial Spinal Cord for Real-Time Control of an Anthropomorphic Robot"

- Designed both hardware and software for parallel processing based on a biological model
- Constructed the computers using TMS320C25 Digital Signal Processing (DSP) chips and wrote the software in assembly language

HONORS and AWARDS

- Department of Defense (DoD) National Defense Science and Engineering Graduate Fellowship, 1992 - 1995
- member of the Tau Beta Pi Engineering Honor Society

EXPERIENCE

Research Assistant, ARL, Stanford, CA, September 1995 - present

- adapted the NASA Ames Virtual Environment Vehicle Interface (VEVI) to control OTTER, an autonomous underwater vehicle (AUV), in the test tank environment
- developed image processing algorithms for vehicle position sensing, ocean floor mapping, and robot navigation

Research Assistant, Monterey Bay Aquarium Research Institute (MBARI),

Monterey, CA, June 1996 - present (summers)

- demonstrated experimentally the tasks of visual station-keeping, mosaicking, and navigation on OTTER in the test tank
- demonstrated experimentally vision-based navigation on Ventana, a remotely-operated vehicle (ROV) operated by MBARI, in the open ocean

Computer System Administrator, ARL, Stanford, CA, May 1996 - present

- performed maintenance, troubleshooting, and upgrades of all hardware and software for a UNIX/real-time client-server system comprised of 1 Solaris 2.6 server, 10 Solaris 2.5.1 client workstations, 10 SunOS 4 client workstations, and 10 VxWorks targets

Teaching Assistant, Stanford University, Stanford, CA, September - December 1997

- sole TA for Engineering 140: Dynamic Behavior

- responsible for problem sessions, experimental lab setup, and lab instruction

Software Engineer, Smiths Industries, Florham Park, NJ, June 1991 - September 1991

- performed software design and coding for 8086 real-time embedded processor on the F-111 Stores Management System

PUBLICATIONS

S. D. Fleischer and S. M. Rock, "Experimental Validation of a Real-Time Vision Sensor and Navigation System for Intelligent Underwater Vehicles," 1998 IEEE Conference on Intelligent Vehicles, Stuttgart, Germany, October 1998. IEEE.

A. Huster, S. D. Fleischer, and S. M. Rock, "Demonstration of a Vision-Based Dead-Reckoning System for Navigation of an Underwater Vehicle," Proceedings of the 1998 IEEE Symposium on Autonomous Underwater Vehicle Technology, pp. 185-189, Cambridge, MA, August 20-21, 1998. IEEE.

A. Huster, S. D. Fleischer, and S. M. Rock, "Demonstration of a Vision-Based Dead-Reckoning System for Navigation of an Underwater Vehicle," Proceedings of the OCEANS 98 Conference, pp. 326-330, Nice, France, September 1998. MTS/IEEE.

S. D. Fleischer, S. M. Rock, and R. L. Burton, "Global Position Determination and Vehicle Path Estimation from a Vision Sensor for Real-Time Video Mosaicking and Navigation," Proceedings of the OCEANS 97 Conference, pp. 641-647, Halifax, Nova Scotia, October 1997. MTS/IEEE.

K. N. Leabourne, S. M. Rock, S. D. Fleischer, and R. L. Burton, "Station-keeping of an ROV Using Vision Technology," Proceedings of the OCEANS 97 Conference, pp. 634-640, Halifax, Nova Scotia, October 1997. MTS/IEEE.

S. M. Rock, S. D. Fleischer, K. N. Leabourne, and R. L. Burton, "The Application of Vision Technology to Marine Science," Proceedings of the 10th International Symposium on Unmanned Untethered Submersible Technology, pp. 307-317, Sept. 7 -10, 1997.

S. D. Fleischer, H. H. Wang, S. M. Rock, and M. J. Lee, "Video Mosaicking Along Arbitrary Vehicle Paths," Proceedings of the Symposium on Autonomous Underwater Vehicle Technology, pp. 293-299, Monterey, CA, June 1996. OES/IEEE.

S. D. Fleischer, R. L. Marks, S. M. Rock, and M. J. Lee, "Improved Real-Time Video Mosaicking of the Ocean Floor," Proceedings of the OCEANS 95 Conference, pp. 1935-1944, San Diego, CA, October 1995. MTS/IEEE.

S. D. Fleischer, S. M. Rock, and M. J. Lee, "Underwater Vehicle Control from a Virtual Environment Interface," Proceedings of the Symposium on Interactive 3D Graphics, pp. 25-26, Monterey, CA, April 1995. SIGGRAPH.

H. H. Wang, R. L. Marks, T. W. McLain, S. D. Fleischer, D. W. Miles, G. A. Sapilewski, S. M. Rock, M. J. Lee, and R. L. Burton, "OTTER: a Testbed Submersible for Robotics Research," Proceedings of the ANS 6th Topical Meeting on Robotics and Remote Systems, pp. 587-594, Monterey, CA, February 1995. American Nuclear Society.