Matthew D. Hancher

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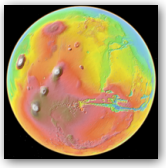
San Francisco CA 94131

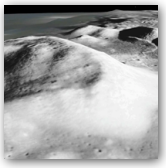
Digital cartographer, roboticist, and architect of planetary-scale data processing systems.



NASA Ames Research Center

Research Scientist, Intelligent Robotics Group Apr. 2006 – present

Led development of the NASA Vision Workbench, an open-source image processing library in C++ optimized for robotics and cartography, including a highly-scalable core image processing engine; feature detection, image alignment, and compositing; reprojection with interfaces to GDAL and ISIS; camera modeling, stereo correlation, and 3D reconstruction; and SSE and GPU optimization. Led NASA's planetary data collaboration with Google, using the Vision Workbench and Python to build pipelines to make NASA data more useful and accessible, including joint development of Google Mars 3D. Collaborated with CIO to develop a new scalable Django-based architecture and virtualized server platform for NASA web applications. Forged and managed partnerships between developers, scientists, educators, and corporate partners, and directed teams of over a dozen developers.



Research Scientist, Adaptive Control & Intelligent Systems Group Dec. 2003 – Mar. 2006

Designed and built a reconfigurable modular robotic system, including power and embedded control electronics, mechanical design and manufacture via stereolithography, and control software in C, C++, and AVR assembly. Developed a physics-based robot simulator in C and C++, automated controller design and evaluation techniques, and algorithms for visually-guided end effector placement and kinematic self-calibration. Assisted with RF antenna design and optimization, including flight hardware. Supervised interns.

MIT Media Laboratory

Research Assistant, Robotic Life Group Sep. 2001 – Sep. 2003

As lead electrical engineer, designed and built hardware and software for several robots, including a 67-degree-of-freedom humanoid still in operation. Designed DC/DC and wireless power systems; microcontroller- and FPGA-based controllers including a custom soft-core microprocessor; motion control software in C, C++, assembly, and Java; capacitive and RF sensors; and communications hardware and software. Supervised undergraduate assistants.

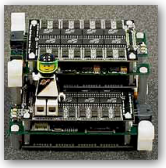
Undergraduate Research Assistant, Physics & Media Group Sep. 1998 – Sep. 2001

Designed and built hardware and software for distributed and ethernet-attached embedded systems, custom embedded Linux systems, and robot control systems for competitive robotics teams. Developed and supported hardware for high-profile installations at sites including MoMA and SIGGRAPH.

Massachusetts Institute of Technology

Fall 1997 — Spring 2003

M.Eng., Electrical Engineering and Computer Science, Spring 2003
Thesis: "A Motor Control Framework for Many-Axis Interactive Robots."
S.B., Electrical Engineering, Spring 2003
Undergraduate GPA: 4.4/5.0, Graduate GPA: **5.0/5.0**



MIT Robotics & Electronics Cooperative Fall 1999 – Spring 2001

Taught and developed curricula for seminars on topics in robotics and electrical engineering. President, 2000–2001.

MIT Autonomous Underwater Vehicles Team Spring 1998 – Summer 2000

Developed software and integrated hardware for autonomous submarines to compete in the AUVSI's international AUV competitions. Awarded first place in 1998 and 1999, second place in 2000.

Recent Publications

Hancher, M.D., and Hornby, G.S., "Evolving Quadruped Gaits with a Heterogeneous Modular Robotic System". Proc. IEEE Congress on Evolutionary Computation, 2007. Singapore, 25-28 Sept. 2007, pp. 3631-3638.

Hancher M. D., et al., "New Platforms for Web-based Lunar and Planetary Mapping and GIS". Poster, Lunar and Planetary Science Conference (LPSC) 2008. League City, TX, March 10-14, 2008.

Hancher, M.D., "High-Performance Image Processing and Cartography using the NASA Vision Workbench". Abstract and presentation, Free and Open Source Software for Geospatial (FOSS4G) 2007. Victoria, Canada, 24-27 Sept. 2007.

Key Skills

C.S.: C/C++, Python, assembly, GIS, databases, networking, device drivers, supercomputing, embedded systems
E.E.: Analog and digital design, PCB design, FPGAs, microprocessors, RF and power electronics, control systems
Etc.: 2D & 3D CAD, rapid prototyping, dynamics & modeling, advanced mathematics, Mathematica