J. Dan Morrow

Home:

4285 Glen Lytle Rd
Pittsburgh, PA 15217
(412) 521-7849
jmorrow@ri.cmu.edu

Carnegie Mellon University:

Robotics Institute
5000 Forbes Avenue
Pittsburgh, PA 15213-3891
Office: (412) 268-3762, Lab: 268-3652

OBJECTIVE:

Applied R&D or design engineering position with project leadership opportunities creating mechatronic systems solutions for interdisciplinary process and product development problems.

SKILLS:

Engineering	• Systems integration. • Computer-aided mechanical design. • Real-time control system design and implementation. • Modelling and simulation of physical systems. • CAD/CAE: Nastran FEA, CADAM, CATIA, Drafix, CIMStation, Telegrip
Computer Programming	• Languages: C/C++, LISP, Pascal, Fortran, tcl/tk, assembly (6809, 6811, 680x0) • Operating Systems: Unix, Macintosh, MS-DOS; Real-time OS: VxWorks, Chimera • Mathematics Software: Mathematica, Matlab/Simulink, Maple V, TKSolver • Device driver, graphical user interface, and physical system simulation development.
Project Leadership	• Leading junior engineers and technicians. • Organizing and planning interdisciplinary projects. • Strong writing, presentation, and interpersonal skills.

EDUCATION:

Ph.D. Carnegie Mellon University	1/97 expected. Robotics Ph.D. Program (School of Computer Science), GPA 3.9/4.0 The Robotics Ph.D. is an interdisciplinary degree which combines elements of computer science, mechanical engineering, electrical engineering, and applied mathematics. My research focuses on generalizing real-time force and vision feedback for related tasks to support rapid construction of robust robot skills. Advisor: Pradeep Khosla.
M.S.M.E. Univ. of Texas	8/87. Austin campus. Mechanical Engineering Department, GPA 4.0/4.0 Focus: Dynamic Systems and Control. Developed and experimentally verified a dynamic model of a robot wrist joint and its control system. Advisor: Joe Beaman.
B.S.M.E. Univ. of Texas	12/83. Austin campus. Mechanical Engineering Department, GPA 3.7/4.0 Focus: Biomedical and Thermo/Fluid Systems. Graduated with High Honors.
non-degree Univ. of New Mexico, Albq.	1/88-6/91. Electrical Engineering Department, GPA 3.9/4.0 Neural Networks, Fuzzy Logic, Linear Systems, Microprocessors, Computer Logic Design, Digital Electronics, Electromagnetic Fields and Waves I, EE Principles for Adv. Students.

PROFESSIONAL EXPERIENCE:

8/91 - present — **Carnegie Mellon University**, Pittsburgh, PA. Graduate Research Assistant.

- Developed reconfigurable real-time software for robot control under force and vision feedback.
- Developed force and vision feedback algorithms for robotic assembly skills.
- Developed real-time software architecture for execution of event-based skills and a graphical user interface in tcl/tk for constructing the state-machine executable files from software modules.
- Integrating sensorimotor primitive *design agents* into the Telegrip CAD design environment to support rapid construction of sensor-based, task-driven robot skills.

6/93 - 8/93 — **National Institute of Standards and Technology**, Gaithersburg, MD.
Visiting Guest Researcher. Developed real-time control software for Robotics Research Arm and developed force-driven connector insertion skills.

8/87 - 8/91 **Sandia National Laboratories**, Albuquerque, NM. Member of Technical Staff.

- Systems design and selection of mechanical, electrical, and computing components for outdoor mobile robot systems.
- Design and implementation of mechanical, electrical, and software subsystems.
- Developed numerous software subsystems to implement serial communications, user interfaces, real-time servo controllers (on multiprocessor VME MC680x0, PC, and 68HC11 platforms), and high-level controllers.
- Designed vehicle steering control algorithm based on dead-reckoning and radio beacon position location systems. Developed sensor fusion algorithms for combining position estimates.
- Developed "generic" vehicle control computer software for controlling actuators, reading sensors, and communicating with the command/driving station.
- Guided the group in adopting real-time programming practices. Led two projects and directed junior engineers and technicians. Mentored a summer student.
- Wrote proposals for internal research and development funding and technical reports.

8/85 - 8/87 **University of Texas**, Austin, TX. Graduate Research Assistant.

- Developed and experimentally verified a dynamic model of a robot joint and its control system.
- Developed task-based robot joint motion profile algorithm.
- Kinematically modelled a robot wrist to determine tolerance buildup.

6/86 - 8/86 **IBM Corp.**, Austin, TX. Associate Engineer.
Completed detail design and developed test plan for new robot assembly gripper.

2/84 - 7/85 **IBM Corp.**, Rochester, MN. Associate Engineer.

- Analyzed DASD head suspension vibration using finite-element models.
- Studied airflow effects on suspension vibration using hot-wire anemometer to measure airflow frequency content.
- Designed fixturing to support lab tests using CADAM and CATIA CAD packages.

10/83 - 2/84 **Center for Energy Studies, University of Texas**, Austin, TX. Research Assistant.
Developed and experimentally verified a model of attic heat transfer to assess the effectiveness of foil radiation barriers.

6/83 - 8/83 **IBM Corp.**, Boulder, CO. Summer Engineer.
Learned Statistical Process Control and reduced injection-mold tooling inventory.

6/82 - 8/82 **J. M. Huber, Corp**., Borger, TX. Summer Engineer.

- Developed physical fluid flow visualization models to understand a furnace burn-out problem in a carbon black manufacturing process.
- Used SAS program to investigate statistical correlations between different process variables and carbon black quality.

HONORS:

Department of Energy Integrated Manufacturing Predoctoral Fellow, 1995-98
Department of Energy Computational Science Graduate Fellow, 1992-1995
1982 College Scholar; Tau Beta Pi (Eng. Honor Soc.); Pi Tau Sigma (M.E. Honor Soc.); Dean's List

ACTIVITIES AND ASSOCIATIONS:

Chairman, Robotics Institute Teaching Quality Committee (1993-1995); Member, Robotics Ph.D. Program Committee (1994-1995); Member, Robotics Institute Review Committee (1992-1994); ASME, Dynamic Systems and Control Division; IEEE, Robotics and Automation Society and Computer Society

SELECTED PUBLICATIONS:

R.M. Voyles, Jr., J.D. Morrow and P.K. Khosla, "Shape from Motion Approach to Rapid and Precise Force/Torque Sensor Calibration," in *Proceedings of ASME Dynamic Systems and Control Division*, 1995 ASME Winter Annual Meeting, San Francisco, CA, Nov. 1995.

J.D. Morrow, B.J. Nelson, and P.K. Khosla, "Vision and Force Driven Sensorimotor Primitives for Robotic Assembly Skills," in *Proceedings of the 1995 IEEE/RSJ International Conference on Intelligent Robots and Systems*, Pittsburgh, PA.

B.J. Nelson, J.D. Morrow, and P.K. Khosla, "Improved Force Control Through Visual Servoing," *1995 American Control Conference*, Seattle, WA, June 21-23, 1995 (one of five finalists for **Student Best Paper Award**).