Curriculum Vitae

Personal:

Name:	Frederick G.M. Roeber
Date of Birth:	28 November 1967
Citizenship:	United States of America
Marital Status:	Single
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Education:

BS Physics, California Institute of Technology, 1990. My senior year research with the High Energy Physics group (L3 Experiment) involved the writing of software for the symbolic solution of Feynman diagrams.

Honors Graduate, Mead Senior High School, Spokane WA USA, 1985.

Graduate, Rickover Science Institute, Leesburg, VA USA, 1984.

Work experience:

October 1994 – Present:
Caltech staff scientist, consulting for the World–Wide–Web core development team at CERN.

- Worked on the design of an automatic document caching/distribution system to complement the HTTP and NNTP protocols.
- Designed and implemented the distributed, multi–host HTTP service on the highly–loaded `info.cern.ch` machines. Oversaw the long–term operation of this service.
- Modified the World–Wide–Web software to use GNU Autoconf, an industry–standard configuration system, to enhance and simplify the porting of this software to new platforms.
- Provided general consultation, problem solving and troubleshooting for the Web development team.

June 1990 – June 1994:
Caltech staff scientist, consulting for the CERN SPS/LEP Controls Group.

- Designed and implemented several large, distributed software systems essential to the control of the LEP and SPS accelerators; this includes the SL Measurement, Logging, and Error–handling Systems.
- Helped run the CERN side of a pilot project that explored the contracting to industry of the engineering of a software system. I actively reviewed the software engineering documents and deliverables, particularly during the Critical Architectural Design Review, and assisted in the application of the ESA Software Engineering Standards. I ensured that the design would properly interact with the rest of the system with which it was to be integrated, and performed acceptance tests to explore the system's real–time, network–dependent, and fault–tolerance characteristics. I also provided general consultation, problem solving, and emergency troubleshooting and debugging for the contractors.
- Modified PAW, the standard high–energy physics analysis software, to monitor, analyze and present LEP accelerator data in real–time.
- Measured, analyzed and correlated LEP accelerator data for operations, instrumentation and controls personnel.

- Designed and implemented software for the control of equipment in a real–time environment, including software running the site–wide video distribution system.

- Wrote an X Window System server for a multichannel video image generator.

- Provided general consultation, problem solving and troubleshooting for SL personnel.

September 1986 – June 1990 (during academic year):
Caltech Undergraduate Teaching Assistant, for the Ph 20, Ph 21, and Ph 22 courses.

- These three laboratory courses focused on the development and use of numerical methods for the solution of symbolically intractable physics problems. Though nominally a "teaching assistant," I effectively taught my sections of the courses.

Academic Summer 1989:
Caltech Summer Undergraduate Research Fellow, with the High Energy Physics group (L3 Experiment).

- Completed the design of the high energy beam transport begun the previous year (see below). This design was optimized for multiple operating regimes, and included an analysis of the accuracies and sensitivities involved in the equipment positioning.

Academic Summer 1988:
Caltech Summer Undergraduate Research Fellow, with the High Energy Physics group (L3 Experiment).

- Began the design of the high energy beam transport needed by the radiofrequency quadrupole (RFQ)–based calibration system for the L3 electromagnetic calorimeter.

- Ported and evaluated several particle beam transport simulation packages.

- Wrote my own particle beam transport simulation package, which included all facilities needed for the design and optimization of the RFQ–based calibration system's high energy beam transport.

Academic Summer 1987:
Caltech Summer Undergraduate Research Fellow, with the High Energy Physics group (L3 Experiment).

- Measured short–term radiation damage in bismuth–germanium–oxide (BGO) scintillator crystals as a function of dosage and penetration depth, for comparison with theoretical models.

- Redesigned the RFQ calibration system lithium target for minimal nuclear background and greater durability.

September 1987 – June 1990 (during academic year):
Caltech undergraduate student. As part of, and in addition to, my undergraduate studies in physics, I worked with the Caltech High Energy Physics group (L3 experiment).

- Contributed to the RFQ–based calibration system design.

- Installed, administered, and maintained the Caltech High Energy Physics computer infrastructure.

Academic Summer 1984:
As part of the Rickover Science Institute, I worked with the US Navy's Naval Surface Weapons Center, in Robotics Research and Development.

- Designed and wrote software to support hand–eye coordination in a simulated robotic arm.

Publications:

- Billen, R., et. al.: “LEP accelerator logging system using on–line database,” CERN SL/93–42 (CO), Proceedings of the 4th International Conference on Accelerator and Large Experimental Physics Control Systems – ICALEPCS ’93, Berlin, Germany 18–22 October 1993, Nucl. Instrum. Methods Phys. Res., A: 352 (1994).
- Roeber, Frederick: “The SL Error System Software User Manual,” CERN SL/93–101, CERN, Geneva, Switzerland, January 1994.
- Roeber, Frederick: “The design of the L3 BGO EM calorimeter RFQ calibration system high energy beam transport and focusing systems, and gas cell neutralizer,” California Institute of Technology Summer Undergraduate Research Fellowship report, presented at Caltech, Pasadena, California, October 1989.
- Roeber, Frederick: “Calibration of the L3 detector BGO array at LEP, CERN,” California Institute of Technology Summer Undergraduate Research Fellowship report, presented at Caltech, Pasadena, California, October 1988.
- Ma, Hong, et. al.: “Calibration of the L3 BGO electromagnetic calorimeter with a radiofrequency quadrupole accelerator,” CALT 68–1497, Caltech, Pasadena, California, June 1988; Pub. in Nucl. Instrum. Methods Phys. Res. (1988).
- Roeber, Frederick: “Study on the radiation damage of BGO crystals, and a new target design for the L3 BGO calibration system,” California Institute of Technology Summer Undergraduate Research Fellowship report, presented at Caltech, Pasadena, California, October 1987.

Particular computer–related skills:

- Extensive knowledge of Unix and related operating systems, including kernel and design aspects.
- Design of distributed, object–oriented, and real–time systems and applications.
- Extensive knowledge of the internet and world–wide–web, including historical development.
- Numerical methods for problem analysis and solution.
- C, C++, FORTRAN, Pascal.
- Unix (multiple flavors), VMS, Apollo Domain.
- Oracle, including Pro*C, SQL*Plus, PL/SQL, schemas, and general design.
- X Window System, particularly X servers.

General research interests:

- Information theory; including applications to theoretical physics, molecular biology, and other fields.
- Distributed operating systems and object stores.
- Game theory, particularly in economic markets.