

## Curriculum Vitae

C. Arthur (Art) MacCarley, Ph.D. PE. [amaccarl@calpoly.edu](mailto:amaccarl@calpoly.edu)  
<http://www.ee.calpoly.edu/faculty/amaccarl>, <http://telab.ee.calpoly.edu>, and <http://www.loragen.com>

Interim Department Head, BioResource and Agricultural Engineering  
Professor of Electrical Engineering and Computer Engineering.  
Director, Cal Poly Transportation Electronics Laboratory  
California Polytechnic State University, San Luis Obispo

Academic specialization: digital control systems, electronics, alternative energy, automotive engineering.

Research specialization: automotive and transportation electronics, advanced sensors, renewable fuels and electric vehicles.

## Education

Purdue University, West Lafayette, Indiana

Ph.D. Electrical Engineering (Computer-based Control Systems), 1987. Thesis: Suboptimal Control via Numeric Saturation in Linear Digital Compensators.

University of California, Los Angeles, California

M.S. Electrical Engineering, 1978. Thesis: Electronic Fuel Injection Techniques for Hydrogen Fueled Internal Combustion Engines.

B.S. (Cum Laude) Engineering, Mechanical/Alternative Energy Specialization, 1976.

## Employment

3/88 to present *California Polytechnic State University, Professor, Electrical Engineering.* Teach undergraduate and graduate courses in control systems and computer engineering. Department Chair 2007-10. Director of Computer Engineering Program 2000-2003. Research funded by NSF, US DOE, US DOT, Caltrans, and PG&E on advanced highway monitoring and control systems, electric vehicles, electronic engine controls, and alternative fuels.

1/11-5/11 *Franklin Olin College of Engineering, Adjunct Professor of ECE.* Visiting faculty appointment. Taught multidisciplinary freshman introductory lect/lab and senior elective on Sustainable Automotive Technologies.

6/97 to present *Loragen Corporation, Advanced Technology Group, Principal Engineer*  
Interdisciplinary team contracted to deploy or evaluate advanced electronics and computer-controlled systems on highways. Provides high-tech experience for Cal Poly faculty and students. Clients include US Department of Energy, California Department of Transportation, Univ. of California Berkeley, Hughes SBRC.

1/84 to 12/87 *Purdue University, School of Electrical Engineering, David Ross Fellow*  
Research in microprocessor-based control systems and advanced indirect sensing methods. Lead teaching assistant for digital laboratory; instructor for two undergrad laboratories; teaching asst. for two grad courses.

8/82 to 9/83 *American Bosch Division of United Technologies, Springfield, MA., Senior Engineer*  
Design and optimization of electronic diesel engine controls. Lead engineer, controls group, responsible for development and testing of electronic engine control algorithms.

5/82 to 8/82 *Consulting Engineer in Private Practice, Denver, CO.*  
Designed, constructed and tested electronic fuel injection and ignition control system for natural gas fueled engines, for CNG Vehicle Equipment Co., Fort Collins, Colorado.

5/79 to 5/82 *Denver Research Institute, University of Denver, CO., Research Engineer*  
Principle investigator on three programs involving the development and testing of alternative fuel engines and vehicles. Designed electronic engine controls and on-board metal-hydride hydrogen fuel storage systems.

9/77 to 5/79 *Hughes Aircraft Co. Digital Communications Lab, El Segundo, CA., Member of Technical Staff*  
Design, analysis and computer optimization of circuits for NASA Space Shuttle, GMS2 and GOES satellites.

6/75 to 9/77 *Research Assistant, UCLA School of Engineering and Applied Science*  
Designed electronic fuel injection system for hydrogen-fueled vehicles, and cryogenic hydrogen fuel storage systems. Projects funded by US Dept. of Transportation, US Postal Service, and private donations.

## Honors and Awards Received

Dean's Honor List, UCLA, 1975 and 1976.  
Tau Beta Pi Engineering Honorary Society.  
Eta Kappa Nu Electrical Engineering Honorary Society.  
Recipient of Hughes Aircraft Corporation Graduate Fellowship, 1977-78.  
Huffsmith Award, University of Denver, for best research paper of the year, 1980.  
Overall Champion, and winner of six individual class awards, 1981 Society of Automotive Engineers High Altitude Clean Air and Fuel Economy Rally.  
Recipient of David Ross Fellowship for doctoral study, 1985-87.  
Cal Poly Meritorious Promise and Professional Practice (MPPP) Award, 1990.  
Award recipient, DOE/NIST New Invention Competition, 1992.  
Most Inspirational Instructor Award, runner-up, 1989 and 1992.  
Outstanding Faculty-Student Involvement Award, 1992 and 1993.  
Outstanding Faculty Advisor, 1995, 1996, 1997, 1998.  
Northrup-Grumman Excellence in Teaching and Applied Research Award, 1997.  
Litton Industries Excellence in Research and Development Award, 1997.  
Society of Automotive Engineers "Best Oral Presentation" Award, SAE International Congress, 2000.  
Society of Women Engineers Team Tech Competition Project Advisor, Recognition Plaque, 2003.  
Computer Engineering Program Appreciation Plaque, Director of Computer Engineering 2000-2003.  
Student Appreciation Award, Service as Computer Engineering Program Director, 2003.  
Society of Women Engineers Team Tech Competition Project Advisor, Recognition Plaques, 2004 and 2005.  
Caltrans nomination for State of California Award for most cost-effective research of the year, 2004.  
Cal Poly 20-year Service Award, 2008.  
EE Student Award for "Best Stories", EE Department Banquet, 2010.  
Professional Recognition Plaque, personal gift from Cal Poly Astronaut Greg Chamitoff, 2009.  
Recognition pin for service to the disabled community, personal award from Cal Poly alum Congressional Medal Recipient Rory Cooper, 2010.

## Professional Society Memberships

Registered Professional Engineer (Electrical and Mechanical), Colorado  
Society of Automotive Engineers (SAE), Senior Member, 1976-present.  
International Association for Hydrogen Energy (IAHE), original society member, 1976-1982.  
Institute of Electrical and Electronic Engineers (IEEE), Senior Member, 1976-present.  
Sigma Xi Scientific Research Society, 1980-present. Cal Poly Chapter President 1991/92.  
American Society of Engineering Educators (ASEE), Senior Member, 1989-present.

## Professional Service

As student at UCLA 1973-78, member and captain of UCLA Hydrogen Car Team, developer of first practical hydrogen fueled vehicles, winner of several collegiate competitions. Developed electronic fuel injection for hydrogen fueled engines, which overcame the previously unsolved problem of intake backfiring.  
As director of the Alternative Fuels Laboratory at University of Denver Research Institute 1979-82, developed first electronically fuel injected multi-fuel (ethanol, methanol, gasoline) vehicle for US DOE. Also three hydrogen fueled vehicles (for Daimler Benz, US DOE, Eimco Mining Equipment Co., and City of Denver).  
As senior engineer for American Bosch, control systems team leader for development of first microprocessor-controlled diesel fuel injection system, 1981.  
As doctoral student in electrical engineering at Purdue, lead teaching assistant in digital and microprocessor laboratory, teaching assistant for nationally televised course "Advanced Microprocessors", David Ross Fellow for research in distributed sensor processors (now known as sensor nets) and robotic controls.  
Faculty advisor to 150+ senior projects, 20+ MS theses in electrical and computer engineering, 1988-present.  
Faculty advisor of student or team winning the Hewlett Packard Senior Project of the Year Award, 1989, 90, 91, 92, 93, 95, 98, 99, 2000, 2002.  
Deployed first EE Central UNIX computer system, using donated systems and components. 1988.  
Produced first computer-typeset lab manual in College of Engineering, using UNIX TROFF/EQN, 1988.  
Patent Disclosure "Indirect Sensing Method for Diesel Fuel Injection Quantity Control," CP Foundation, 1989.  
Specified, deployed and wrote practical users manuals for EE Dept. network of 15 UNIX Workstations, 1990.  
Served as UNIX and network system administrator for the EE Dept., 1990-1999.  
Presentations for Electrical Engineering Graduate Seminar almost every year since 1989.

Faculty Advisor and Branch Counselor to Cal Poly Student IEEE Chapter, 1990-97.  
Cal Poly representative to Chancellor's Technology Transfer Task Force, 1993.  
Cal Poly Academic Senator, 1993-95.  
Principal Evaluator, US Dept of Transportation Federal Highway Administration Field Operational Test, "Evaluation of Video Intersection Detection System", 1993-06.  
Principal Evaluator, US Dept of Transportation Federal Highway Administration Field Operational Test, "Evaluation of Integrated Freeway Ramp Meter and Arterial Control System", 1993-06.  
Patent Disclosure "Rapid Battery Interchange," Cal Poly Foundation, 1993.  
Invited speaker for IEEE Central Coast Professional Section Meetings, 1995, 1999 and 2007.  
Cal Poly Intellectual Property Committee, 1995-97.  
Developed modern EE/CPE Embedded Systems Laboratory, teaching both Intel and Motorola MCs, 1996.  
Founder and Incorporator of Loragen Corp., San Luis Obispo, CA (consulting and independent evaluation team of Cal Poly faculty and students) 1997.  
Interviewed by KSBY News for technical opinion on ordinance banning cell phone use at gas stations, 1998.  
Co-author of Cal Poly College of Engineering Mission Statement document, 1998.  
Academic Senate Research Committee, College of Engineering Representative, 1996-99.  
College of Engineering Strategic Planning Committee, 1997-98.  
College of Engineering Research and Professional Development Committee, Chair, 1997-99.  
Founder and faculty adviser, Cal Poly Electric Vehicle Engineering Club and Electric Racing Team, national winner of 4<sup>th</sup> place 1998 and 2<sup>nd</sup> place 1999. 1996-2012.  
Expert witness for California Department of Transportation Legal Division (1999-present).  
Director of Cal Poly Computer Engineering Program 2000-03.  
Spent June-August of 2000 fundraising for CPE and EE; traveled to 18 companies throughout California. Resultant contacts and donations provide continuing annual support of CPE, EE and CsC.  
Designated by Advancement Office in 2000 as the official contact between the College of Engineering and Bert and Candace Forbes, helping to secure \$3 million dollar donation to Cal Poly CPE, half to the EE Dept.  
Organized and offered the first Computer Engineering Program Banquet, September 2001.  
Created first Industrial Advisory Board for the Computer Engineering Program, December 2001.  
Founder and permanent faculty co-advisor of Cal Poly Computer Engineering Honor Society, Fall 2001-present.  
Created and advised three Computer Engineering Capstone team projects with industrial collaborators.  
Appointee, Caltrans working group on telecommunications, meeting annually 2002-present.  
Raytheon Excellence in Teaching Award Selection Committee, 2004, 05, 06.  
Raytheon Excellence in Applied Research Award Selection Committee, 2004, 05, 06.  
Northrup-Grumman Excellence in Teaching and Research Award Selection Committee, 1999, 2004, 05, 06.  
Developed and continue to operate Caltrans Detector Testbed on I-405 in Irvine, 2002-present.  
Faculty advisor to the SWE *Team Tech* National Competition Team, 2003 (2<sup>nd</sup> place) and 2004 (1<sup>st</sup> place)  
Developed "SIBS Bill Analyzer" computer program for Caltrans. Program for auditing and controlling state telecommunications costs, attributed with saving over \$4 million in first year of use, 2004.  
Member and Inter-committee Liaison, TRB Committee on User Information Systems, 2005-present.  
Faculty advisor, Cal Poly Advanced Autonomous Vehicle Club, 2005-present.  
Faculty advisor to the Cal Poly DARPA Grand Challenge Team, (semifinalists) 2005-06.  
Chair of Tenured and Probationary Faculty Committee, Tenured Faculty Committee, and Probationary Review Committee, Cal Poly Electrical Engineering Department, 2005-06.  
Expert witness in automotive electronics on four automobile accident cases, 2005-07.  
Developed Cal Poly EE "Control Systems" educational web site <http://telab.ee.calpoly.edu/~amaccarl>  
Invited participant in the "Baker Forum", focusing on sustainability issues, 2006.  
Completed short "CDR Certification Course" conducted by Collision Safety Institute, (for qualification as automotive crash data expert witness), Vallejo, CA, July 2006.  
Co-organizer of special session "Next Generation of Driver Information Systems" at 2007 TRB Annual Meeting.  
College of Engineering Domain 5 (Professional Development) Advisory Committee, 2007.  
Member of SurGE, Cal Poly Sustainable Initiatives Working Group, headed by Margot McDonald, Architecture  
Selected to participate in US Congressional Caucus meeting on "Education in Simulation and Modeling," 2007.  
College of Engineering RPT Committee. Co-author of draft CENG RPT Policy Document, 2007-2009.  
Represented Cal Poly at International Engineering Education Symposium, Seoul, Korea, 2009.  
College of Engineering Project-Based Learning Center Committee, representing CPE, 2006-present.  
College of Engineering Computers and Networks Committee, representing EE and CPE, 2006-present.  
Founder and faculty advisor to interdisciplinary Electric Vehicle Engineering Club, 2007.  
Active in many forums as advocate for improvement of research environment at Cal Poly.

Published lecture notes and laboratory manuals for 12 Electrical and Computer Engineering courses at Cal Poly, San Luis Obispo.

Principal Investigator on 36 funded research projects involving various areas of advanced controls and transportation electronics 1989-present, totaling over \$3.5 million in external funding. All projects have involved and provided employment for undergraduate and graduate students. Complete list on request.

Member, National Academy of Engineering Transportation Research Board User Information Committee, 2006-Chair, Cal Poly Electrical Engineering Dept., 2007-2010.

Member, College of Engineering Committee to write new Retention, Probation and Tenure Document, 2006-08.

Invited Speaker, Cal Poly Focus the Nation campus-wide event. Presented "Global Warming: Problems and Solutions, An Engineering Approach", with Yarrow Nelson and Linda Vanasupa, Jan 31, 2008.

Invited Speaker, Inaugural Cal Poly Kennedy Library Science Café Series. Presentation: "My Methanol Motorcycle", Jan 28, 2009.

Department Chair, Electrical Engineering, 2007-2010. Among accomplishments were major fiscal restructuring, implementation of "Promise-keeping Policy" for assured student accommodation in required classes, and guidance of Department through ABET accreditation culminating in visit 2008.

EPIC Course instructor, 2008 and 2009 (solar-powered model car design and competition).

Volunteer GATE course teacher, Nipomo MESA Middle School, every year 2002-present.

Adjunct Professor of Electrical and Computer Engineering at Olin College of Engineering, Needham, MA, during Sabbatical leave 2011. Developed and taught new course on Sustainable Automotive Technologies. Co-developed and taught major revision of freshman introduction course "Real-World Measurements".

Created "Electric Vehicle and Battery Safety Course" with certification examination for Cal Poly Electric Vehicle Engineering Club. Offered course and certification exam to all interested Cal Poly students, Dec. 2011.

Created and taught new Cal Poly multidisciplinary engineering course "Automotive Technologies for a Sustainable Future", Winter quarter, 2012.

Recipient of Chevron Grant for support of student team projects in above course.

Co-recipient (with ME faculty) of Chevron Grant for support of Wind Energy Project.

Currently (2012) PI on Caltrans Division of Innovation and Research advanced detector testbed project.

### University Courses Developed

#### *Major course revisions:*

EE 342, Control Systems Laboratory. Designed lab, wrote new lab manual, 1988, 1994, 1996, 1998.

EE/CPE 319/359 Digital Design with Laboratory. Introduced modern PLDs and FPGAs, and ABEL4 logic programming language.

#### *Created new courses:*

EE 563 Graduate Seminar, 1989.

EE 514 Advanced Topics in Automatic Control, 1988.

EE/CPE 432 Digital Control Systems, 1989.

EE 434 Automotive Engineering for a Sustainable Future, 2013

EE/CPE 472 Microprocessor Controls Laboratory, 1989.

EE/CPE 336 Microprocessor Embedded Systems Lecture and Laboratory, 1994.

EE470/471 Multidisciplinary lecture and lab "Automotive Technologies for a Sustainable Future", Winter quarter, 2012.

Assisted in the creation (2003), and instructor for CPE 350 and 450 Capstone Course Sequence, 2006-present.

Course coordinator, EE 436 and 336, Embedded Systems Laboratories.

Course coordinator, EE 342 Controls Laboratory 1993-2003.

Course coordinator and major revisions, EE/CPE 219,259,319,359 digital area lectures and labs, 990-1998.

Course coordinator, EE 432/472 Digital Control Systems lecture and laboratory.

Course coordinator, EE 513, Linear Control Theory

Course coordinator, EE 514, Advanced Topics in Automatic Controls.

Creator of "Prof. MacCarley's Control Systems Online Tutorial Web Site" [www.telab.ee.calpoly.edu/~amaccarl](http://www.telab.ee.calpoly.edu/~amaccarl), a comprehensive online resource for control system education (content password-protected, access provided upon request). Continuously updated and in active use in courses, 1998-2012.

### Journal Publications and Book Chapters

"Development of a Sodium Borohydride Hydrogen Fuel Storage System for Vehicular Applications," *Physica Status Solidi (A) Applied Research*, pp. 315-321, 1976.

"Energy Primer", contributed section "Hydrogen Energy", published by Portola Institute, Santa Cruz, CA, 1976.

- "Electronic Fuel Injection Techniques for Hydrogen Powered I.C. Engines," International Journal of Hydrogen Energy, V5.2, Pergamon Press, Oxford, England, 1980. Co-author: W.D. VanVorst.
- "Alternative Automotive Fuels Handbook," Publication of National Science Foundation, under Grant No. ISP-8009001, administered by University of Denver Research Institute, 1981.
- "State Feedback Control of Nonlinear Systems," International Journal of Control, V.43, No.5, 1986. Co-author: S. H. Zak.
- "An Auxiliary Sensor Processor to Provide Real Time Fuel Delivery Feedback for a Microprocessor Based Diesel Engine Controller," chapter in SAE publication "Recent Advances in Electronic Diesel Engine Control" and 1987 SAE Transactions. Co-author: D. G. Meyer.
- "A Study of Numeric Saturation Effects in Linear Digital Compensators," Electrical Engineering Technical Journal, Purdue University, School of Electrical Engineering, 1988. Co-author: D. G. Meyer (thesis advisor).
- "An Indirect Sensing Technique for Closed-Loop Diesel Fuel Quantity Control," Society of Automotive Engineers Transactions, 1990. Co-authors: W. Clark and K. Nakae (students).
- "Sample Rate Selection for Discrete Time Switching Controls", IFAC Journal, International Assoc. for Mathematics and Computer Simulation and International Federation of Operational Research Societies, Pergamon Press, Inc. 1990
- "Evaluation of Video Image Processing Systems for Traffic Detection," Transportation Research Record No. 1360, National Research Council, Wash. DC., 1992. Co-authors: S. Hockaday, D. Need, S. Taff.
- "Video Cameras for Roadway Surveillance: Technology Review and Product Evaluation Results," Transportation Research Record No. 1410, National Research Council, Washington D.C., 1993. Co-authors: D. Need, R. Neiman (students).
- "Video Technologies for Roadway Surveillance and Automated Detection," Society of Automated Engineers, Transactions, 1995. Co-author: L. Ponce (student).
- "Advanced Imaging Techniques for Traffic Surveillance and Hazard Detection," Intellimotion (journal), Vol 6 No.2, Partners for Advanced Transit and Highways, University of California, Berkeley, March 1997.
- "Evaluation of Infrared and Millimeter-wave Imaging Technologies Applied to Traffic Management," Society of Automotive Engineers, Transactions, and chapter in SAE publication "Journal of Passenger Car Electronic and Electrical Systems", 2001.
- "Computer Vision Detection System for Network Model Validation," Transportation Research Record 01-3442, National Research Council, Washington D.C., 2001. Co-author: B.M. Hemme (student).
- "Technical Evaluation of the Anaheim Advanced Traffic Control System Field Operational Test," Transportation Research Record, National Research Council, Washington D.C., March 2004. Co-authors: J. E. Moore II, S. P. Mattingly, M. G. McNally.
- "Methods and Metrics of Evaluation of an Automated Real-Time Driver Warning System," Transportation Research Record, No. 05-1423, National Research Council, Washington DC, January 2005.
- "A Study of the Response of Highway Traffic to Dynamic Fog Warning and Speed Advisory Messages," TRB 06-3086, Transportation Research Record, National Research Council, Washington, DC, Feb 2007. Co-authors: C. Ackles, T. Watts (students).
- "Automated Consensus-based Data Verification in the Caltrans Detector Testbed" Transportation Research Record, Vol. 1993, No. 1, pp. 124-130, 2007, National Research Council, Washington DC, January 2007. Co-author: J. Slonaker.
- "A Spy Under the Hood: Controlling Risk and Automotive EDR" Risk Management Magazine, Vol. 55, Issue: February 01, 2008. Co-author: Peter Thom Available online at

### Conference Papers and Published Articles

- "Development of a Sodium Borohydride Hydrogen Fuel Storage System for Vehicular Applications," American Society of Aeronautical Engineers Conference on Future Transportation Fuels, AIAA Proceedings, 1976.)
- "Electronic Fuel Injection Techniques for Hydrogen Powered I.C. Engines," Proc. Second World Hydrogen Energy Conference, Zurich, Switzerland, International Association of Hydrogen Energy, Coral Gables, FL, 1978. Co-author: W.D. VanVorst.
- "Hydrogen Fuel Applications for Urban Transit," Proc. AIAA Society and Aerospace Technology Workshop, Los Angeles, California, 1979.
- "Development of a High Speed Injection Valve for Electronic Hydrogen Fuel Injection," Proc. Third World Hydrogen Energy Conference, Tokyo, Japan, International Association of Hydrogen Energy, Coral Gables, Florida, September, 1980.
- "A Study of Factors Influencing Thermally Induced Backfiring in Hydrogen Fueled Engines, and Methods for Backfire Control," Proc. Intersociety Energy Conversion Engineering Conference, American Society of Mechanical Engineers, Atlanta, GA, July, 1981.

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