Curriculum Vitae: Dr DAVID JAMES AUSTIN

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Nationality: Australian

Summary of Skills

Programming Languages: C, C++, Tcl/Tk, Python, Perl, PHP, many other scripting languages, matlab, Java, Pascal, Modula-2, Modula-3, Fortran, BASIC, LOGO, LISP, SQL, 80x86 Assembler, 680x0 Assembler, 68HC11 Assembler, Z80 Assembler, PIC Assembler. Started programming at 7 years of age. At 11 years, developed program to compute the digits of π. Used Linux extensively for 15 years.

Electronics: digital and analog circuit design, PCB design, circuit diagnosis and repair, advanced soldering including surface mount components, FPGAs and VHDL. Started electronics with soldering course at 7 years. At age 15, designed and built Z80-based computer system. Developed 1200 baud radio modem at age 16.

Operating Systems: Linux, Solaris, VxWorks, QNX, RTLinux, Windows, DOS.

Academic Qualifications

- Bachelor of Science (Computer Science), Australian National University, 1993
- Bachelor of Engineering (Systems Engineering), Australian National University, 1995
- Doctor of Philosophy, Australian National University, 2000
- One book, seven international journal papers and 33 conference papers, mostly in premiere international conferences.

Prizes and Awards

- Almost $1.3m in grants awarded during my academic career, 2001-2005.
- University Medal for outstanding results, Engineering, 1995
- National Undergraduate Scholarship 1991-5
- Top Student, Third year Engineering: Electrical Engineers' (Australian College) Prize, 1994
- Top Student, Third year Computer Science, 1994

Hobbies

Robotics: Continuing my interest in robotics with a mobile robot of my own, based on a Lego chassis.

Chess: Started playing chess at age 7. Played in the Australian Junior Championships at age 9. Won the ACT Junior Championship at age 12. Have held 25th ranking (with a rating of 2170) on Free Internet Chess Server (USA) for chess variants (wild5).

Mountain Biking: Keen mountain biker, taking advantage of the many bush reserves of Canberra.

Recent Experience and Career Highlights

July 2007 – present, April 2006 - October 2006: IT Consultant & Freelance Programmer

Developed a speech recognition system for mobile phones. This involved 10,000 lines of C code, heavily optimised both for speed and memory savings. The system delivered an excellent recognition rate of 97% for isolated words (continuous speech recognition is much harder and was not a goal of the project).

Developed a cryptographic auction website prototype which used strong Pallier encryption to ensure a fair auction proof against cheating by either the auctioneer or other bidders. The project basically involved implementation of a scientific paper, with the usual lack of detail and obscurity that scientific writing entails. Python was used because of native support for big integers and the project resulted in 5,000 lines of code for the client and the server.

Engaged in a data recovery exercise for a local company in the finance industry. Successfully recovered 380GB of data from a 1TB disk array. Developed scripts to clean up the recovered data as much as possible (as is usually the case in data recovery, some of the meta-data was lost, including file names, directories and time stamps). Reduced the list of recovered files from 85,000 files to 47,000 files by removing duplicates and garbage files and restored 91% of the directory structure by comparison to the latest available backup. The company was very pleased with the results, including my rapid turn-around.

October 2006 – June 2007: Chief Technical Officer, Location Aware Technology Pty Ltd

Lead developer and manager of development process during the development of a radio location and tracking system. The system required heavy duty statistics to estimate the position of the tracked object from the complex radio frequency measurements. The company was just starting to use statistics when I came on board and my personal contributions improved the system accuracy from 15m to better than 7m.
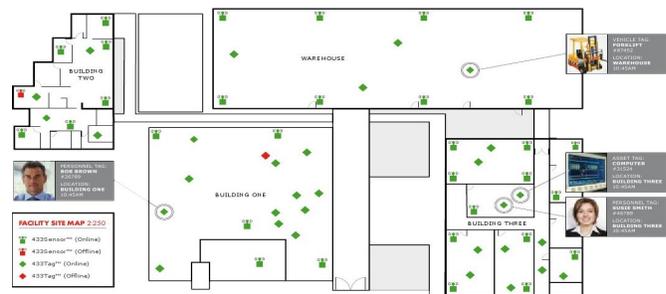
My responsibilities chiefly consisted of providing expert leadership to the technical development of the radio location system. This included development of R&D plans, management of the development team of five developers, project management of the development projects, instigation of repeatable, scientific experiments and honest reporting, development of documentation, recruitment and reporting to the board.

October 2005 - April 2006: Programmer, Prometheus Information Pty Ltd

Contributed to the development and maintenance of the Prometheus statistical information desktop client and server systems. Complete upgrade of unix file and web servers and linux desktops. Unfortunately, the company failed to secure a vital contract and suffered a severe financial crisis, including reduction of staff numbers by more than 50%.

August 2005 - September 2005: Contract Research Programmer, Seeing Machines Pty Ltd

Developed a new Hidden Markov Model based system for detecting failure of the Seeing Machines eye tracking system. Seeing Machines has developed a sophisticated software system for tracking eyes, eye closure and gaze direction (pictured). The primary envisaged application is driver fatigue monitoring, particularly for long-haul truck drivers. However, the Seeing Machines eye tracker does not always function correctly, due to rapid head motions or sudden changes in lighting. I quickly developed a system that models human eye opening data and correctly detected failure of the Seeing Machines eye tracking 95% of the time.
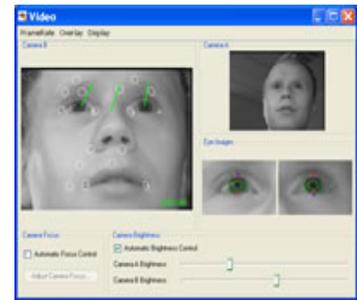
January 2001 - September 2005: Research Fellow, Robotics Systems Lab, RSISE, Australian National University

Investigated operation of mobile robots in dynamic environments (typically a static environment is assumed) and long-term reliability and robustness issues for mobile robots. Developed tour-guide robot with Questacon science and technology museum. Taught postgraduate course in Simultaneous Localisation and Mapping in 2004. Awarded almost $1.3m in competitive national and international grants. Led a significant research group, peaking at 19 people, with a primary focus on mobile robotics and understanding of the robot's environment. Developed online robot control system (pictured) that allowed everyday people to log in and drive the mobile robot over the internet.

1999 - 2000: Postdoctoral Researcher, Center for Autonomous Systems, Royal Institute of Technology, Stockholm

Taught two courses with the Automatic Control Group, Department of Signals, Sensors and Systems, Royal Institute of Technology: Automatic Control Project Course and a PhD level course in Hybrid Dynamic Systems.

Studied techniques for the control of an "Intelligent ServiceRobot", which combines mobility and manipulation. Proposed a feature-based, probabilistic localisation method for mobile robots. Developed a non-monotonic map building technique which can correct past mistakes and so can make large inductive leaps, confident in the knowledge that false assumptions can be corrected by future, contradictory observations. Developed a hybrid dynamic system for automatic door opening, used a localisation procedure to roughly locate the door, visual servoing to locate and grasp the door handle and force control to open the door (using pictured robot).

Sample Software Projects

Dave's Robotic Operating System (DROS): A set of modules and systems for control of robots. Chiefly designed to allow my team of post-doctoral researchers, programmers and graduate and under-graduate students to collaborate in the development of research systems for robotics. I led the project, including personal development of the core middleware (extensive use of TCP/IP, UDP and shared memory communications), supervision of most of the research projects, as well as personal development of some projects. This was a particularly complex project, requiring optimisation of the use of CPU and network resources and meeting real-time requirements to ensure robot safety. The project averaged more than 100,000 lines of code a year. In 2004 and 2005 the group averaged ten people, peaking at 19 people over the summer of 2004-5. DROS has over 330,000 lines of code and is still in use at the ANU and for my own projects. See also dros.org.
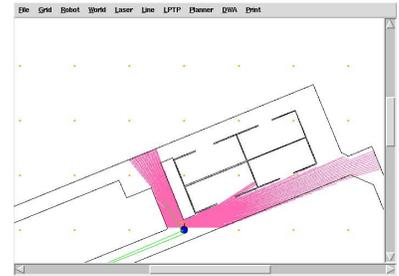
DRobot: A reverse-engineered driver for Nomadic Technologies XR4000 robots (pictured). In 2000, Nomadic Technologies was acquired by another company and the robotics business abandoned. To continue support for the ANU XR4000 robot, I reverse-engineered the Linux kernel driver for the robot (some 30,000 lines of C code). Since then, the driver has been ported to the 2.4 and 2.6 kernels.
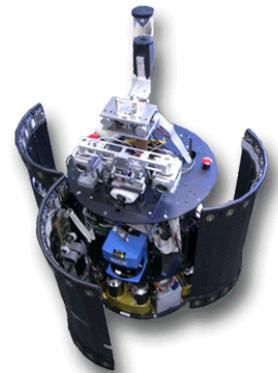
RobotADT: An abstract data type for control of robots. This system permitted control of Puma robot arms. It was written in C and ran under VxWorks on Motorola 68040 VME boards. This system allowed position and force control of the Puma robots and had a client-server interface for high-level control. I wrote extensions to the Tcl scripting language which were used in teaching labs for easy controlof the robots. This project consisted of approximately 100,000 lines of code and was written during my PhD studies.

DES Encryption in Firmware: A Z80-based system for encryption of a serial link between computers. I developed an assembly language implementation of DES for the Z80 (with a princely 2k of RAM) as well as an implementation in Pascal for the IBM PC. This was a project for Computer Science in year 12, when I was 16.

Z80 ROM Emulator: A system which allowed a host computer (an Apple Macintosh) to emulate the first 2k of ROM for a Z80. The host computer used a serial interface and the Z80 was kept in a wait state until the required byte was available from the serial to parallel converter. This was developed as a PCB as well as using wire wrapping. The ROM emulator was developed when I was 12 years old and in the next couple of years I developed a bi-directional radio modem (1200 baud) and used both for control of my first mobile robot.