

Curriculum Vitae

Dr. Tom Arbuckle.

Career Summary

Post-Doc, Software Quality Research Laboratory, University of Limerick, Ireland (2005-present)

Here I am switching fields once again to become a software engineering researcher. Our main interest here is in creating functional methods for the specification of software. Much of my time so far has been spent working with Darren Bane (on the kernel for our new table tools system) and Marius Dragomiroiu (on a diagnostic/identification system based around the concept of rough sets). I am currently searching around for my own research direction before starting my own research themes with the understanding that those to be chosen will forward the aims of our research group.

Post-Doc, Department of Computer Science III, University of Bonn, Germany. (2000~2003)

Project ABIS (German Ministry for Education and Research, BMBF)

ABIS (Automatic Bee Identification System) was a project for bee identification and monitoring. Given images of bees' wings, the system employed image processing and nonlinear statistical techniques to provide bee species identification with high levels of confidence. My work consisted of reengineering the prototype system, researching alternative image processing techniques, and liaising with biologists to create a user-friendly system with a graphical user interface. I voluntarily created and taught two C++ programming courses and contributed to two seminars on GIS. (Conference Papers)

Consultant/Post-Doc, Computer Science III, University of Bonn, Germany. (1997~2000)

Project VIRGO, Vision in Autonomous Robotics (EU, TMR)

I created RECIPE, a run-time configurable Image Capture and Processing System written in multi-threaded C++ using the ACE Framework. This large system was designed to be multi-platform and to facilitate its deployment with minimal knowledge of its internal design. It utilised dynamic linking, lex/yacc/gperf interpreter, active objects and ran under Solaris or Linux. (Main development tools: SunPro Compilers, Purify.) I successfully supervised a *Diplom* (similar to Masters) student whose dissertation employed the system as a key component. (Conference Papers, Journal Paper)

Visiting Research Engineer, Semiconductor Research Laboratory, Mitsubishi Electric Corporation, Japan. (1993~1997)

Real-World Computing Project (Ministry for International Trade and Industry)

In collaboration with researchers from Japan's Electrotechnical laboratory, workers had already developed a face-recognition system. I created a new C++ version, and then extended the system by applying fuzzy integrals to amalgamate image information from multiple image resolutions. (Conference papers, Journal Paper). I further created a system applying the Noise Adaptive Fuzzy C-Shells technique to finding elliptical shapes in face image data. (Conference Papers).

Company Internal Projects

- I designed and created a large industrial image processing application, prototyped system modules, wrote large code base in C++, liaised with engineers (in a foreign language, Japanese).
- My beta testing of SunPro workshop (compilers and development tools) version 4.0 under early access license from Sun Microsystems was highly evaluated by the development team.
- I wrote simple Motif/Fresco GUIs for application control and the display of image processing output.
- I administered 2 CPU Sun SPARCServer 1000 Solaris 2.3 and up, 4 CPU Ultra-server 4000. Set up simple httpd, gopherd, waisserver; NIS slave server; CAP 6.0; installed new Solaris systems on several occasions

Education

Ph.D.: “Computer Algebra Implementations of Whitham’s Averaged Lagrangian Technique in the field of Nonlinear Optics”, Department of Electronics and Electrical Engineering, Glasgow University, U.K., September 1992. (Supervisor: Professor John M. Arnold)

B.Sc.: 1st Class Honours in Chemical Physics, Departments of Natural Philosophy and Chemistry, Glasgow University, U.K., June 1985.

Membership of Professional Societies

Senior Member IEEE and also member of the IEEE Computer Society.

CEng, MIEE: Chartered Engineer and Member of the Institution of Electrical Engineers

Member ACM: Member of the Association for Computing Machinery

CITP, MBCS, CSci: Chartered Information Technology Professional, Chartered Scientist and Member of the British Computer Society.

Member SIAM: Member of the Society for Industrial and Applied Mathematics.

CPhys, MInstP: Chartered Physicist and Member of the Institute of Physics.

Research Interests

My interests are broad. Software engineering is now my main theme.

Functional methods of specification, formal methods, program verification, testing, object-oriented coding and design, componentisation, patterns, refactoring, reengineering, requirements, maintainability, computer and robot vision, image filtering, classification algorithms, image segmentation algorithms, neural and fuzzy approaches, coding methodologies, open-source software (especially Linux kernel), bioinformatics, autonomous robotics, language design and implementation, C++, Python.

Professional Activities

Conferences and workshops (IMACS, IIZUKA, RWC, Nara Face Recognition, EUFIT, ECAI, CVMR, IROS, EnviroInfo, ECOOP(x2), ECSI), EU project meetings (Nice, Zürich, Crete, Copenhagen), public relations (TV, National Geographic), demonstrations of working systems (Bonn, Zürich), formerly regular attendee IEE Germany meetings, paper reviewing (external: Neural Networks, internal: many conference and journal papers for various authors), invited session (IIZUKA), supervision of Masters theses, course development, book reviewing, open-source coding/bugfixing, IEEE senior member elevation referee, panel member of interviewing committee.

Teaching Experience

Teaching of practical programming courses (in German). Many seminar presentations. Assisting in taught seminars. Supervision of MSc (equivalent) student. Mentoring of post-graduate students. Several years teaching at colleges (to pay my Ph.D. fees). University course demonstrator (Physics, Engineering).

List of Publications

- 9th International Workshop on Systems, Signals and Image Processing (IWSSIP'02)**, "Automatic Identification of Bees' Species from Images of Their Wings", Tom Arbuckle, November 7-8, UMIST, Manchester, 2002, pp.509-515
- 16th International Conference Informatics for Environmental Protection (2002)**, "Environmental Communication in Biodiversity Information Systems", V. Steinhage, S. Meyfarth, T. Arbuckle, S. Schröder, A.B. Cremers, D. Wittmann, Vienna, pp.332-335
- 15th International Symposium Informatics for Environmental Protection (2001)**, "Biodiversity Informatics in Action: Identification and Monitoring of Bee Species using ABIS", T. Arbuckle, S. Schröder, V. Steinhage, D. Wittmann, Zürich, October 2001, pp. 425-430
- IEEE Intelligent Systems**, "Integrated Plan-Based Control of Autonomous Service Robots in Human Environments", M. Beetz, T. Arbuckle, T. Belker, M. Bennewitz, W. Burgard, A.B. Cremers, D. Fox, H. Grosskreutz, D. Hähnel, D. Schulz, Sept./Oct. 2001, pp. 56-65
- Künstliche Intelligenz** Zeitschrift, "Enabling Autonomous Robots to Perform Complex Tasks", M. Beetz, T. Arbuckle, T. Belker, M. Bennewitz, A.B. Cremers, D. Hähnel, D. Schulz, in English, 4/2000 (Autonome Mobile Systeme), pp. 5-10.
- International Conference on Intelligent Robots and Systems (IROS'99)**, "Controlling Image Processing – Providing Extensible, Run-time Configurable Image Processing on Autonomous Robots", T. Arbuckle, M. Beetz, Kyongju, Korea, October 1999
- CVMR '98 Workshop**, "RECIPE – A System for Building Extensible, Run-Time Configurable, Image Processing Systems", T. Arbuckle, M. Beetz, San Torini, Greece, September 1998
- European Conference on Artificial Intelligence '98**, "Transparent, Flexible and Resource-adaptive Image Processing for Autonomous Service Robots", M. Beetz, T. Arbuckle, Armin B. Cremers, M. Mann, Brighton, U.K., August 1998.
- Technical Report, Bonn University**, IAI-TR-98-2, "A Reconfigurable Image Capture and Image Processing System for Autonomous Robots – A Proposal.", T. Arbuckle, M. Beetz, B. Trouvain, January 1998
- Real World Computing '97**: "An Image Recognition System", T. Arbuckle, T. Ishii, E. Lange, N. Otsu, K. Kyuma, Tokyo, 30th January, 1997
- IIZUKA '96**: "Fuzzy Clustering Method Applied to Face Segmentation", T. Arbuckle, T. Iwamoto, N. Otsu, K. Kyuma, Proc. IIZUKA '96, October '96, Iizuka, Fukuoka, pp.-268-271
- EUFIT '96**: "Fuzzy Clustering Method and Face Segmentation", T. Arbuckle, T. Iwamoto, N. Otsu, K. Kyuma, Proc. EUFIT '96, Sept. 1996, Aachen, Germany, pp. 1669- 1673.
- Int. J. Uncertainty, Fuzziness and Knowledge-based Systems '95**: "Fuzzy Information Fusion in a Face Recognition System", T.D. Arbuckle, E. Lange, T. Iwamoto, N. Otsu, K. Kyuma, Int. J. Uncertainty, Fuzziness and Knowledge-based Systems, **3(3)**, 217-246 (1995)
- Real World Computing Symposium '95**, "Towards a General Vision System", T. Arbuckle, E. Lange, T. Iwamoto, N. Otsu, K. Kyuma, Tokyo, Japan, June 1995, pp. 63-64.
- IEICE '95**: "Multi-resolution Face Recognition System Incorporating Fuzzy Integration", T. Arbuckle, E. Lange, T. Iwamoto, N. Otsu, K. Kyuma, Proc. 1995 IEICE General Conference, March, Fukuoka Inst. Tech., 1995, p252.
- U.S. Patent Application '95**
- IIZUKA '94**: "Face Recognition System Incorporating Classifier Combination by Fuzzy Integral", T. Arbuckle, E. Lange, F. Goudail, T. Iwamoto, M. Takahashi, T. Ishii, H. Mori, K. Kyuma, N. Otsu, Proc. IIZUKA '94, August 1994, pp. 393-394
- IMACS '91**: "A MAPLE Implementation of Whitham's Averaged Lagrangian Technique", T. Arbuckle, J.M. Arnold, Proc. IMACS '91, Dublin 1991. (Extended Abstract).