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EDUCATION

PhD in Biologically inspired Artificial Intelligence. Stirling University 2002 - 2005

MSc in Evolutionary & Adaptive Systems. Sussex University 1997-1998

BSc(Hons) Computer Science (2:2) University of Kent at Canterbury 1994-1997

MAIN PROGRAMMING LANGUAGES

• C++	G++, Borland
• Java	JDK, J2EE
• Fortran, Perl, Prolog, LSL	Learnt as and when required by the job.

SKILLS

• Artificial Intelligence	See publications for details. Biologically inspired neural networks, artificial neural networks, self-organisation. genetic algorithms, cellular-automata, artificial-life.
• Code generation	Java to VRML / C++ to VRML / Java to Java to XML / Java to JavaScript.
• Information visualisation	Knowledge engineering, complex neural networks & social interaction. See website for examples.
• Distributed processing	Java agent architecture, C++ academic research
• Socket programming	Java agent architecture & Inter-Life, C++ academic research
• Multi-threading	Java agent architecture & Inter-Life, C++ & Java academic research
• Extreme programming	Used at Netdecisions for web development
• Unix / Linux	Academic research and web hosting uses Linux
• Windows	Predominantly used in industry

TOOLS

• Swing, Qt4, VRML	• SecondLife, OpenSim	• JSP, Servlets, Spring
• MySql, Oracle	• XML	• GDB, JDB, Valgrind, Borland debugger
• STL, Boost, GMP	• JUnit, JNI, JDBC	• VXML, Nuance SpeechObjects, TTS.

CAREER PROFILE

07 / 2011 – present **European Southern Observatory (Top IT services)** **Software engineer**

Working in the Software Development Division on the ALMA project using Java, Spring and Oracle.

12 / 2008 – 06 / 2011 **University of Stirling** **Research Assistant**

Initially employed on a fixed term two year contract to provide tools and technical support for the Inter-Life project. The contract was extended for half a year and then continued for a few months afterwards on a freelance basis paid by the University of Glasgow.

The aim of the project was to support skills development of young people to enhance their management of educational and social transitions in their lives. The project used the Second Life and OpenSim platforms to provide heavily scripted virtual environments. In-world objects were scripted using LSL to track data such as local chat, personal reflections, positional and rotational information and social clustering. A back-end server was implemented in Java to store this data using MySql. This information could then be replayed back in-world or using Java client programs at a later date. Tools were created to help establish a community. These allowed users to see who else was in-world and the likelihood of other people coming in later on. Communications were enabled between in-world avatars and out-of-world users using Skype and Twitter. Tools were also created to enable the secure creation and management of users for the Inter-Life system. I wrote the technical sections for two grant applications submitted by other members of the department. I am due to be joint-author on several papers produced by the Inter-Life project and also wrote a journal paper in my spare time that was accepted and published.

Reason for leaving: Funding ran out.

01 / 2008 – 12 / 2008 **Self-funded** **Researcher**

I moved back in with my parents so that I could work full-time on expanding the framework I use for my academic research. I used this period to develop my skills so that they were current and were also useful for freelancing. The framework is written in C++ for the Linux platform. Beforehand it was used to evolve agent controllers for use in artificial worlds. It is now possible to evolve functions for use with data sets that are read in from heterogeneous sources. I have distributed the framework using parallel processing techniques, multi-threading and sockets. A GUI is currently being developed for it using Qt. I also developed a ‘free energy

automata'. This was written in Java for multi-core platforms using a GUI and 2D graphics. The aim was to explore how the flow of free-energy into an open-ended system can allow for interesting forms of self-organisation.

01 / 2007 – 12 / 2007 University of Hertfordshire Research Fellow

I was informally offered a position as research fellow by the external examiner the day after the viva of my PhD to work on the Humaine project. The project finished at the end of 2007 and therefore funding was only guaranteed until then. Research was a continuation of my PhD. I researched temporal processing using self-organising spiking neural networks, neuromodulation and also how neural networks can be used to provide signals to each other. The experiments were coded in C++ for the Linux operating system. I was also the project supervisor for two MSc students.

Reason for leaving: Funding was for one year only.

11 / 2005 – 12 / 2006 Smith's Aerospace Senior R&TD Engineer

Employed in the R&TD department as part of a team to develop and debug existing fleet user management software. The role required me to work closely with the aeronautical engineers developing algorithms that they could use whilst drawing upon my software engineering knowledge and expertise. I designed and implemented envelope-estimation software for use in arbitrary dimensions, as well as curve- and distribution-fitting algorithms. During this time I also worked on the thesis of my PhD during the evenings.

Reason for leaving: External examiner offered me a position the day after my PhD viva.

10 / 2002 – 10 / 2005 Stirling University PhD student

The topic of the PhD was to emulate emotions and neuromodulation for use in intelligent and autonomous agents using a non-symbolic bottom-up approach. The functionality provided by emotions in natural agents was emulated by modelling the same underlying processes in artificial agents. A biologically plausible neural network using spike timing-dependent plasticity was implemented and comparisons were made between agents performing different tasks with and without the use of global neuromodulators.

Reason for leaving: Funding for PhD was for a fixed period.

04 / 2000 – 09 / 2002 **Netdecisions Ltd** **Senior Developer**

Employed at the R&D department. Initially researched and developed new technologies in the areas of information visualisation, personal area networking, agent architectures and the classification of user navigation of web sites with a view to personalising content. The department then focused on the development and implementation of the voice equivalent of web sites. This involved identifying and solving the issues that arose from implementing such a new technology. Having initially learnt the Nuance Speech Objects library, I then designed and implemented an XML data-binding tool for the dynamic generation of XML languages, such as VoiceXML. This was achieved by writing a program to generate Java bean libraries from XML DTDs to read in, manipulate and render out XML documents. Consequently Netdecisions spawned off a new company to exclusively develop voice sites and which later became a market leader (Fluency voice). This allowed the R&D department to focus on new areas of technology. I was assigned to research the area of knowledge discovery and knowledge management. I helped to develop a dynamic grammar framework for the spin-off company. One task involved the dynamic run-time translation of arbitrary Java objects to and from Javascript data structures using reflection. I was given sole responsibility for establishing coding standards and regular code reviews and also frequently ran training sessions and interviewed potential employees.

Reason for leaving: Started a PhD in Artificial Intelligence & Computational Neuroscience.

09 / 1999 – 03 / 2000 **Arclight Strategy Systems** **Research & Development**

I was employed as the first member of a new R&D department to add value to their existing software projects. Researched and developed agent technology and knowledge visualisation for use in knowledge discovery. A mark-up language was designed in which meta-data could be extended at run-time. This was visualised using automatically generated VRML. The agents were designed and developed for use on palmtops in wireless LANs. The code was written using 100% pure Java.

Reason for leaving: Company faced threat of closure and could no longer afford to support research.

02 / 1999 – 08 / 1999 **Axcess Media** **A.I. Consultant & Programmer**

Evaluated the technical and computational plausibility of creating adaptive Internet applications and User Interfaces. The focus was on web personalisation, desktop agents and web-site chatterbots for more anthropomorphic Human

Computer Interaction. This required sorting through the hype and buzzwords surrounding the existing products in the market place to see what was truly on offer. The role also involved network programming and Internet development using a variety of languages and tools.

Reason for leaving: Contract came to an end.

10 / 1998 – 02 / 1999 A.L. Digital Programmer

Developed and maintained new and existing Internet utilities. This included identifying problems inherent in the original design and creating simple solutions, fixing errors in existing code and fully documenting the work for future maintainers.

Reason for leaving: Originally hired for my C++ skills yet they were never used.

08 / 1997 – 10/1997 Context Ltd Programmer

Responsible for creation of object-oriented library and utilities used to assist in the manipulation of tagged, legal text for use on CD-ROMs. Liased with project co-ordinator to analyse the task in hand. I was responsible for design, code, testing and documentation.

Reason for leaving: Started MSc in Evolutionary & Adaptive System.

PUBLICATIONS

"Emotion as a Significant Change in Neural Activity." International Journal of Synthetic Emotions. (2010) 1(1), 51-67.

"Biasing Neural Networks towards Exploration or Exploitation using Neuromodulation." ICANN 2007: Proceedings of the 17th International Conference on Artificial Neural Networks Part II. Volume 4669. Springer-Verlag 889-898.

"A Bottom-up Approach to Emulating Emotions using Neuromodulation in Agents". PhD thesis. University of Stirling. 2006.

"Cost minimisation and Reward maximisation. A neuromodulating minimal disturbance system using spike timing-dependent plasticity". Proceedings of the Symposium on Agents that Want and Like: Motivational and Emotional roots of Cognition and Action at the AISB-05 conference.

INTERESTS & OTHER INFORMATION

A-levels	Computer Science, English, Design & Technology.
GCSEs	Eight including English, Mathematics & German.
Hobbies	Photography, carnivorous plants and growing food.
Sport	Paragliding, hill walking and wild-camping