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Education

PhD, Mechanical Engineering, Heriot-Watt University, UK

[2014]

Title: *Ubiquitous Integration and Temporal Synchronisation (UbiITS) Framework*. – **Thesis Prize Winner 2014**

Scholarship by EPSRC/Innovative Manufacturing Research Centre

Thesis presented the UbiITS framework, a generic solution for interconnecting and interoperating multi-platform heterogeneous sensors, devices, control systems, software and human interface devices in real-time. UbiITS includes a software library, multi-layer abstractions, a reference architecture and implementation guides as a collection to enable systematic construction for a variety of complex multi-platform hardware-software configurations. UbiITS is continually being updated and supported in C, C++ and C# languages.

MSc, Mechatronics, King's College London, University of London, UK

[2008]

Subjects included: Robotics Systems, Sensors and Actuators, Embedded Microprocessors and Real-Time Systems, Dynamical Systems & Simulations, Computer Aided Manufacturing (CAM), Computer Aided Design (CAD), Advanced Numerical Methods for Engineers

BSc (Honours) Engineering, Mechanical Engineering, University of Moratuwa, Sri Lanka

[2006]

Subjects included: Mechatronic Systems Engineering, Control Systems & Instrumentation, Manufacturing processes, Engineering Design, Automotive Engineering Applied Electronics, Applied Electricity, Design/Research project, Computational Fluid Dynamics, Aerodynamics

Work Experience

Department of Mechanical Engineering, Heriot-Watt University, Edinburgh

Post-doctoral Research Associate

[2013 - to date]

Research Assistant

[2012 - 2013]

Approved Teacher

- Research focus: **Industry 4.0, smart manufacturing shop-floor, Knowledge Capture, Human-in-the-loop devices, wearable-devices**
- Worked on research projects funded by: **EU H2020, EPSRC/IMRC, Connected Everything, Construction Industry Training Board (CITB)**
- Research Grants:
 - EPSRC/Connected Everything: Secondment at Advanced forming Research Centre (AFRC) **£5k**
 - Atomic Weapons Establishment/Heriot-Watt University Strategic Alliance: Seedcorn fund **£15k**
 - BEACONING EU Horizon 2020-ICT / IA Funds to HEI: **€465k** – (Co-investigator)
- Engaged with leading **UK, EU** - both **industrial** and **academic** partners from defence, aerospace, shipbuilding, construction, health, neurophysiology and gaming sectors.
- Experienced in **all parts of research**: requirement analysis, stakeholder engagement, project reviews, managing deliverables, accounts management, technical solution development, piloting, deployment and dissemination, developing proposals & funding applications
- Wide spectrum of activities was covered from **fundamental R&D** to **technology commercialisation** and **leading a spinout**.
- Won international research and innovation **CIOB Premier Award 2015** <[URL](#)> for digital innovation in construction
- Fluent in **communicating** knowledge; both in **high-profile scientific language** and **layman-terms** to audience from **diverse backgrounds**
- Undergraduate Teaching, **Y1-Y4 Engineering Manufacture and Computing for Engineers** subjects
- Supervised **master's** and **undergraduate research projects**; conducted **rapid-prototyping**, **3D printing seminars** for doctoral (CDT) students

Electronics Engineer - BW Broadcast, London

[2009 - 2010]

- Undertook research and development of audio processing and transmission equipment. These **commercial products** dominate a niche market worldwide.
- Embedded programming in C/C++, ARM micro controllers, Digital Signal Processors
- Designed multilayer highspeed, noise sensitive printed circuit boards, motherboards and daughter boards.
- User interfaces, touch control panels, and embedded webservers

Industrial Apprenticeship - Volvo, Sri Lanka

[2005]

- Duties related to Pro-active maintenance and repair works of Volvo Cars, trucks and buses.
- Experienced with Volvo on-board computers and engine control unit diagnostics (VCADS) and preventive maintenance.

Trainings and Courses

- Big Data Specialisation – UCSanDiego & Splunk, – Coursera (*Big Data modelling, management, processing, machine learning, graph analytics*) [ongoing]
- Audio Signal Processing for Music Applications – Stanford University – Coursera (*Signal processing, classification, information extraction*) [2015]
- Converge Challenge Business Development, (*Enterprise Building, R&D, Tax, Kick Starter, Business plans, Directorship, Funds, Trademarks*) [2015]
- CUDA - Edinburgh Parallel Computing Centre (*Parallel processing with GPUs and real-time stream processing*) [2014]
- Enterprising Researcher Summer School – Heriot-Watt University (*Research Management, Budget, Finance, Teams, Impact and Entrepreneurship*) [2013]
- 3D printers Operator and Maintenance Training – Object 3D printer solutions [2012]
- Certificate of Training, CREO Elements Pro – Course conducted by PTC [2011]
- Learning Enhancement and Development Skills LEADS (1, 2) – Heriot-Watt University (*Teaching/Academic Enhancement*) [2010]

Technical Skills

- **Strong Programming experience**
 - **C, C++ and C# (.NET)**, Languages. Cross platform development for **bare-metal, Linux, and Windows**
 - Familiar with frameworks: Qt, CUDA, Unity, Intel IPP, FFMPEG,
 - Writing High performance **Real-time, low-latency** codes human-in-the-loop interfaces, **distributed** systems, data streaming
 - Version-control (git), make-files (make, cmake, qmake) and bash scripting
- **Embedded Programming and electronics design**
 - **TI ARM cortex** 32-bit Microcontrollers, **PIC16, PIC18** MCUs, and **Silicon Labs EFM8 and EFM32** MCUs
 - I2C, SPI, CAN Bus, bit-banging, DMA, USB and Ethernet Interfaces, Zigbee, TCP, USB, and Bluetooth stacks, FAT FS
 - **Ultra-low power**, 2.4 GHz **wireless** design, **battery** charging and **IoT** infrastructures
- **Signal processing**
 - **Psychophysiological signals processing** (EEG, EMG, Respiration, ECG) for emotions, confidence, satisfaction levels
 - **Human body motion analysis using IMU data**
 - **Audio signal processing, synthetic music generation, and data sonification**
- **MATLAB and SIMULINK, Data analysis and generating high quality scientific visualisations for Research Projects.**
- **Bigdata Ecosystems: Hadoop, Spark, MongoDB, SQL, Power Query**
- **PTC Creo - Design for Manufacture and Assembly – design for 3D printing**
- **Industrial Programmable Logic Controllers (PLC) Siemens Programmable Logic Controllers (Siemens S7 200/300, Logo)**

Publications

Paper

- S. Harper, A. Sivanathan, T. Lim, and J. M. Ritchie, "Development of a Mixed Reality Game for Simulation Based Education," presented at the European Conference on Games Based Learning, Nice, France, 2018. (Accepted)
- S. Harper, A. Sivanathan, T. Lim, S. McGibbon, and J. M. Ritchie, "Control-display affordances in Simulation Based Education," in ASME Proceedings | 38th Computers and Information in Engineering Conference, Quebec City, Canada, 2018. (Accepted)
- A. Sivanathan, J. M. Ritchie, and T. Lim, "A novel design engineering review system with searchable content: knowledge engineering via real-time multimodal recording," *Journal of Engineering Design*, pp. 1–28, Oct. 2017. ⇨
- E. Valero, A. Sivanathan, F. Bosché, and M. Abdel-Wahab, "Analysis of construction trade worker body motions using a wearable and wireless motion sensor network," *Automation in Construction*, vol. 83, pp. 48–55, Nov. 2017. ⇨
- A. Sivanathan, S. McGibbon, T. Lim, J. Ritchie, and M. Abdel-Wahab, "A cyber-physical gaming system for vocational training," in *ASME 2017 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference*, Cleveland, Ohio, USA, 2017 August, pp. DETC2017-67560. ⇨
- T. Lim, D. Yurchenko, G. Rajendran, A. Sivanathan, and J. Ritchie, "Advances in Balance and Biofeedback Measurement: The Case for Health-Based, Postural Serious Games," in *ASME 2016 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference*, Charlotte, North Carolina, USA, 2016, p. V01BT02A048–V01BT02A048. ⇨
- D. Anagnostakis, J. Ritchie, T. Lim, A. Sivanathan, R. Dewar, R. Sung, F. Bosche, L. Carozza, "Knowledge Capture in CMM Inspection Planning: Barriers and Challenges," *Procedia CIRP*, vol. 52, pp. 216–221, 2016. ⇨
- E. Valero, A. Sivanathan, F. Bosché, and M. Abdel-Wahab, "Musculoskeletal disorders in construction: A review and a novel system for activity tracking with body area network," *Applied Ergonomics*, vol. 54, pp. 120–130, May 2016. ⇨
- E. C. Friedrich, A. Sivanathan, T. Lim, N. Suttie, S. Louchart, S. Pillen, and J. Pineda, "An Effective Neurofeedback Intervention to Improve Social Interactions in Children with Autism Spectrum Disorder," *Journal of Autism and Developmental Disorders*, pp. 1–17, 2015. ⇨
- A. Sivanathan, T. Lim, J. Ritchie, R. Sung, Z. Kosmadoudi, and Y. Liu, "The application of ubiquitous multimodal synchronous data capture in CAD," *Computer-Aided Design*, vol. 59, pp. 176–191, Feb. 2015. ⇨
- M. Hislop, A. Sivanathan, T. Lim, J. Ritchie, G. Rajendran, and S. Louchart, "Lecture Notes in Computer Science: Beyond simulators, Using F1 Games to Predict Driver Performance, Learning and Potential," in *Games and Learning Alliance*, A. De Gloria, Ed. Springer International Publishing, 2014, pp. 157–171. ⇨
- A. Sivanathan, M. Abdel-Wahab, F. Bosche, and T. Lim, "Towards a Cyber-Physical Gaming System for Training in the Construction and Engineering Industry," in *ASME 2014 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference*, 2014, pp. V01BT02A034–V01BT02A034. ⇨
- A. Sivanathan, "Ubiquitous Integration and Temporal Synchronisation (UbiITS) Framework – A solution for building complex multimodal data capture and interactive systems," Doctor of Philosophy, Heriot-Watt University, Edinburgh, Scotland, UK, 2014. ⇨
- E. V. C. Friedrich, N. Suttie, A. Sivanathan, T. Lim, S. Louchart, and J. A. Pineda, "Brain-computer interface game applications for combined neurofeedback and biofeedback treatment for children on the autism spectrum," *Front. Neuroeng.*, vol. 7, p. 21, 2014. ⇨
- Y. Liu, J. M. Ritchie, T. Lim, Z. Kosmadoudi, A. Sivanathan, and R. C. W. Sung, "A fuzzy psycho-physiological approach to enable the understanding of an engineer's affect status during CAD activities," *Computer-Aided Design*, vol. 54, pp. 19–38, Sep. 2014. ⇨
- A. Sivanathan, T. Lim, S. Louchart, and J. Ritchie, "Temporal multimodal data synchronisation for the analysis of a game driving task using EEG," *Entertainment Computing*, Mar. 2014. ⇨
- J. Ritchie, T. Lim, R. Sung, A. Sivanathan, C. Fletcher, G. Gonzalez, H. Medellin, Y. Liu, Z. Kosmadoudi, "Knowledge Capture in Virtual Reality and Beyond," in *Advances in Computers and Information in Engineering Research, Volume 1*, ASME Press, 2014. ⇨
- R. C. Sung, J. M. Ritchie, T. Lim, A. Sivanathan, and M. J. Chantler, "The Evaluation of a Virtual-Aided Design Engineering Review (VADER) System for Automated Knowledge Capture and Reuse," in *ASME 2013 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference*, 2013, pp. V02BT02A030–V02BT02A030. ⇨
- E. V. C. Friedrich, N. Suttie, A. Sivanathan, T. Lim, S. Louchart, and J. A. Pineda, "A Neurofeedback protocol using a sophisticated interactive video game to improve social responsiveness in children with ASD," in *Society for Neuroscience, 2013*, New Orleans, LA, 2013, p. 181.15/AAA24.
- A. Sivanathan, T. Lim, S. Louchart, and J. Ritchie, "Temporal Synchronisation of Data Logging in Racing Gameplay," *Procedia Computer Science*, vol. 15, pp. 103–110, 2012. ⇨