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## Professional Profile

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I am a PhD candidate student studying in the Software Defined Radio (SDR) Research Laboratory of the Electronic and Electrical Engineering Department at the University of Strathclyde. I previously graduated from the university in June 2014 with a First Class BEng EEE Degree. My current work is focusing on the development of HDL compatible Filter Bank Multicarrier (FBMC) based SDR radio transceivers for use in secondary user Dynamic Spectrum Access (DSA) applications. Focusing on the PHY, the aim is that these radios will be able to identify empty spectral bands, cognitively decide which are most suitable for use, and then use dynamic non-contiguous modulation in order to establish communications channels in them. I am developing these transceivers from within MATLAB and Simulink, which means they can ultimately be deployed with the tools to ZynqSDR devices (Xilinx Zynq based FPGA/ARM SoC dev board + Analog Devices SDR front end) or used in conjunction with USRP radios.

I am a punctual and reliable individual with good time management skills, who rarely misses appointments and aims to complete tasks long before deadlines. I volunteer at my local church in Edinburgh, and have PVGs to work with children and venerable adults through the Church of Scotland and the STEM Ambassador programme. I help to run the University Postgraduate Society, planning events, working on outreach, and managing the website and all social media (@pgstrath).

I am one of the authors of a 670 page 12 chapter textbook: *Software Defined Radio using MATLAB & Simulink and the RTL-SDR*. This spawned from my final year undergraduate project (discussed below). Beginning by covering the theory behind a variety of transmitters and receivers for both analogue and digital communications systems, our textbook progresses onto their practical implementation in the MathWorks software. Novel communications systems are presented, such as one capable of transmitting and receiving greyscale images using cheap FM transmitters and an RTL-SDR, which are inkeeping with the 'low cost' ethos of the project. You can find more information about this project (and get your free book download!) at [www.desktopSDR.com](http://www.desktopSDR.com).

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## Qualifications and Publications

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1<sup>st</sup> Class Honours Bachelor of Engineering (BEng) in Electronic and Electrical Engineering

*University of Strathclyde, Glasgow. June 2014, Degree Grade 81%*

I specialised in classes focusing on Digital Signal Processing (DSP), communications algorithms, networks and protocols (IEEE 802.3, 802.11), cellular networks and protocols (GSM, UMTS, LTE), software programming (MATLAB, Simulink, C, C++ for execution on computers and microcontrollers), hardware programming (VHDL, HDL Coder, Xilinx FPGAs, Xilinx SoCs) and information theory.

In my final year project, I worked with an emerging piece of SDR hardware called 'RTL-SDR'. The SDR community hacked \$20 RTL2832U based DTV receivers to create devices capable of sampling the RF spectrum across the range 25MHz - 1.75GHz. RTL-SDR is revolutionary, as it is the first SDR within the price range of hobbyists (as normally SDR hardware costs \$1000s). After experimentation to confirm the operation of the device and to learn what it was capable of, a selection of receivers for analogue modulation schemes were constructed in MATLAB and Simulink that were able to perform real-time demodulation and decoding of received off-the-air RF signals. Additionally I developed a series of AM transmitters, which were used to modulate and transmit signals for local reception, enabling practical implementations of more advanced concepts such as multiplexing to be carried out from the desktop.

*Textbook:* Software Defined Radio using MATLAB & Simulink and the RTL-SDR  
*Strathclyde Academic Media, Sept 2015, ISBN 978-0-992978723 – [www.desktopSDR.com](http://www.desktopSDR.com)*

*Journal Article:* A low-cost desktop SDR design environment using MATLAB, Simulink, and the RTL-SDR  
*IEEE Commun. Mag., vol. 53 no. 9, Sept 2015 – [dx.doi.org/10.1109/MCOM.2015.7263347](https://doi.org/10.1109/MCOM.2015.7263347)*

*Conference Papers:* Partial Discharge Detection Using Low Cost RTL-SDR Model for Wideband Spectrum Sensing  
*IEEE Int. Conf. on Telecommunications, May 2016 – [dx.doi.org/10.1109/ICT.2016.7500353](https://doi.org/10.1109/ICT.2016.7500353)*

Partial Discharge Detection Using Software Defined Radio  
*IEEE Int. Conf. for Students on Applied Engineering, Oct 2016 – [dx.doi.org/10.1109/ICSAE.2016.7810220](https://doi.org/10.1109/ICSAE.2016.7810220)*

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## Previous Employment

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### MathWorks UK

180 West George Street, Glasgow

October 2015 – March 2016

Positions: Internship



I completed an internship with the SDR Signal Processing and Communications (SPC) group in the MathWorks Glasgow office. My work was focusing on developing examples using the new ZynqSDR hardware/ software co-design workflow (part of the Xilinx Zynq-Based SDR support package for MATLAB and Simulink), external FPGA hardware, and radios from Analog Devices.

### The University of Strathclyde (Electronic and Electrical Engineering Department)

Royal College Building, 204 George Street, Glasgow

2013-Present

Positions: UCLA Short Course Author, Summer Researcher, Internship, Teaching Assistant



*UCLA Short Course – FPGAs for DSP and Software-Defined Radio:* In October 2016 I flew with colleagues to the USA to teach x2 three-day short courses on SDR I co-wrote with colleagues through the UCLA Extension Programme. Participants were taught how to, and then had the chance to implement real world SDR systems using laptops, RTL-SDRs, USRPs, Raspberry Pis, and ZynqSDR equipment. We latterly moved onto presenting hardware targeting techniques, and attendees were able to perform HDL code generation to target radio algorithms onto the Zynq's FPGA.

*802.11af WiFi TV White Space Trial in Glasgow:* In 2014 I was offered the opportunity to become involved with the Glasgow branch of the Ofcom TVWS trial, thanks to my connection with the Centre for White Space Communications at Strathclyde. The trial saw around 20 international organisations come together to test a variety of new white space technologies for numerous applications. The focus in Glasgow was primarily on deploying prototype 802.11af WiFi networks, in an effort to assist Ofcom in finalising its TVWS regulations and to test equipment from partners 6Harmonics and MediaTek.

*Internship:* During the summer of 2013, I undertook a research internship at the university, sponsored by the Faculty of Engineering. My project investigated the implementation of re-programmable FIR filters on a Xilinx Zynq SoC. Utilising the *Remez Exchange Algorithm*, software was developed to calculate FIR weights for low, high, bandpass and notch filters, that were used for real-time filtering of an audio stream on a ZedBoard. This work lead to a position reviewing a book on Xilinx Zynq – the *Zynq Book*.

*Teaching Assistant Duties:* Since 2013, I have been working as a teaching assistant within the EEE department; supporting both undergraduate and master level students in practical lab sessions. I have found this a very rewarding activity and it has helped to reaffirm my knowledge in digital circuit design, Xilinx software, and VHDL. I now actively teach part of a fourth year (senior) Information Transmission and Security class, presenting material and running laboratories from the SDR textbook.

### J Hewit & Sons Ltd

12 Nettlehill Road, Houstoun Industrial Estate, Livingston

July 2008 – Present

Positions: General Factotum, IT Network Manager



Tasks I was initially assigned at the leather manufacturer ranged from general maintenance in the factory to working in both the warehouse and office. The company moved premises in 2010, and all of the machinery from the factory had to be disconnected and moved. I worked with an electrician at the Livingston site, carrying out the installation of distribution boards and 3-phase SWA cables to the relocated machinery. Once the factory was up and running, I turned my attention to the computer system. I cabled the building, installed network switches, and organised the purchase of a new server. I configured this to act as a domain controller, file server and VPN server. I perform ongoing maintenance and upgrades on the server all client machines, which are currently running Windows Server 2016 and Windows 10 respectively.

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## Interests, Hobbies and Volunteering

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In my free time I like to drive, watch Netflix, cook, game and do 'extreme' DIY. I have nearly finished the renovation of my flat (Ikea-hacking, decorating, rewiring, replacing the kitchen, exposing brick walls...). I really enjoy outdoor activities such as walking, mountain biking and fishing, and at school I took part in the Duke of Edinburgh's Award scheme (completing Bronze, Silver and Gold awards). I spend time socialising with friends and colleagues, attend the gym and am an avid badminton player. Each year I voluntarily take part in the organisation and running of children's Holiday Clubs. I also take on the role of a mascot character for duration of the club, and tell stories each day to the 100 (or so) children while wearing ridiculous outfits!