CHRISTOPHER W. F. PARSONSON

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EDUCATION

University College London, Ph.D.   2019-22
Thesis: 'Network System Optimisation with Artificial Intelligence', EEE Dept., Optical Networks Group

Supervised by Dr. Georgios Zervas. Working on improving resource allocation in data centre networks. Specific research interests include: (1) Machine learning for combinatorial optimisation over graphs applied to resource allocation and scheduling in all-optical data centre networks; (2) optimisation algorithms applied to ultra-fast optical switching; and (3) benchmarking.

University of Cambridge (Gonville & Caius College), M.Res.   2018-19
*Integrated Photonic & Electronic Systems Engineering, **Distinction***

Research interests included: (1) Computer-generated 3D holography for AR and VR displays (80%); (2) ultra-fast all-optical switching for future data centre networks (82%). Relevant modules: Software for Network Services and Design (75%); Embedded Systems for the Internet of Things (77%); Photonic Systems (80%); Optical Transmission Networks (80%).

Imperial College London, M.Eng.   2014-18
*Materials Science and Engineering, **First-Class Honours***

Achieved high first-class honours. Averaged **79.4%** in third- and fourth-year exams and overall scored in **top 5% of class** (out of 120 students) in third year. Won 2016 Morgan Advanced Ceramics prize for highest mark in year for ceramics extended lab. Won entry out of >4,600 engineering students from across UK to attend Engineers Without Borders Challenge 2016 finals, taking third place overall. Achieved distinctions and first-class grades in various business management courses.

PUBLICATIONS

- **C. W. F. Parsonson**, Z. Shabka, W. K. Chlupka, B. Goh and G. Zervas, 'Optimal Control of SOAs with Artificial Intelligence for Sub-Nanosecond Optical Switching,' in *IEEE/OSA Journal of Lightwave Technology (JLT)*, June 2020

- **C. W. F. Parsonson** and G. Zervas, 'Benchmarking Data Centre Management Systems,' *Currently Under Peer Review*, September 2020

- T. Gerard, **C. W. F. Parsonson**, Z. Shabka, P. Bayvel, D. Lavery and G. Zervas, 'Scalable Ultra-Wideband Sub-Nanosecond Wavelength Switching for Data Centre Networks,' *Currently Under Peer Review*, August 2020

INTERNSHIPS & ADDITIONAL RESEARCH EXPERIENCE

VividQ Ltd., Cambridge   2018-19
6-month part-time research engineering placement with 3D display company VividQ (reference available). Performed simulations in Matlab and Zemax. Experimentally demonstrated ideas. Collaborated with University of Cambridge to develop large FOV and eyebox displays without compromising display size and quality using a waveguide and holographic optical elements.

Dyson Ltd., Bristol   Summer 2017
12-week research engineering internship in Dyson's Research, Design and Development branch as part of the Thermodynamics team, focusing on research of heat exchangers (received graduate job offer, reference available). Experience with CAD (NX11), materials characterisation and evaluation (CT scans, SEM, Matlab etc.), and test rig design and build. Allocated $20,000 budget to set up new suppliers and write Statements of Work for contracted researchers. Participated in 2017 Hackathon, taking third place.

Cambridge Nanosystems Ltd., Cambridge   Summer 2016
11-week research engineering internship focusing on material optimisation, laboratory research and industrial graphene production (reference available). Researched and wrote report on graphene heat treatement and analysis and nanocomposite production and testing.

Polygelco PLC, Cambridge   Summer 2015
6-week competitor analyst internship focusing on polymer property, competitor and market research, looking at top established companies and how Polygelco's innovative recycled polymer may compete (reference available).

Ubisense PLC, Cambridge   Summer 2014
4-week software-interface engineering internship focusing on performance enhancement. Used Google SketchUp, Inkscape and Gimp 2 to reallocate nodes (reducing image size by 90% to increase software performance) and to convert images to vector format.

RELEVANT TECHNICAL PROJECTS

Data Centre Network Traffic Generation and Benchmarking Tool
Developed open-source traffic generation suite in Python to (1) standardise network management benchmark methodologies and (2) make literature network traffic pattern replication easy even in absence of open-access data. Flexible to any network topology, handles both individual flow and job computation graph traffic, and integrates with Jupyter-Notebook front-end interactive interface. Currently used by other researchers in UCL group, paper under peer-review.

Ultra-Fast Optical Switch Optimisation
Built SOA simulation in Python, Matlab and ADS. Designed gradient descent, PID control, GA, and PSO algorithms using Python and Matlab. Open-accessed code. Experimentally demonstrated order of magnitude improvement over previous switch speed world-record. One paper published in *IEEE Journal of Lightwave Technology* and another under peer-review.

Scheduling with Graph Neural Networks (Ongoing)
Using end-to-end reinforcement learning framework to develop novel job- and network-aware optical data centre flow scheduling graph neural network agents in Python. Exploring and implementing latest GNN research (GraphSage, GAT, etc.).

Smart Ski Boot
'Over-bare-metal' coding in C to build smart ski boot from scratch. Used FRDM-KL03Z dev board, an OLED, 3 INA219 current sensors and 3 A201 FlexiForce sensors, writing drivers for each and integrating to make final working prototype. Developed algorithm to give user real-time feedback and calculate final score to evaluate performance. Characterised system uncertainty and error.

Network Attack Detection
Used KKD dataset of 5 million network request fingerprints to build network attack detection system. Implemented deep NN model with Python and Tensorflow for supervised ML approach. Trained and tested in client-server architecture using Socket.

Huawei DriveML Challenge
Worked in team of 3 to build autonomous driving agents in Python using NEAT algorithm and RLlib. Trained and tested in custom PyGame environment. Attended finals in British Museum and gained insights into practical applications of ML.

Engineers Without Borders Challenge
Competitive 20-week national competition focusing on innovating an engineering solution to real-world problems in Bambui, Cameroon. Designed innovative solution to Bambui's waste and power shortage problems. Won entry out of >4,600 applicants to compete in finals. Presented to >200 engineers and panel of 18. Finished in third place, placing in top 0.1% of applicants.

TEACHING EXPERIENCE

- Lecturer, Machine Learning MSc, 'Cloud Data Centres and Edge Computing', EEE & CS Dept., UCL — 2020-Present
- Post Graduate Teaching Assistant and marker, Programming Challenge project, EEE & CS Dept., UCL — 2020-Present
- Post Graduate Teaching Assistant and marker, Mathematical Modelling & Analysis, EEE Dept., UCL — 2019-Present
- TutorHunt Private Tutor for school-level Mathematics, Physics and Aptitude Testing — 2019-Present

VOLUNTEERING

- **South Africa, Mount Camdeboo, 2015**: 2 weeks volunteering on Mount Camdeboo game reserve, South Africa.
- **Madagascar, Nosy Bay, 2014:** 3 weeks volunteering in Madagascar, Nosy Bay.
- **South Africa, Athlone, 2013:** Won competitive travel scholarship to work on a self-organised 3-week project in the Christine Revell orphanage in Athlone (a township in Cape Town, South Africa).

SPORTS, HOBBIES & INTERESTS

- *Organisational and leadership roles include:* Gonville & Caius M2 rowing team 2018-19, Imperial College boxing sponsorship secretary 2015-17, Stowe teams for rugby, cricket, hockey and swimming (1st team). Student paper journalist.
- *Other interests:* Sailing (Level 4), diving (PADI Open Water qualification), skiing, tennis, golf and downhill mountain biking. Clarinet and percussion for 10 and 3 years respectively. Member of Stowe CCF, various courses completed.