

Conor Power

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EDUCATION

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- University College Dublin** Dublin, Ireland
 - Doctor of Philosophy(PhD) - Quantum Computer Architecture* 2021 - Present
 - M.E. - Electronic and Computer Engineering; GPA: 3.93/4.2 (Top of Class)* 2016 - 2018
 - B.Sc. - Engineering Science; GPA: 4.2/4.2* 2013 - 2016
 - **Selection of Courses:**
 - * **Quantum Condensed Matter Theory:** Introduction to methods of many-body quantum mechanics and topological spin systems, as applied to condensed matter physics. This module is taken by final-year undergraduate students studying theoretical physics.
 - * **Applied Quantum Mechanics:** This class covered some of the following topics: Complete description of spin and Stern-Gerlach experiment, Heisenberg operators and equations of motion, evolution of state in quantum mechanics, spin precession, multiparticle states, entangled states. This module is also taken by final-year undergraduate students in physics.
 - * **Solid-State Electronics:** This course was an introduction to the electrical properties of materials, in particular crystalline semiconductors alongside the drift-diffusion framework and its application to the description of simple semiconductor devices.
 - * **Digital Communications:** This class covered an introduction to the mathematics and simulation of digital communication encoding techniques such as PSK, QAM, FSK. This lead into a section covering classical information theory off which quantum information theory is based.
 - University of California Los Angeles** Los Angeles, USA
 - Pass/Fail Exchange Program* 2015 - 2016
 - **Selection of Courses:**
 - * **Engineering Electromagnetics:** This class covered more advanced concepts in electromagnetics for engineering students including transmission lines, Smith charts, Maxwell's equations in differential form, static and quasi-static electric and magnetic fields.
 - * **Analog Electronic Circuits:** Covered the analysis and design of single-stage amplifiers, DC biasing circuits, small-signal analysis, feedback systems and stability.
 - * **Search for Extraterrestrial Intelligence: Theory and Applications:** The SETI class provided broad exposure to a large team collaboration of 15 students (a mixture of undergraduate and graduate students). Together we each developed a different section of an initial data processing pipeline in Python for processing and selecting candidate signals from our observations with the Greenbank RF Telescope in West Virginia.

SKILLS SUMMARY

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- **Programming Languages:**
 - **Proficient:** Python, L^AT_EX, C, Verilog-A, MATLAB
 - **Familiar:** Mathematica, Javascript, HTML, CSS
 - **Libraries:**
 - **Qiskit:** Qiskit is an open-source SDK from IBM for working with quantum computers at the level of pulses, circuits, and application modules. I participated in the 2020 IBM Quantum Challenge and completed the final challenge which involved the deconstruction of an arbitrary unitary using the IBM Qiskit platform. I was awarded a badge for completing this challenge here: https://www.youracclaim.com/badges/fc7a9add-522c-4dd6-a80b-344dc8cb319b/linked_in
 - **Quimb:** Quimb is a Python library for quantum information and many-body calculations. I used this library when completing a numerical study of the longitudinal and transverse Ising models while taking a course in Quantum Condensed Matter Theory.
 - **Numpy:** This Python library provides the standard in fast array computing. I have used this library extensively with Pandas (an open source data analysis tool) for reading and processing data for producing graphs and visualisations of data with Python.
 - **Software:**
 - **Cadence Analog Design Environment:** I am familiar with the entire analog design flow for microelectronic circuits within the Cadence Analog Design Environment. This includes Schematic Capture, Spectre Simulation, Maestro and Assembler Testbench Generation, Monte Carlo Sensitivity Analysis, Aging and Reliability Analysis, Layout Parasitic Extraction and Electromigration Analysis. As part of my time in Adesto/Dialog Semiconductor I produced short guides on how to use some of the simulation tools, namely the Aging and Reliability Analysis platform.
 - **COMSOL:** A multiphysics finite-element modelling physics platform. I primarily use COMSOL in my PhD research in the simulation of potential barrier formation in silicon based quantum dots. This encompasses electrostatic and semiconductor physics.
 - **Sentaurus TCAD:** A fully-fledged Technology-CAD platform for the design, simulation, and fabrication of microelectronic devices using standard foundry techniques. This is an industry standard package and I am familiar with the basics of its flow to date. I am learning this as part of my PhD research and will be an asset for the design and simulation of CMOS FD-SOI (Fully Depleted Silicon on Insulator) based quantum dot arrays.

- **Soft Skills:**

- **Collaboration:** I was an editor for the UCD college newspaper, "The University Observer", where I led a team of contributors to produce a 2 page section on Science, Health, and Technology every 3 weeks. I also helped to design a 6-week introductory archery course for the UCD Archery Club alongside other committee members as the Head Coach.
- **Presentation:** As part of my PhD programme I have the opportunity to present updates on my work on a semi-regular basis to a group of UCD and Equal1 employees. This involves a broad range of backgrounds in electronic engineering and physics and requires tailoring presentations to be as accessible as possible.
- **Visualisation:** I enjoy creating diagrams and animations to help visualise difficult concepts and have made some of these publically available through my personal website <https://power.ws>. Some examples include animations from my masters project, https://power.ws/#projects/projects_physical and an explanation of how to write down an arbitrary CNOT gate in quantum computing https://power.ws/#projects/projects_quant_cnot.

TEACHING EXPERIENCE

- **University College Dublin** Dublin, Ireland
Teaching Assistant *September 2021 - Present*

I have acted as a teaching assistant (TA) for two undergraduate classes to date which are listed below. As part of my training I successfully completed the class "EEEN40530 Teaching Assistant in School of Electrical & Electronic Engineering" with a Distinction. This class exposed me to the fundamentals of teaching pedagogy, techniques for engaging with students, grading methodologies, and self-reflection techniques for continuous improvement. I was also exposed to the Brightspace virtual learning environment (VLE) from the perspective of a teacher.

 - **EEEN20050 - Digital Electronics: From Gate to System - Trimester 1 2021/22:** I attended weekly 2-hour laboratories where I would assist around 50 students with any difficulties they encountered in their simulations of digital electronics. I learned to focus on letting the student first explain the problem, their understanding, and then helping them identify the relevant sections of the lecture slides. I also assisted in grading and developed a detailed marking scheme for one of the laboratories.
 - **EEEN10020 - Robotics Design Project - Trimester 2 2021/22:** This class required me to be available as a teaching assistant towards the second half of Trimester 2 2021/22 for over 50 students. The students were all working on their own designs at this point in preparation for a final competition. As a result the role of the teaching assistant was more open-ended and involved fielding varied questions from across the whole course as students worked through their design. I also helped in the running and scoring of the final competition.
- **University College Dublin** Dublin, Ireland
Mathematics Support Centre *September 2021 - December 2021*

Part-time tutoring for the Maths Support Centre where undergraduate students can seek help for all maths/physics/engineering queries. The Maths Support Centre is open to all Stage 1 and Stage 2 students in UCD where the goal is to first help reassure the student and then encourage and improve their relationship with mathematics.
- **Cellusys** Dublin, Ireland
Ansible Training Course *February 2019*

Developed and presented a short training course on the fundamentals of Ansible for software deployments across many servers in a network. This training course was recorded and added to an internal Wiki where I provided further notes and diagrams. This was attended by a wide variety of levels throughout the company and helped to inform engineers on the capabilities of Ansible.

RESEARCH EXPERIENCE

- **University College Dublin** Dublin, Ireland
Doctor of Philosophy (PhD) *September 2021 - Present*

Full-time PhD program focusing quantum computer architecture. I am specifically focused on the modelling and simulation of silicon based quantum bit (qubit) arrays and associated measurement techniques. These measurement techniques include single-electron transistor readout and dispersive readout systems. The overarching goal is to couple multiphysics simulations of silicon qubit arrays with these measurement systems to produce an improved understanding of the underlying physics and to predict future experimental findings.

 - **Equal1 Internship:** Part-time internship with the startup Equal1 helping to create internal documentation on qubit architectures.
 - **Teaching Assistant:** TA for two undergraduate classes to date in digital electronics and robotics design.
 - **Maths Support Centre:** Part-time tutoring for the Maths Support Centre where undergraduate students can seek help for all maths/physics/engineering queries.
- **University College Dublin** Dublin, Ireland
Masters of Engineering (M.E.) *September 2017 - May 2018*

"Physical-Layer Network Coding for Multi-Way Relaying" — Advised by Dr Mark Flanagan. This is a theoretical topic in wireless communications that encourages interference in wireless communication networks to increase throughput. Two techniques were proposed to help improve the throughput, namely nearest neighbour quantisation and common cluster pairing. I plan to add thorough descriptions of these techniques to my personal website soon.

- **Animations of Research:** https://power.ws/#projects/projects_physical

- **University of California Los Angeles** Los Angeles, USA
Undergraduate Research *March 2016 - May 2016*
 Worked under Prof. Jean-Luc Margot as part of an undergraduate research class in UCLA. Developed software for choosing the most relevant signals from data collected using the Greenbank RF Telescope in West Virginia. My contribution to the data processing pipeline was through the generation of test signals that should be picked up by the pipeline in such a way that its operation could be verified.
 - **Publication:** <http://iopscience.iop.org/article/10.3847/1538-3881/aabb03>
- **UCD IoE^2 Lab** Dublin, Ireland
Undergraduate Research *June 2015 - August 2015*
 Worked under Prof. Anding Zhu on the optimisation of pre-distortion algorithms for use with power amplifiers. Designed a hardware block in VHDL to calculate the normalised mean square error in testing how well the digital pre-distortion performed.
- **Advanced Optical Imaging Group, UCD Physics** Dublin, Ireland
Undergraduate Research *June 2014 - August 2014*
 Worked under Assoc. Prof. Brian Vohnson in designing software for use in a UV scanning system with applications in keratoconus research and treatment. Designed an interface in LabVIEW for choosing particular spiral scan patterns which were implemented using a 2 mirror scanning system.

INDUSTRY EXPERIENCE

- **Dialog Semiconductor/Adesto Technologies** Dublin, Ireland
Mixed Signal Design Engineer *April 2019 - August 2021*
 Design and verification of analog building blocks including: bandgap, bias blocks, relaxation oscillator in 28nm FD-SOI and 12nm FINFET. I became proficient in the use of the Cadence Analog Design Environment and associated tools for simulating, extracting, and verifying analog microelectronic circuits. I also developed an internal tool for cataloging and searching through all of the available PDKs, Standard Cell Libraries, and Pad Libraries in conjunction with the EDA manager. I also developed a visualisation tool for quickly viewing all of the relevant characteristics of a particular transistor device for sizing.
 - **Training:** Analog Circuit Design (Waterford Institute of Technology), Advanced Python for IC Design Engineers
 - **Software:** Schematic and layout design using Cadence and Mentor tools. Simulation, verification, reliability analysis, and extraction using DRC, LVS, and QRC.
- **Cellsys Roaming, Security, and Analytics** Dublin, Ireland
Software Engineer *August 2018 - March 2019*
 Worked with the Steering of Roaming and Signalling Firewall teams across the full software stack. Deployments for Steering of Roaming, Implemented token bucket rate limiting library across the full stack in the Signalling Firewall. Ran a training course of my own design on Ansible deployments.
- **Internet of Things and Wearables Group, Intel Corporation Ireland** Leixlip, Ireland
Student Engineer *January 2017 - July 2017*
 I worked with the Emulation Team during my internship in Intel. I designed and implemented a full software stack in C and Python for passing data to and from chip models on FPGA boards. I also designed and tested a single clock FIFO stack as part of detailed tutorial in hardware design with a senior member of the emulation team.

HONORS AND AWARDS

- S3 Electronic Engineering Medal - Highest GPA in UCD M.E. Program - September, 2018
- UCD Intel M.E. Program Scholarship - September, 2017
- Partially funded exchange to UCLA - Awarded to top 2 UCD Engineering Students - September, 2015
- UCD Ad Astra Academic Scholarship for Leaving Certificate examination results - September, 2013

PUBLICATIONS

- Jean-Luc Margot, Adam H. Greenberg, Pavlo Pinchuk, Akshay Shinde, Yashaswi Alladi, Srinivas Prasad MN, Oliver Bowman, Callum Fisher, Szilard Gyalay, William McKibbin, Brittany Miles, Donald Nguyen, **Conor Power**, Namrata Ramani, Rashmi Raviprasad, Jesse Santana, and Ryan S. Lynch "A Search for Technosignatures from 14 Planetary Systems in the Kepler Field with the Green Bank Telescope at 1.15-1.73 GHz", *The Astronomical Journal*, Volume 155, Number 5, Article ID. 209, 9 pp. (2018)