Gregory Brooks

Consultant (Embedded Systems) at TTP plc

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Skills/Technologies

- Bare-metal C
- C++11
- ChibiOS
- mBed RTOS
- IAR
- STM32Cube
- STM32
- Rust
- Jira
- Git
- GitHub
- Subversion
- Docker
- Python
- Raspberry Pi
- Linux (Debian-based)
- Kivy
- PyQt
- Altium
- KiCad

Relevant Experience

2019 to Present **Consultant (Embedded Systems)**, *TTP plc*, Melbourn.

Worked on a range of multidisciplinary projects within the Life Science/Cell and Gene team, such as:

- Puckdx sample-to-answer human IVD platform (for DiaSorin).
- CoVent ventilator, a collaboration with Dyson in response to the 2020 'Ventilator Challenge' during the COVID-19 pandemic.

Responsibilities include:

- Hardware (schematic and PCB) design, assembly of prototypes.
- Firmware development for STM32 family, from bare-metal C99 to mutithreaded C++11 with mBed RTOS.
- Software/GUI development in Python (Kivy touchscreen interface for an embedded SBC).
- Testing and debugging of hardware, firmware and software (oscilloscopes, logic analysers, SWD debuggers).
- Implementation, testing and debugging of communications interfaces (UART, I2C, SPI, Modbus, Ethernet<->TCP<->HTTP).
- Communication and collaboration with other team members, especially those without an electronics/software background (e.g. scientists, project managers).
- Project timeline estimation, prioritisation of tasks to meet aggressive deadlines.

2018 **Summer Intern**, *Samsung Cambridge Solution Centre*, Cambridge.

3 month internship, developing WiFi chip firmware (in C) within a team of ~10. Introdction to unit tests (Unity) and continuous integration (Gerrit and Jenkins).

2017 **Summer Intern**, *TT Electronics*, Cambridge.

10 week internship, modelling high frequency behaviour of PCBs to troubleshoot and suggest techniques for minimising unwanted parasitic effects.

2016 **Technical Delivery Graduate**, *BAE Systems Applied Intelligence*, Guildford.

12 week internship, configuring Linux (CentOS) systems using Puppet scripts in addition to general development in C++.

2014 **Work Experience Student**, *Surrey Satellite Technology Ltd.*, Guildford.

Two week work placement, providing an introduction to satellite design, production and testing.

2012 **Work Experience Student**, *Sperry Marine (Northrop Grumman)*, New Malden.

Two week work experience placement - repaired and tested computers returned from the field, wrote reports on tested units.

Education

2015–2019 **MEng & BA Electrical and Information Sciences (Electronic Engineering)**, *Christ's College, University of Cambridge, 2.1.*

2008–2015 **A-level Mathematics, Futher Mathematics, Physics & Chemistry**, *Sutton Grammar School*, Sutton, *4 A* grades.*

Relevant Skills & Activities

- Experienced with time and resource management when working on constrained projects (this is especially important when working at a consultancy with a fees-for-time business model). Familiar with techniques such as:
  - Agile development techniques where appropriate, prioritisation of core features whilst allowing for future expansion.
  - Minimising accrual of technical debt where appropriate.
  - Selection of development tools based on project requirements (e.g. the time/effort saving advantages of a continuous integration system & automated build and test).
- Have used a variety of toolchains and technologies, from self-contained Windows development environments (IAR EW) to open source tools (make and gcc in a containerised Linux environment).
- Some experience working towards IEC 62304 and MISRA 2012.
- Co-authored and presented a poster at the EuroSys 2019 conference in Dresden *(Gregory Brooks, Youchao Wang and Phillip Stanley-Marbell. Safeguarding Sensor Device Drivers Using Physical Constraints. Poster presented at EuroSys 2019, Dresden, Germany.)*.
- Hobby projects can be found on GitHub (github.com/Gregox273), examples include:
  - Ardupilot based UAV project to capture near-infrared imagery of vegetation so that NDVI analysis could be performed to analyse crop health.
  - Apollo 11 guidance computer emulator (with 'DSKY' user interface) using an ARM Cortex-M0 based microcontroller and custom PCB.
- Won Google Creative Technology Prize at the national Big Bang Science Fair 2015.
- Received an Arkwright Engineering Scholarship, sponsored by the ERA Foundation.
- At university, I was a core member of Cambridge University Spaceflight society where I have worked on the design, construction, programming and testing/flight of projects such as an inertial measurement unit, GPS/telemetry boards for rockets, lightweight balloon payloads and a time-of-flight trilateration system for tracking a rocket's position during flight.
  - Developed Python backends and GUIs using PyQt for various society projects e.g. the trilateration project mentioned above.
  - Part of the team that launched the society's Martlet 3 rocket at Black Rock desert, Nevada, in 2017.

Master's Degree Project

Title *Compiling Physical Invariant Descriptions to Hardware Descriptions for a Sensor Interface for Security and Privacy in IoT Applications*

Supervisor Dr Phillip Stanley-Marbell

Description This project involves writing a compiler, in C, that takes a description of physical laws/constraints relating electronic sensor data (e.g. pressure $\times$ volume $\propto$ temperature) and outputs Verilog RTL for use with a low power iCE40 FPGA. This FPGA sits between the sensors and external circuitry, such as a microprocessor, implementing a local differential privacy system which accounts for the physical relationships and hence mutual information between related measurements.

Relevant Degree Modules (Condensed Summary)

- Mathematics
- Signal Processing
- Information Theory
- Embedded Systems
- Analogue and Digital Electronics
- Software Engineering