Jacob Peake

Portfolio

GitHub Profile
LinkedIn Profile

Education

Imperial College London Oct 2021 - Jun 2025
Master of Engineering, Computer Engineering MEng

Winstanley College Sep 2019 - Jun 2021
A-Levels: Mathematics(A) Physics(A*) Further Mathematics(A) Extended Project(A*)*

Experience

Qualcomm Jul 2023 - Sept 2023
Software Engineer *Internship*

- Developing Platform Software for the Latest Voice & Music SoC - with significant C & Python development.
- Contributing towards the continuous development of the department's processes, capturing system requirements, defining tasks, maintaining relevant documentation, and participating in design reviews.
- Communicating within a small team & wider organisation to establish additional functionalities for the SoC.

Karman Space Programme Feb 2023 - Present
Avionics Engineer

- Designing the Avionics System to be implemented into Vega & Aurora Spaceshot Rockets - aiming to be the first student-led team to reach space (100km) with a fully-reusable rocket.
- Designing, Building & Testing the System Architecture, Sensor System, Telemetry Communication, Guidance, Navigation and Control System, Power Distribution, Camera System, & Software.
- Producing a Conceptual Design Review, Preliminary Design Review & other academic research literature.

Relevant Projects

Autonomous Pathfinder Robot
C++, FPGA, HTML, CSS, JavaScript

- Designed an Autonomous Pathfinder Robot that navigated & mapped a maze - calculating the shortest path from start to end-point.
- Implemented an in-hardware Vision System (FPGA) that detected the white-maze markings & coloured beacons to enable active obstacle avoidance and triangulate position, along with IMU Dead-Reckoning.
- Developed a Web-Application that displayed the maze representation & communicated with a server & database to store mapping data & send real-time commands to the robot.

C Compiler
C++, RISC-V, Lex/Flex, Yacc/Bison

- Designed a C Compiler in C++ that takes C as its source and produces RISC-V assembly as its target language.
- Used Test Scripts of increasing complexity to verify design decisions and ensure correct functionality throughout the development process, as more features added.
- Managed development using a tracking system to define milestones, give a week-by-week plan and log updates, assessing the estimates given for reaching milestones and making adjustments accordingly.

RISC-V CPU
SystemVerilog, C++, RTL Design

- Designed a multi-stage pipelined processor compliant to the RISC-V ISA using SystemVerilog.
- Wrote C++ testbenches to verify correctness of digital hardware and used digital design tools such as Verilator and gtkWave to design functionality.
- Coordinated Development Methodology & allocated tasks & resources to team members to ensure structured approach taken - to meet timing deadlines.
- Used C to RISC-V Compiler project to compile C code into RISC-V instructions - which could then be executed on RISC-V design.

FPGA IoT System
FPGA, C, Python, Verilog

- Developed an IoT system with multiple FPGA nodes that processes data captured by an accelerometer and interacts with a cloud server to exchange information.
- Used IoT system and PyGame to implement a 'Mario Kart' style game- using FPGA nodes as controllers, using cloud server to sync data between players and storing player information in a NoSQL database.

Vega Avionics System
C++, C, Design

- Developed the System Architecture, Software, Control System & contributed to the Conceptual Design of the Telemetry System and Camera System.
- Created a structured testing & prototyping methodology, coordinated with other team members, and presented a Launch Day Protocol to be following before and during vehicle operation.
- Produced a Conceptual & Preliminary Design Review - which each were presented to a panel of experts within the space industry - allowing critical feedback such that the iterative design process could be followed.

Webpage Portfolio Design
HTML, CSS, JavaScript, React

- Developed a portfolio website using HTML, CSS, JavaScript & React to introduce myself and share my projects, experiences, & thoughts.
- Added features to make a user-friendly, simple interface for navigating efficiently between information, with additional animations.

Technologies

- **Languages**: *(in order of competency)*
  C++, C
  Python, SystemVerilog
  HTML, CSS, Javascript, MATLAB, SQL
- **Technologies**:
  RISC-V, PyTorch, OpenCV, FPGA, Quartus Prime
  Unix, Lex/Flex, Yacc/Bison, GCC, LLVM
  LaTeX, Git, Perforce, Jira
- **Skills**:
  Report & Documentation Writing, Design Process & Design Review Writing, Software Development, Communication, Leadership & Management
- **Relevant Modules**:
  Instruction Architectures and Compilers, Information Processing, Software Systems, Discrete Mathematics, Programming For Engineers, Digital and Computer Architecture