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

Karman Space Programme Feb 2023 - Present
Avionics Lead *Part-Time*

- Leading 8-students in designing the Avionics System for the first student-led reusable rocket to space.
- Implementing Software with C++, C, & FreeRTOS to meet high-performance, low-power, real-time requirements.
- Leading the integration of Software, Hardware, Control & Telemetry Systems to produce an elegant, robust solution.
- Collaborating with Leading Experts (such as European Space Agency), & creating 150-page Technical Design Reviews.

Imperial College London Oct 2023 - Present
Undergraduate Teaching Assistant *Part-Time*

- Selected to assist in teaching Instruction Architectures & Compilers module to 80+ students, & helping improve module.
- Guided students during lab sessions, in particular using SystemVerilog, Verilator, WSL, ESP32, & command-line interface.

Qualcomm Jul 2023 - Sept 2023
Software Engineer *Internship*

- Developed Platform Software for the Latest Qualcomm Bluetooth Audio SoC - with significant C Software Development.
- Established additional functionalities for the SoC, including implementing a new on-chip communication protocol.
- Implemented Automated Test Scripts in Python to verify design functionality & validate successful integration.
- Translated given functionalities into software implementation, maintained relevant design documentation, tested development board over JTAG interface, and pushed updates to production codebase (100s+ lines of code to production).

Projects

Architectural Optimisation
SimpleScalar, Microarchitecture, Scripting

- Optimised Total Energy Utilisation of OoO Issue Processor Through Exploration of Microarchitectural Designs.
- Utilised SimpleScalar & Wattch Simulators to analyse & optimise performance of a Splay Trees Benchmark.
- Formulated & Executed a systematic strategy to identify the optimal microarchitectural configuration to achieve the minimum total energy (RUU Size, LSQ Size, Cache, etc.).

Neural Network for Regression
Python, PyTorch, NumPy

- Developed a Multi-Layer NN Mini-Library using NumPy, with Linear Layer, Activation, Training, & Preprocessing classes.
- Implemented & Optimised a Neural Network Regressor Model to estimate California Housing Prices with high accuracy.
- Designed & Justified the NN Architecture, performing Training, Hyperparameter Tuning, & Evaluation.

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 to verify design functionality throughout the development process, as more features added to Lexer, Parser, & Code Generator.
- Managed development using a tracking system to define milestones, give a week-by-week plan and log updates, assessing the estimates given and adjusting accordingly.

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

- Designed a multi-stage pipelined RISC-V processor.
- Wrote C++ testbenches and used a cycle-accurate behavioural model to verify digital hardware.
- Coordinated Development Methodology & allocated tasks & resources to team members to ensure a structured approach was taken - to meet timing deadlines.

Technologies

- **Languages**: C++, C, Python, SystemVerilog, MATLAB, JavaScript *(in order of competency)*
- **Technologies**: SimpleScalar, Scripting, Verilator, RISC-V, FreeRTOS, STM32, PyTorch, NumPy, OpenCV FPGA, Quartus Prime, Linux/Unix, Lex/Flex, Yacc/Bison, LaTeX, Git, Docker, Perforce, Jira
- **Relevant Modules**: Advanced Computer Architecture, Instruction Architectures & Compilers, Machine Learning Advanced Linear Algerba, Discrete Mathematics (Algorithms & Data Structures), Information Processing, Control Systems