# Jikai Wang

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## EDUCATION

**Cornell University** Ithaca, US
M.Eng in Electrical and Computer engineering Expected Dec 2025
Relevant Coursework: Computer Architecture; Design with Embedded Operating Systems

**The University of Manchester** Manchester, UK
BSc (Hons) in Physics GPA 3.91/4.0 Sept 2020 - June 2023
Relevant Coursework: Quantum Computing; Condensed Matter Physics; Semiconductor Quantum Structures; Electrodynamics(M)

## PROJECT EXPERIENCE

**Accelerator Design and Exploration using Allo and Xilinx Vivado/Vitis** Sept 2024 - Now

- Explored the design of FPGA accelerators using Allo, a Python-based domain-specific language, for high-performance workloads such as machine learning, genomics, and robotics.
- Developed simple algorithm (character exact match) and mapped them to an Alveo U250 FPGA card using Xilinx Vivado/Vitis for comparison with host Intel Xeon CPU performance.
- Target the Allo-to-ASIC flow using Mentor CatapultC, gaining insights into FPGA-to-ASIC migration.
- Prepared for an individual design project focusing on a complex accelerator in the areas of machine learning or genomics.

**Pipelined Processor Design and Evaluation using Verilog and PyMTL3** Sept 2024 - Now

- Designed and implemented a five-stage pipelined processor supporting the TinyRV2 instruction set architecture (ISA) using Verilog and PyMTL3.
- Developed both stalling and fully bypassed (software prediction) processor microarchitectures that can correctly handle hazard and interrupts/exceptions.
- Implemented a comprehensive testing strategy, including unit testing for individual instructions and parameterized integration tests for instruction sets. Leveraged pytest for automated test generation and validation.
- Performed detailed performance evaluations using simulation-based tools, analyzing cycles-per-instruction (CPI), instruction throughput, and memory latency under different benchmark scenarios.

**Raspberry Pi 4 Motion Detection and Surveillance System** June 2024

- Implemented a motion detection system using a PIR sensor and indicator light on a Raspberry Pi 4.
- Developed a photo capture and upload feature using a V2 Pi Camera, with automatic email notifications containing photo timestamp and location.
- Designed a user-friendly webpage to view new photos, latest capture details, and to configure photo/video settings, including manual and scheduled captures.

**Embedded Linux Development on Beaglebone Black** May 2024

- Developed an embedded Linux system on Beaglebone Black, mastering the ROM, U-Boot, and Kernel boot processes.
- Compiled and tested U-Boot and Linux Kernel, configuring platform devices and ARM-board configuration files.
- Implemented various boot modes (eMMC, UART, TFTP, NFS) and updated the Debian OS on the Beaglebone.
- Utilized Busybox and Buildroot, wrote and tested custom uEnv.txt, and used I2C tools for hardware interfacing.

## RESEARCH EXPERIENCE

**Investigation of the Electrical Properties of Graphene**
Research Mentor: Prof. Alexander Grigorenko Feb 2023 - May 2023

- Prepared a CVD graphene sample and employed the van der Pauw method to measure its sheet resistance and hall resistance.
- Determined the density of charge carriers inside the graphene sample at different gate voltages by using the modified Hall coefficient equations and making reasonable assumptions.
- Investigated the electric properties of the graphene sample under various conditions, including undoped, doped with water vapor, and doped with ammonia.
- Discovered a zero hall resistance and a very low charge carrier concentration of graphene sample at the Dirac point, which is attributed to its distinctive electron band structure.

## SKILL

**Programming**: C, python, Verilog, PyMTL3, High Level Synthesis.

**Embedded board**: Raspberry pi, Beaglebone Black, STM32 discovery.

**Tool:** Xilinx Vivado, STM32CubeIDE, VSCode, Github.

**OS:** Ubuntu linux.