Curriculum Vitae (pdf)

Siddharth Sahay (LinkedIn, email: {my last name}@cmu.edu)

1. Education

Degree	University	Date
PhD, Electrical and Computer Engineering (advised by Prof. James Hoe)	Carnegie Mellon University, USA	In Progress (2nd year)
MS, Electrical and Computer Engineering (3.84/4)	Carnegie Mellon University, USA	Dec 2021
BTech, Computer Science and Engineering (9.47/10)	Manipal Institute of Technology, India	May 2018

2. Research

PhD Research, CMU ECE (Jan 2021 - Present) Member of Intel/VMware Crossroads Research Center. Making an executable architecture template for the Crossroads device that can drive a variety of tools including simulators and performance models. Making a framework to describe and compose FPGA applications more intelligently in the context of partial reconfiguration. Investigating using session types to describe latency-insensitive hardware.

MS Research, CMU ECE (May - Dec 2020) Implemented a code generator for service oriented FPGA design. Made a basic compiler framework for SystemVerilog in Python.

3. Teaching

TA for CMU 18-740 (Modern Computer Architecture and Design) (Fall 2021) In addition to grading and recitations, created a new lab for the course exploring mobile GPUs and their programming, and created content on visualizing superscalar out-of-order execution and a taxonomy of computing devices.

4. Internships

National Informatics Centre, Govt. of India (May - July 2017) Implemented a concurrent, high performance SSL offloader in Erlang.

NITI Aayog (earlier Planning Commission), Govt. of India (June - July 2016) Prepared a report on Electronic Toll Collection systems for the Transport and Infrastructure Division, doing case studies of various such systems and providing recommendations for improving toll collection in India.

5. Selected Academic Projects

Rendering Complex Light Sources (Undergraduate Thesis, May 2018) Implemented a path tracing renderer optimized for complex lights via precomputation into a cloud-of-point-lights approximation using C++ and Lua.

RISC-V Processor with 2-way Superscalar Ex. and Branch Prediction (Spring 2020) CMU Introduction to Computer Architecture (18-447) final lab. Written in SystemVerilog, with a saturating counter BTB and secondary pipeline for superscalar ALU instructions.

Optimizing for PIM Architectures (Spring 2020) CMU Optimizing Compilers (15-745) project. Defined a theoretical 3D memory based Processing in Memory machine model and wrote a LLVM pass to extract loop computations suitable for this machine model.

Mark-and-Sweep Garbage Collector Semantics (Fall 2020) CMU Types and Programming Languages (15-814) final project. Analysed the semantics of a mark-and-sweep garbage collector on top of a typed destination-passing processes computation model.

Adaptive Stochastic Variance-Reduced Gradient Descent (Spring 2021) CMU Optimization (18-660) final project, written in Python with scikit-learn and numpy. Implemented various accelerated and variance-reduced gradient descent algorithms in a results-reproduction study on Adaptive GD and SVRG.

Port Knight: Multiplayer Third-Person 3D Battle Royale with Portals (Fall 2021) CMU Game Programming (15-666) final project. Did rigging, animation, created an asset pipeline using Assimp for exporting skeletal animation, wrote a multi-oscillator software synthesizer with ADSR envelope for interaction sounds, composed music, and implemented skeletal mesh rendering. Tools: Blender, GarageBand, Python, and C++ with OpenGL.

6. Competitions

MUTBI Provenance 2015: Co-founder, Winning Team An annual state-level business-plan competition hosted by a Dept. of Science and Technology, Govt. of India funded incubator. Submitted a business plan and prototype for an affordable three-axis CNC mill and won first place, incubation, and funding.

Texas Instruments India Innovation Challenge Design Contest 2016: Co-founder, Finalist Team A national-level business-plan/startup competition hosted by Texas Instruments and IIM Bangalore. Submitted a proposal and prototype for a three-axis motion control system and reached the final round (top 25 out of 1500+ entries) and won funding in the process.

Robomanipal 2015 Undergraduate robotics club at Manipal. Programmed motion control and PID systems, sensors, and automation using Arduino and TI MSP/Tiva boards. Participated in ABU Robocon 2015, an international robotics competition.

7. Extracurriculars

- Represented my undergraduate home department in the Manipal Curriculum Conclave 2018, a conference organized to suggest changes and improvements to the curriculum.
- Taught workshops on Haskell, Python, and Quantum Computing under ACM and ISA (Manipal).
- Won the Cultural Talent Scholarship, Ministry of Culture, Govt. of India, in 2007 for Hindustani Classical Violin.
- Played Hindustani Classical Violin twice on Doordarshan, a TV channel, and once on an All India Radio broadcast.
- Visharad Pt. 1 in Hindustani Classical Violin from Bhatkhande Sangeet Vidyapeeth.
- Grade 7 in Bass Guitar and Grade 5 in Electric Guitar from Trinity Rock n' Pop.
- Co-credits on the song "Closure" by Teja G ("ft. Sahay"), out on most streaming services.