RAJBIR MALIK

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Indian Institute of Technology Delhi
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EDUCATION

Indian Institute of Technology Delhi *July 2017 - Present*
Sophomore *(Expected 2021)*
Department of Computer Science and Engineering Overall GPA: 9.655/10

IMPORTANT PROJECTS

Electronic Voting Protocol February 2019 - Present
Cryptography & Security Project, Prof. Subhashis Banerjee

- Designed a universally verifiable, software independent, bare-handed voting protocol with complete voter-verified accountability.
- E2E verifiable voting protocol with feasible EVM specific implementations.
- Protocol and various results in the process of being published.

Pipelined ARM Instruction Processor February 2019 - April 2019
Course Project, Prof. Anshul Kumar

- Developed and Simulated a 32 bit, pipelined processor for ARM Instructions in VHDL and demonstrated it on BASYS-3 board
- Supports all ARMv7 instructions along with branch predictions and SW/HW interrupts.
- Interfaced with UART and a visual support for simple I/O.

Cybersecurity & Cryptography | Tel-Aviv University July 2018 - June 2018
Summer Course, Prof. Amit Kleinmann

- Separately tested and implemented cryptographic primitives including a Block Cipher in CTR mode using a given secure PRF, HMAC from a Merkle-Damgrd construction and a one-way trapdoor function based on Elliptic Curves.
- Studied and analyzed various attacks on digital systems and networks, and implemented defenses against common exploits such as Replay attacks, Buffer overflows, Man-in-the-Middle attacks, etc.

Krivine and SECD Machines March 2019 - April 2019
Course Project, Prof. Sanjeeva Prasad

- Implemented a compiler with Krivine and SECD machine in OCaml.
- A Lex Scanner converted program to tokens which were converted to an Abstract Syntax Tree using Recursive Descent Parser.
- The AST was type checked and a low level code was generated, which was executed by the machines.
- Machines also supported features like scoping,recursion etc.

Image Processing and Sharpening/Blurring on FPGA October 2018 - November 2018
Course Project, Prof. Anshul Kumar

- Designed, synthesized, and implemented a system to apply basic image processing filters using UART serial protocol based Transmitter/Receiver and a 3x3 sliding window to apply filter coefficients.
- Programmed in VHDL on a BASYS3 FPGA board using Xilinx Vivado, with support for optional PMODs.

Personalised Search Engine September 2018 - October 2018
Course Project, Prof. Amitabha Bagchi

- Implemented an inverted-index using AVL trees for the search problem.
- Optimized by using Hash-Maps allowing large scale indexing.
- Used cache and history to personalise the inverted index and increasing efficiency.

RELEVANT COURSES

Computer Science

Discrete Mathematics, Computer Architecture, Data Structures and Algorithms, Programming Paradigms, Artificial Intelligence*, Computer Networks*, Image Processing*, Algorithm Design*, Machine Learning**, Distributed and Parallel Systems**

Mathematics and Electrical

Linear Optimization*, Signals & Systems, Probability Theory and Stochastic Processes, Calculus, Linear Algebra.

SCHOLASTIC ACHIEVEMENTS

Qualified Regional Mathematical Olympiad, (precursor to IMO) in high school (grade 10 & 11).

JEE Advanced Rank 154 : Ranked 154 nationally, (amongst 150,000 candidates) in JEE Advanced 2017, **with a perfect score in mathematics** (122/122).

KVPY Fellow : Cleared the KVPY exam, twice, in the categories SA (2017) and SX (2016)

IIT Delhi Merit Award : Awarded IITD Merit Scholarship for being in the top 7 percent in the first, second and fourth semester.

SKILLS

Programming Languages: Python, Java, C++, JavaScript, OCaml, Golang, VHDL, ARMv7
Frameworks: NodeJS, OpenGL, MongoDB, SQLite, Git, OpenBlas, MKL

SIDE PROJECTS

I work profusely on independent projects. I love tweaking with new libraries and technologies, and many a times have come up with some interesting application. (listed below with links)

Grid Traversal : A java-applet which simulates various traversal algorithms on user defined grid.

Platformer : A small platformer game designed in `HTML5` using the `Impact.js`. Fun to play!

Traffic Simulator : A traffic simulator, both terminal and `GUI` based. Uses `OpenGL` for `GUI` rendering.

Image Processing Library : My own image-processing library with parallel-processing capabilities. Implemented with an in-built `LeNet API`. Uses `MKL, OpenBlas` for parallel computation.

Sorting Analysis : An in-depth visual analysis of common sorting algorithms.

Percolation Analysis : Physical simulation, to check for the percolation limit in 2D-square grid.

N-Queens & Sudoku Solver : A simulation of the backtracking solutions for N-Queens problem and Sudoku. (Uses `JavaFX and Java AWT`) libraries.