

RAJBIR MALIK

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Indian Institute of Technology Delhi

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EDUCATION

Indian Institute of Technology Delhi

Sophomore

Department of Computer Science and Engineering

July 2017 - Present

(Expected 2021)

Overall GPA: 9.67/10

IMPORTANT PROJECTS

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-Damgard 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.
- Received the highest grade while competing with students from across the globe with a score of 97/100 in finals.

Electronic Voting Machine Design

January 2019 - April 2019

Embedded Systems Project, Prof. Subhashis Banerjee

- Analysing the EVM design problem, emphasising on correctness, secrecy, verifiability and reliability.
- Implementing various parity measures for proving global and line correctness.
- Extending and adapting the **FOO protocol** for Indian elections with elaborate voter privacy.

Pipelined ARM Instruction Processor

February 2018 - April 2018

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.

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.

Mobile Phone Routing Structure

August 2018 - September 2018

Course Project, Prof. Amitabha Bagchi

- Built a standalone system for efficient routing between mobile phone base stations.
- Used k-ary trees and bloom filters along with multithreaded algorithms to find suitable routes while avoiding deadlocks and race conditions.

Personalised Search Engine

September 2018 - October 2018

Course Project, Prof. Amitabha Bagchi

- Implemented an inverted-index using AVL structures 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.

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 and second semester.

Program Upgrade 2017 : Selected for Program Upgrade due to GPA Merit (Ranked 5th at the end of first year).

SKILLS

Computer Languages

Python, Java, C++, VHDL, OCaml, GO, Rust

Development

HTML, CSS, JavaScript, Angular, Node, Django & BootStrap

Hardware & Software

Xilinx Vivado and ISE suit, Autodesk Inventor

IMPORTANT COURSES

Discrete Mathematics

Data Structures and Algorithms

Programming Languages*

Computer Architecture*

Digital Logic and System Design

Probability Theory and Stochastic Processes

Signals and Systems*

Laboratory (*Physics, Chemistry, Biology, Electronics*)

** currently pursuing.*

SUMMARY

I have a particular interest in topics from theoretical computer science and mathematics which have real-life applications. These include -

- Discrete Mathematics, Set theory, Geometry, Algebra, Probability.
- Algorithms, Automation, Cryptography, Network Security, Machine Learning.

I am a coding enthusiast. I am intrigued by problems that require the best of both worlds (Math and CS) for solutions.