# Kanishk Singhal

B.Tech
Associate, Engineering Development Group
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## ACADEMIC DETAILS

| Degree | Specialization | Institute | Year | CPI/% |
|---|---|---|---|---|
| B.Tech. | *Computer Science and Engineering* | IIT Gandhinagar | 2020-2024 | 9.04 |
| Class XII | *Physics, Chemistry, Maths* | DAV Public School, Ghaziabad (CBSE Board) | 2019-2020 | 95 |
| Class X | | DAV Public School, Ghaziabad (CBSE Board) | 2017-2018 | 97 |

## EXPERIENCE

- **Associate, Engineering Development Group** [July'24 - Present]
  *MathWorks, India*
  - C++ Optimization for MISRA compliance
    - Developed a C++ optimization to eliminate redundant casts in generated code.
    - Conducted an in-depth analysis of the Intermediate Representation (IR) for both simple and complex expressions to identify and remove unnecessary castings, enhancing compliance with MISRA Rule 10.
  - Hardware Benchmarking Data Visualization Tool
    - Developed the backend of a data visualization tool using Django and MongoDB.
    - Implemented dynamic chart generation using Plotly in Python, enabling comprehensive data visualization.
    - Designed and integrated user-friendly filters and grouping options, dynamically generated based on the provided data, to enhance user interaction and data analysis capabilities.
- **Associate, Engineering Development Group (Summer Internship)** [May'23 - July'23]
  *MathWorks, India*
  - Developed a MATLAB application integrated with JavaScript to connect and control external hardware, such as motors, enabling precise management of motor speed and other parameters.
  - Designed an intuitive user interface to plot and analyze incoming data.

## PROJECTS

- **Affects of Pruning on Uncertainty in Neural Networks (Research Project)** [August'23 - April'24]
  *(Advisor: Prof. Nipun Batra, Computer Science & Engineering, IIT Gandhinagar)* | Github
  - Conducted a comprehensive comparison of various pruning techniques for neural networks, including one-shot, iterative, and re-initialization methods.
  - Enhanced the performance of custom and existing models on out-of-distribution data by improving accuracy and calibration while maintaining a reduced size compared to the original models.
- **Compiler/Interpreter for Python based Language: Dino** [January'23 - April'23]
  *(Advisor: Prof. Balagopal Komarath, Computer Science & Engineering, IIT Gandhinagar)* | Github
  - Developed a compiler for a custom dynamically typed language, Dino, implemented using Python.
  - Utilized Python to perform reading, parsing, resolving, type-checking, and evaluating of the abstract syntax tree (AST) generated during compilation.
  - Created comprehensive documentation, and implemented unit tests to ensure reliability of the compiler.
- **Alumni Relations Management System** [January'23 - April'23]
  *(Advisor: Prof. Mayank Singh, Computer Science & Engineering, IIT Gandhinagar)* | Github
  - Developed a comprehensive database using SQL, incorporating tables, keys, constraints, and user roles with varying privileges, guided by an Entity-Relationship (ER) diagram based on specific requirements.
  - Deployed a frontend framework utilizing HTML, CSS, TailwindCSS, and Flask to effectively manage the database.
- **Networking utility program using eBPF** [August'22 - November'22]
  *(Advisor: Prof. Sameer G. Kulkarni, Computer Science & Engineering, IIT Gandhinagar)* | Project Report
  - Developed a packet filtering and port forwarding program using eBPF (Extended Berkeley Packet Filter) and BCC (BPF Compiler Collection) to prevent Denial of Service (DoS) attacks by identifying and mitigating excessive packet traffic from the same IP address within a short time frame.
  - Enabled efficient resource management by forwarding packets to different ports and rejecting unnecessary packets before processing.
- **Assembler and Dis-assembler for MIPS Architecture** [January'22 - May'22]
  *(Advisor: Prof. Sameer G. Kulkarni, Computer Science & Engineering, IIT Gandhinagar)* | Github
  - Developed a GUI-based assembler and disassembler for MIPS32, capable of converting machine code in binary and hexadecimal formats to human-readable assembly code.
  - Designed and implemented a functional graphical user interface using Pygame and Python, allowing users to input data through files and input boxes for seamless interaction.

- **Developed a portfolio site with ReactJS** | Deployement [May'22]
  - Designed and developed a medical portfolio website using ReactJS and the Material UI library.
  - Integrated Firebase to enable functionalities to manage blogs, success stories, and user authentication.
- **Website Development, Metis Summer Project** [June'21 - August'21]
  *(Metis, Coding Club of IITGN)* | *Github*
  - Fullstack frontend and backend using PugHTML, CSS, JavaScript and NodeJS framework and deployed over heroku.
  - Implemented dynamic content fetching using APIs by developing database using headless CMS on Strapi.
- **Space Invaders & Egg Basket: Python Games** [Novemebr'20 - December'20]
  *(Advisor: Prof. Neeldhara Misra, Computer Science and Engineering, IIT Gandhinagar)* | *Github*
  - Innovated, designed, and implemented retro-style fixed shooter arcade games, including "Space Invader" and a falling egg-catching game, utilizing the Pygame library.
  - Enhanced the gaming experience by incorporating features to track current scores and high scores.
  - Added immersive elements to progressively increasing difficulty levels to engage players more effectively.

## TECHNICAL SKILLS

- **Languages:** Python, C, C++, HTML, CSS & SCSS, JavaScript, Solidity, Dart, Git.
- **Tools:** MATLAB, LaTeX, Github, LTSpice, Autodesk Inventor and Fusion, Android Studio.
- **Libraries:** Pygame, TailWindCSS, BootstrapCDN, Matplotlib, Numpy, Pandas.
- **Frameworks:** NodeJS, ReactJS, Flutter.

## ACADEMIC ACHIEVEMENTS

- First Position in GRASP Launchpad 2.0 competitive programming challenge
- Dean's List in First year for academic excellence.

## RELEVANT COURSES

- Probabilistic Machine Learning, Natural Language Processing, Machine Learning, Introduction to Data Science.
- Compilers, Computer Networks, Computer Organization And Architecture.
- DSA - II, DSA - I, Database Management System, Operating Systems.
- Digital Systems, Electrical Systems, Analog And Digital Electronics, Theory of Computing.
- Principles of Business Management, Discrete Mathematics, Mathematics IV (Probability and Numerical Methods), Mathematics III (Differential Equations), Mathematics II (Multi variable Calculus), Mathematics I (Vector Algebra).

## POSITIONS OF RESPONSIBILITY and EXTRA-CURRICULAR ACTIVITIES

- **Instructor, Introduction to Web Development Series**
  - Conducted a series of 3 shortcourses to introduce students to web development. The series covered concepts from basics of web dev to building backend and deployment.
    - Introduction to Web Development [August'23]
    - Introduction to ReactJS [October'23]
    - Introduction to NodeJS & MongoDB [March'24]
- **Secretary, Metis - The Coding Club, IIT Gandhinagar** [May'22 - April'23]
  - Led and managed the activities of the Coding Club at IIT Gandhinagar, facilitating the circulation of projects and actively encouraging student participation in the development community.
  - Promoted software development within the community by organizing workshops and hosting hackathons with prizes, fostering a culture of innovation and collaboration.
- **Instructor, HackRush'22, IIT Gandhinagar | Project Link** [March'22]
  - Organized and instructed a Web Development workshop, teaching the fundamentals of building a website.
  - Developed a portfolio website live with students using HTML, CSS, and JavaScript, incorporating TailwindCSS to demonstrate practical application of web development skills.
- **Event Executive, Blithchron - Annual Cultural Fest, IIT Gandhinagar** [January'21 - March'22]
  - Ideation and implementation of various events for the community as a part of team of hundred members.
  - Led a team to organize an event on a national scale resulting in a footfall from other prestigious institutes.