Rahul Singh

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Department of Electrical Engineering

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Rahul Singh | RSourceCode

Academic Qualification

Year	Degree/Examination	University/School	CPI/ %
2025*	Electrical Engineering	Indian Institute of Technology Kanpur	9.6/10.0
2023	Intermediate (12th standard) CBSE Boards	Shiv Jyoti Convent School	93.4%
2021	High School (10th standard) ICSE Boards	Sunshine School	97.2%

Scholistic Achievements

- **JEE Advanced 2023**: Secured an All India Rank (AIR) of **1233**, placing among the top 0.1% of over 180,000 candidates.
- **JEE Main 2023**: Achieved an All India Rank (AIR) of **2243** out of over 1 million candidates.
- Recipient of IIT Kanpur's **Academic Excellence Award 2023** for ranking among the top 100 students institute-wide.

Projects

Meshmerize | Robotics Club, IIT Kanpur *Oct'24 - Dec'24*

- Built a line-follower robot using ESP32, capable of **autonomously solving maze** with selectable left/right priority logic
- Implemented real-time turn detection & path recording, with final run path simplification, allowing replay via shortest path
- Achieved best timings of **(0:58 dry, 0:28 final run)**. Bagged **Gold Medal** at Jaipur Zonal round of Techfest, IIT Bombay

Part Segmentation using SAM2 | SURGE | *Prof. Koteshwar Rao*, IIT Kanpur *May'25 - Jul'25*

- Developed a pipeline to convert point prompts into **anchor-style boxes** for SAM2 fine-tuning on part-level segmentation
- Fine-tuned SAM2 on **PACO/COCO** datasets using binary masks derived from point-to-box–generated part annotations
- Enhanced SAM2's precision on fine-grained parts by integrating point-guided box generation for **zero-shot segmentation**

Wire Bending Machine | Course Project | *Prof. Virkeshwar Kumar*, IIT Kanpur *Aug'24 - Nov'24*

- Built a machine to mechanize 3D wire bending using **Stepper, Servo and**, **DC feed motor** for precise & coordinated control
- Programmed control logic enabling both manual command execution from serial input and custom pattern modes(star & cube)

Chat Web App | Self Project *Apr'25 - Jun'25*

- Built a full-stack chat application with **ReactJS**, featuring a responsive user interface with login and sign-up functionality
- Developed backend services using **ExpressJS** and **MongoDB Atlas**, enabling **CRUD operations** & persistent chat history
- Integrated **Socket.IO** to enable real-time messaging, supporting both private and group chats with instant message updates

Vision-Based Sudoku Solver | Self Project *May'25 - Jun'25*

- Identified Sudoku grids in input images using **YOLO**, followed by preprocessing, contour detection, and four-point transform
- Implemented a LeNet-style **CNN in PyTorch** achieving **98.24% accuracy** on MNIST for recognizing digits in Sudoku cells
- Built a Sudoku solver pipeline, combining digit recognition with a **backtracking** algorithm for automated puzzle solving

DataCraft | Product Club, IIT Kanpur *May'24 - Jul'24*

- Gained hands-on experience in **Product Management**, working with **Excel**, **SQL**, **Google Sheets**, and **Tableau**
- Built an interactive **HR Attrition Dashboard** to analyze employee churn by department, role, age, gender, and education

Mastering Web 3.0 | Programming Club, IIT Kanpur *May'24 - Jul'24*

- Simulated custom **blockchain system** featuring custom blocks, merkle root computation, & **PoW** mining on mempool data
- Programmed a decentralized voting app using **Solidity**, with secure registration, single-vote enforcement & winner selection
- Built a responsive **ReactJS weather dashboard** that fetches and displays real-time weather data using external API data

AI Flappy Bird | Self Project *Dec'23 - Jan'24*

- Implemented **NEAT** (NeuroEvolution of Augmenting Topologies) to evolve neural networks that learn to play Flappy Bird
- Simulated gameplay using **Pygame** to visualize agent behavior & assign survival-based fitness, showcasing real-time evolution
- Engineered informative input features (bird's height and distance from pipes) to optimize neural network's decision-making

Rock Paper Scissors Multiplayer | Self Project *Oct'23 - Nov'23*

- Developed multiplayer Rock Paper Scissors game using Python and **Socket programming**, enabling real-time matches
- Designed a client-server architecture enabling simultaneous gameplay between multiple connected players over a local network
- Built a responsive **Pygame** interface for real-time feedback, user input handling, and dynamic display of match outcomes

Adventure Platformer Game | Self Project *Oct'23 - Nov'23*

- Developed a 2D platformer game in **Unity**, with 18 collectible coins, 4 spike obstacles, and a final flag to mark level completion
- Implemented core mechanics including player movement, jumping, collision detection, and game-over logic on obstacle contact

Personal Portfolio Website | Self Project *May'25 - Jun'25*

- Developed a fully responsive personal portfolio website using **HTML**, **CSS**, and JavaScript, and deployed it on GitHub Pages
- Integrated **JavaScript**-driven interactivity across navigation, dynamic content, & form validation for a smooth user experience
- Designed and implemented responsive layouts using flexbox, grid, and **media queries** for consistent cross-device performance

E Commerce Data Analysis | Self Project *May'25 - Jun'25*

- Developed an end-to-end analytics pipeline using **SQL** and **Python** to extract insights from 50K+ e-commerce records
- Visualized business KPIs like revenue trends and customer retention by combining SQL queries with Python dashboards
- Developed SQL and Python scripts to solve business questions on product trends, customer retention, and revenue analysis

MP40 Replica | Course Project | *Prof. Kallol Mondal,* IIT Kanpur *Feb'25 - Apr'25*

- Designed and fabricated a functional spring-powered MP40 replica, incorporating an auto-reloadable magazine mechanism
- Performed metal fabrication using **shearing**, **drilling**, **grinding**, **brazing**, and **arc welding** to assemble replica components
- Designed a trigger-bolt system with manual loading via a rod-locked magazine cap, enabling refill and secure reassembly

Technical Skills

- **Programming Languages** : C, C++, Python, JavaScript, Solidity, SQL.
- **Libraries** : Pandas, NumPy, Matplotlib, PyTorch, TensorFlow, Keras, scikit-learn, Seaborn, NEAT, OpenCV, Sockets, Selenium.
- **Software/Tools** : Visual Studio Code, Kaggle, Arduino IDE, Anaconda, MATLAB, Visual Studio, Unity, Autodesk Inventor, Remix, Tableau, Microsoft Excel.
- **Utilities/Development** : Git, Bash, HardHat, HTML, CSS, ReactJS, ExpressJS, MongoDB, LaTeX.

Relevant Courses

* - for Excellent performance

Probability & Statistics (MSO201)	Data Structure & Algorithms (ESO207)	Fundamentals of Computing-I&II (ESC 111/112)*
Linear Algebra (MTH113)	Partial Differenial Equations(MSO203)*	Ordinary Differenial Equations(MTH114)*
Multi Variable Calculus (MTH112)	Complex Variable(MSO202)*	Single Variable Calculus (MTH111)*
Control System (EE250)*	Analog Electronics (EE210)*	Introductions to Electronics (ESC201)
Signal System & Networks (EE200)	Quantum Physics (PHY114)*	Introduction to Electrical Engineering (ESO203)*

Position of Responsibility

- **Academic Mentor**, MTH – Mentored 30 first-year students in mathematics, providing academic guidance and support.
- **Student Guide**, Counselling Service – Guided 6 incoming students, assisting with academic and social challenges.
- **Secretary, Robotics Club** – Led workshops, sessions, and events while representing the club in robotics competitions.