# Saurav Kumar

LinkedIn — GitHub — Portfolio

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## Education

- **Indian Institute of Technology, Mandi** 2023 – 2027
  *B.Tech in Bioengineering; CGPA: 8.02/10* *Mandi, HP*
  - **Relevant Coursework**: Data Structures & Algorithms, Machine Learning, Computing and Data Science, Probability and Statistics

## Experience

- **HIMPACT LAB, IIT Mandi** Aug 2024 – Dec 2024
  *Frontend Developer (Intern)*
  - **Initial UI Development**: Architected and developed the first production-ready UI for **Inlicne**, leveraging Django templates, HTML/CSS, and vanilla JS. Delivered responsive layouts for cross-device compatibility.
  - **Backend Integration**: Set up Django backend to serve Leaflet.js-based interactive maps; displayed real-time server-side plots and developed endpoints that responded to map clicks for dynamic location data retrieval.
  - **Project Handoff**: Contributed to the first production-ready version before handing over to a new developer; current site available at incline.iitmandi.ac.in.

## Technical Skills

- **Languages**: Python, C++, JavaScript, Perl
- **Frameworks**: React,ROS, TensorFlow, Django, Streamlit
- **Tools**: Git, Linux, Docker, SolidWorks, Raspberry Pi, Arduino
- **Concepts**: Sensor Fusion, Kalman Filtering, Data Preprocessing, Control Systems

## Projects

- **AquaSweep – Underwater Rover with Edge and Motion Detection** GitHub
  *Python, OpenCV, Flask, ROS, Arduino, Raspberry Pi* *Jan 2025 – Jun 2025*
  - **Live Streaming + UI**: Built MJPEG-based camera pipeline delivering 20 FPS video stream over LAN with 200ms latency using Flask sockets. Enabled stable operator feedback in underwater environments.
  - **Edge AI for Algae Detection**: Implemented modular OpenCV pipelines with edge, motion, and algae detection; achieved ˜93% accuracy in lab tests. Activated modes via keyboard shortcuts.
  - **Depth Stabilization System**: Controlled 8 thrusters via ROS–Arduino communication layer. Fused IMU and Bar30 depth sensor with Kalman filter for autonomous depth holding (error margin: ±3cm).
- **AI Medical Chatbot – Multimodal Patient Assistant** GitHub
  *Python, Django, Gradio, Whisper, OpenCV, GROQ API, TTS/STT* *Jun 2025*
  - **Multimodal Interaction**: Developed an AI medical chatbot that accepts both voice and image input. Used Whisper STT for transcription and OpenCV for visual diagnostics; achieved <1s median response time.
  - **LLM Integration + Output Management**: Integrated GROQ-hosted LLaMA-3/4 to provide real-time diagnosis suggestions; enabled token streaming and exportable chat summaries (PDF format).
  - **Knowledge-Augmented Retrieval**: Designed RAG architecture with LangChain and ChromaDB to ground responses in domain-specific datasets. Integration underway.
- **Maze Solver – Interactive AI Pathfinding Visualizer** GitHub
  *Python, Django, BFS/DFS/A*/Dijkstra, Reinforcement Learning, Docker* *Jul 2025*
  - **AI-Augmented Pathfinding**: Implemented interactive visualizations for BFS, DFS, A*, Dijkstra, and IDDFS; added live traversal animations with path cost and visited node tracking.
  - **Deployment + CI/CD**: Deployed via Docker and Render with GitHub Actions-based auto-deployment. Live at mazesolver-5b66.onrender.com.
  - **RL Agent Integration**: Trained Q-Learning and DQN agents on custom grid environments; integrated into UI as auto-solvers with visual feedback and reward trajectory plots.
  - **GNN-Based Solver**: Built GNN module using PyTorch Geometric to solve complex graphs with dynamic obstacles and sparse feedback; achieved 80%+ success rate in test set.

## Leadership & Achievements

- Hospitality Head, Exodia: Led 30-member team for IIT Mandi's cultural fest; managed 1000+ attendees and logistics.
- Robotics Club, IIT Mandi: Mentored juniors in robotics design, automation; contributed to project builds and contests.
- Selected for semester exchange program (TU Darmstadt) on the basis of merit in a batch of 450+ students.
- Secured Top 5 rank in Arduino Hackathon during intra-college techfest.