

GYANIG KUMAR

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Education

University of Colorado, Boulder

Aug 2024 – Jul 2026

M.S. in Computer Science

CGPA: 3.91/4.0

- **Relevant Coursework:** Advanced Robotics, Machine Learning, Advanced Computer Vision

KIIT, India

Jul 2019 – Jul 2023

B.Tech in Computer Science and Systems Engineering

CGPA: 3.88/4.0 (9.05/10)

- **Relevant Coursework:** Data Structures, Artificial Intelligence, Computer Networks, Compiler Design

Technical Skills

Programming: Python, C/C++, C, Java, Bash

Frameworks & Platforms: TensorFlow, PyTorch, TensorFlow.js, LangChain, ChromaDB, Socket.io

Libraries: NumPy, Pandas, Keras, Librosa, Kivy, OpenCV, Matplotlib

Tools & Technologies: ROS, AWS, GCP, Unity 3D, Git, Linux, Fusion 360, MATLAB

Expertise: Deep Learning, Model Optimisation, Machine Learning, Real-Time Systems

Experience

Course Manager, CSCI 3302 - Intro to Robotics

Jan'25 – Present

Univ. of Colorado, Boulder

- **Coordinated course logistics and student support** for 120 undergrad and graduate students, managing assignments, Canvas content, technical troubleshooting, and office hours assistance.
- **Oversaw grading and assessments** ensuring timely feedback, utilizing MOSS for plagiarism checks, and upholding fairness in evaluations.

CAIRO HCI Lab, Univ. of Colorado, Boulder

Sept'24 – Present

Researcher under Prof. Bradley Hayes

- Conducting research on enhancing **human intent recognition** using **Partially Observable Markov Decision Processes (POMDP)**-based algorithms.
- Integrating advanced **vision-based learning** techniques with the **Sawyer Robotic Manipulator** to improve human-robot interaction and decision-making efficiency.

I3D HCI Lab, Indian Institute of Science, Bangalore

April'22 – Aug'24

Machine Learning Intern, Research Assistant under Prof. Pradipta Biswas(Phd. Cambridge)

- **Developed and validated a gaze estimation mapping module**, achieving **95% mAP** accuracy in predicting user intent in complex robotic pick-and-place task.
- Partnered with **Collins Aerospace** to develop a mixed reality-based assembly system using **custom-trained object detection models** with **tailored eye gaze and hand tracking** for efficient, real-time assembly guidance.
- Conducted a comprehensive study comparing GAN models for **generating realistic synthetic datasets (Simulation-to- Real)** achieving FID scores of **0.001, 50.574, and 63.000** across three datasets.
- **Developed a robust motion tracking framework** with a markerless ByteTrack model, achieving **97.8% mAP** detection accuracy in dynamic environments, including moving camera setups such as headset-mounted systems.
- Optimized the **I2D-Net Eye Gaze Estimation model**, reducing parameters by **0.5x** and **2x** inference speed, enabling a relatively faster gaze tracking system for interactive automotive HUDs
- **Collaborated with Faurecia** to extend interactive automotive heads-up display features with a **gaze-based vs gesture-based** on-road distraction detection system.
- Published **5 research papers** at prestigious top conferences like **ICRA, IUI** and Journals like **JMUI**.

Part-Time CS Teacher, Polytechnic College Suriname, Suriname, SA

March'23 – Sept'24

Data Science Program

Appointment Letter

- Conducted classes, designed test & assignments, and evaluated 50 enrolled students for **University-level Mathematics II and Statistics I Courses** for the semester with 15 hours avg. per week.
- Undertook **50+ students** for guidance in Programming & Prototyping in a hackathon.

Projects

Ansh.AI: Conversational Diary Companion

Mar'25

HackCU11 | [GitHub](#) | [Demo](#)

- Built an empathetic AI for self-reflection using **LangChain** and **HeyGen** for natural conversations.
- Enabled real-time memory with **ChromaDB** for **personalized insights** and pattern recognition.
- Developed with Python, Flask, React, and **AMD Minisforum AI 370 for NPU+GPU compute**.

Autonomous Driving Challenge with AWS DeepRacer

Aug'24 – Dec'24

University of Colorado, Boulder | [GitHub](#)

- Built a 1/18-scale autonomous vehicle using **ROS 2 Humble** on Raspberry Pi 4, navigating via **RGB camera-based** blue line following and **LiDAR odometry**.
- Applied **HSV thresholding** and **contour detection** with OpenCV for traffic sign detection, achieving **80% stop sign accuracy**, and implemented **EKF SLAM** for robust localization.
- Designed a modular ROS 2 system with nodes for camera processing, line detection, PID control, and **slam_toolbox** for real-time mapping and **Tkinter**-based telemetry visualisation.

Audio-Visual Correspondance Task using Few Shot Learning

Dec'21 - June'22

Supervisor: Dr. Rajdeep Chatterjee

- Successfully reproduced the results from the *"Look Listen & Learn"* paper, implementing the L3Net model.
- Curated a specialized subset of **34 classes from the KINETIC600 dataset** to train a modified Zero-Shot Learning architecture with an RCNN backbone, incorporating dual subnetworks: **Audio Encoder** and **Vision Encoder**.
- Employed advanced feature extraction techniques such as *FFT* and *Mel-Filter Bank spectrum* for audio features, aligning them with corresponding image samples for improved model performance.
- Achieved **0.180 (Vision)** and **0.245 (Audio)** accuracy, demonstrating significant potential for further optimization and performance enhancement.

Other Projects

Lox: Interpreter for Python-like language | Compiler Design, OOPs | [Github](#)

Sept'20-Dec'20

- Built an **end-to-end interpreter** that takes Python-like syntax based on [Crafting Interpreters](#).
- Implemented features such as *parsing, control flow, hashes, garbage collection, superclasses* etc.

V-BIKES: Deploying Enhanced Safety Measures in two-wheeler vehicles | [Award](#)

Sept'17-Feb'18

- Based on the field of robotics, we developed an **array of non-evasive sensors for collision detection** in a helmet
- Built End-to-End support for Immediate **Ambulance Alert & injury Profile** using ESP32 Kit.
- Awarded as **best in Smart Mobility Project in Atal Marathon** by Government of India among 1200+ projects and **3rd Position** in **C.S.I.R. Innovation Awards**.

Publications

1. L.R.D. Murthy, **Gyanig Kumar**, Pradipta Biswas, M. Madan, S. Deshmukh
"Efficient Interaction with Automotive Heads-Up Displays using Appearance-based Gaze Tracking"
Published in *Work-in-Progress Track of the 14th International Conference on Automotive User Interfaces and Interactive Vehicular Applications (AutomotiveUI 2022)*
[ACM Digital Library Link](#) — [Video Submission](#)
2. Yash Kumar Sahu, A. Mukhopadhyay, **Gyanig Kumar**, Ashok Kumar, Pradipta Biswas
"A Comparative Study on Image Translation GAN Models to Improve Object Detection in Low-Resource Domains"
Published in *2024 International Conference on Vehicular Technology and Transportation Systems (ICVTTS)*
[IEEE Xplore Link](#)
3. Mukund Mitra, A.A. Patil, G. Mothish, **Gyanig Kumar**, A. Mukhopadhyay, L.R.D. Murthy, P.P. Chakraborty, Pradipta Biswas
"Multimodal Target Prediction for Rapid Human-Robot Interaction"
Published in *29th ACM Conference on Intelligent User Interfaces (ACM IUI) 2024*
[ACM Digital Library Link](#)
4. Mukund Mitra, **Gyanig Kumar**, P.P. Chakraborty, Pradipta Biswas
"Enhanced Human-Robot Collaboration with Intent Prediction using Deep-IRL"
Published in *IEEE International Conference on Robotics and Automation (ICRA) 2024*
[IEEE Xplore Link](#)
5. Subin Raj, L.R.D. Murthy, T.A. Shanmugam, **Gyanig Kumar**, A. Chakrabarti, Pradipta Biswas
"Mixed Reality and Deep Learning-based System for Assisting Assembly Processes"
Published in *Journal on Multimodal User Interfaces (2023)*
[Springer Link](#)

Academic Projects

Ticket Price Calculator App | *Java, Android Studio*

November 2020

- Created an Android application using Java and Android Studio to calculate ticket prices for trips to museums in NYC.
- Processed user inputted information in the back-end of the app to return a subtotal price based on the tickets selected.
- Utilized the layout editor to create a UI for the application in order to allow different scenes to interact with each other.

Transaction Management GUI | *Java, Eclipse, JavaFX*

October 2020

- Designed a sample banking transaction system using Java to simulate the common functions of using a bank account.
- Used JavaFX to create a GUI that supports actions such as creating an account, deposit, withdraw, list all accounts, etc.
- Implemented object-oriented programming practices such as inheritance to create different account types and databases.

Volunteering

Teaching Assistant, Konnexions Society, KIIT

Nov'21 - April'22

- Teaching Assistant to a class over 100+ Students. — Appreciation Letter
- Managed a No-Credit Course focused on **Mathematics in Machine Learning** for a semester.

Student Member, Google Developer Student Community, KIIT

Oct'21 - Oct'22

- Contributed in Organizing Online Seminar, Hackathons & Workshops.
- Worked with the ML team on a "*PetFinder.my - Pawpularity Research Contest*" on Kaggle, using ensemble with **custom Vision models**. (e.g. BiT, ViT, EffNetB2-B5)
- Secured **2nd Position** out of 50 teams in KIIT university.

Lead Data Acquisition Engineer, Jaggernaut Racing, KIIT

Feb'22 - Feb'23

- Participated in BAJA SAE India 2022 ATV design and Building Competition
- Build a dashboard system for ATV with sensor data information
- Secured **1st Position** in KIIT University and **16th** among 100+ teams in India

Certifications

TensorFlow DeepLearning Specilization , *DeepLearning.ai* - Jan'22

5th Summer School on AI , *CVIT, IIT Hyderabad* - Sept'21

Coursera course on Machine Learning , *Stanford* - July'20

Achievements

Secured **2nd Place** in HACKCU11, AI Track. - [2025]

Secured **2nd Place** in AWS JAM Hackathon. - [2025]

Hobbies

HackerRank: Gold Level C++ programmer

Soccer, Programming, Electric Guitar, Composing Music