Vibhu Kumar

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EDUCATION

Indian Institute of Technology, Patna (IIT Patna) — **2025 – Present**
Master of Technology in Artificial Intelligence (Computer Science and Engineering) — *Current CGPA: 9.39/10*

Birla Institute of Technology, Mesra (BIT Mesra) — **2020 – 2024**
Bachelor of Technology in Electrical and Electronics Engineering — *CGPA: 8.48/10*

EXPERIENCE

NVIDIA — **Jan 2024 – Jul 2024**
System Software Intern | *C/C++, CMake, GStreamer, CUDA, Cross-Platform Systems Programming* — *Pune, India*

- Ported **22 of 27 DeepStream components** (plugins and core libraries) from Linux to a native Windows implementation, enabling **native Windows support** for GPU-accelerated multimedia analytics.
- Diagnosed and fixed a critical cross-platform **timestamp overflow bug** caused by differing `gulong` sizes (8-byte Linux vs. 4-byte Windows) by replacing it with `guint64`.
- Unified the **Linux and Windows build systems** using **CMake**, generating native Makefiles on Linux and Visual Studio project files on Windows.
- Validated DeepStream pipelines on **30 concurrent video streams** sustaining ∼**29 FPS**, and a dual-stage **PGIE + SGIE** inference pipeline across **4 streams** at ∼**29 FPS**.
- Resolved **5 critical platform-migration issues**, including pthread linking, plugin re-registration, NVTX dependency, and CUDA initialization failures, while improving debugging efficiency using **Visual Studio**.

RESEARCH

Emotion Change Detection in Face Video | *Submitted to CVPR 2027* | *Supervisor: Dr. Rahul Mishra*

- Built two **shortcut-controlled benchmarks** (**1,382 videos**) on which a cue that solves the standard benchmark (**F1 0.99**) carries no signal.
- Showed across **28 pre-registered experiments** that frozen face-video foundation features fail because of a **per-person offset**, not missing emotion information.
- Proposed a **label-free person-enrolment** method that raised face-only F1 by **+0.13 / +0.16**; enrolled audio-visual fusion achieved the **best F1 on both benchmarks** (**0.822 / 0.765**).

PROJECTS

Samvaad | GitHub | *Python, LangChain, Gemini, Whisper, ChromaDB, Streamlit*

- Built an end-to-end **speech-to-insight pipeline** for YouTube links and **MP3/MP4/WAV** files using **yt-dlp** and **FFmpeg**, routing English audio to **local Whisper** and Hindi audio to **Sarvam STT** to generate English transcripts.
- Developed **LangChain LCEL** workflows with **Gemini** for **map-reduce summarization** and chunk-wise extraction of action items, decisions, and open questions, with a **meeting-isolated ChromaDB RAG chatbot** for transcript-grounded Q&A.

PaymentLens | GitHub | Demo Video | *Python, OpenAI, DuckDB, sqlglot, Streamlit*

- Built an **evidence-first AI analyst** for plain-English payment questions: an **OpenAI structured-output** parser maps each question to fixed metrics, then code builds safe SQL (**AST guard**) on **read-only DuckDB** with **role-based access**.
- Implemented **mix-vs-rate decomposition**, counterfactuals, significance tests and **Simpson's-paradox** detection with drill-down and **data-quality checks**; verified by **48 tests** and a **20/20 known-answer evaluation**.

SKILLS

Languages	Python, C++, C, SQL
AI / LLM	LLMs, RAG, Embeddings, Vector Search, Prompt Engineering, Structured Outputs, LLM Evaluation
Libraries	PyTorch, LangChain, OpenAI API, Gemini API, ChromaDB, DuckDB, Pandas, NumPy, Streamlit
Systems & Tools	CUDA, GStreamer, CMake, FFmpeg, Linux, Git, pytest, Visual Studio, React.js
Coursework	Machine Learning, Deep Learning, Generative AI, Operating Systems, DBMS, OOPs, DSA

ACHIEVEMENTS

- Currently **ranked 1st** in M.Tech AI at IIT Patna; secured **Department Rank 3** in EEE at BIT Mesra.
- Qualified **GATE (CSE)** with a score in the **top 3 percentile** nationally; ranked among the **top 3 percentile** in JEE Main.
- Secured **Rank 100/12,711** in Tally CodeBrewers and **Rank 121/34,400** in Techsurf.
- Solved **600+ coding problems** across platforms like LeetCode, GeeksforGeeks, HackerRank, and Codeforces.

POSITION OF RESPONSIBILITY

- **Founding Member, PG Coding Club – IIT Patna:** Established the institute's first graduate coding community with weekly competitive programming sessions, growing participation to **80+ members**.
- **Head Placement Coordinator – IIT Patna:** Led end-to-end recruitment logistics for **25+ companies**, coordinating interview schedules, HR communication, and offer workflows for **500+ students**.