# Debarghya Saha

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## Professional Experience

**Junior Data Scientist** October 2025 – Present
*Ethical Den (Hivyr.ai)* *Hybrid (Part-time)*

- Developing an **Outbound Calls Intelligence Pipeline** leveraging **speech analytics, emotion detection**, and **call outcome prediction models** to optimize customer engagement and automation workflows

**AI Intern** July 2025 – September 2025
*Ethical Den (Hivyr.ai)* *Onsite*

- Led the development of a **real-time multilingual conversational AI agent** integrating **Speech-to-Text, LLMs** (Gemma3n:E4B), sentiment detection, and **Text-to-Speech** systems for scalable voice interaction
- Implemented a **FastSpeech2-based Bengali TTS pipeline** in PyTorch using **Epitran-generated IPA phoneme sequences**, reducing model training time by **32%**
- Enhanced prosody and emotion modeling through **pitch, energy, and duration embeddings**, resulting in more expressive and natural speech synthesis
- Developed an **Apache Beam-based data pipeline** to curate 24kHz multilingual voice datasets with **Speech Synthesis Markup Language (SSML)**, improving **data scalability and efficiency**
- Directed a cross-functional team on **model architecture design, training optimization, and deployment strategies**, ensuring research-to-production alignment

## Technical Projects

**Deep Reinforcement Learning Agent for Pokemon Red Custom Environment** GitHub

- Built custom OpenAI Gym environment using ROM disassembly and memory mapping to emulate Pokemon battle logic and states
- Implemented PPO and A2C agents with Generalized Advantage Estimation and reward shaping, achieving 82% win rate and higher evolution probability
- Improved training efficiency by 35% via refined action space, tuned reward function, and optimized experience replay
- Developed automated emulator interaction and state logging using Python scripting and reverse engineering

**FastSpeech2 Long-Form Text-to-Speech System (PyTorch)** GitHub

- Extended the FastSpeech2 non-autoregressive TTS architecture to support long-form text synthesis through sentence segmentation and audio concatenation
- Refactored the original implementation for PyTorch 2.x compatibility, improving inference stability and GPU memory handling for large input sequences
- Enhanced preprocessing and alignment pipelines to handle long text inputs while preserving prosody and natural pause insertion

## Technical Skills

**Languages**: Python, TypeScript
**ML/AI**: PyTorch, HuggingFace, LangChain, MLflow, Scikit-learn, NLP, CV, DL
**Frameworks/Tools**: FastAPI, Django, React, Docker, Kubernetes, GitHub Actions, SB3, llama.cpp, PineconeDB, Milvus, Pandas, NumPy, Node.js
**Cloud/DevOps**: AWS,GCP, Linux, CI/CD, Redis, Apache Kafka, Prometheus, Grafana
**Databases/Other**: PostgreSQL, MongoDB, Vector DBs, REST APIs, System Design, Microservices, Prompt Engineering

## Education

**Meghnad Saha Institute of Technology** West Bengal, India
*B.Tech in Computer Science and Business Systems* *2022 – 2026*

**Sudhir Memorial Institute** West Bengal, India
*CBSE – Senior Secondary* *2020 – 2022*

**Calcutta Airport English High School** West Bengal, India
*WBBSE – Secondary Education* *2007 – 2020*

## Achievements and Awards

- **Smart India Hackathon 2024 Winner** – Led team to solve Ministry of Education Problem 1742; ranked top 0.3% among 88221+ teams with AI-powered educational solution
- **AI4Andhra Hackathon 2025 Finalist** – Advanced to finals in AI track; presented LLM-powered system for automated CCTNS query generation and processing
- **Smart India Hackathon 2023 Internal Winner** – Secured first place at institutional level with disaster management simulation app