Domain: Applied Deep Learning & Intelligent Systems Design

Specialization: Multimodal learning, deep architecture construction & optimization, real-time system integration, model behaviour shaping.

I'm **Makarand Gokhale**, an Artificial Intelligence and Software Engineer with a strong interest in Applied Machine and Deep Learning, especially in the context of Intelligent Systems Design. I like working on systems that adapt and improve through iteration, where intelligence is designed as a core property of the system rather than an afterthought. I'm particularly interested in how software can exhibit intelligent behaviour through design, not just outputs.

Core Focus Areas:

- **Multimodal Deep Learning**
- **Deep Learning Architecture Construction & Optimization**
- **Real-Time Intelligent System Integration**
- **Model Behaviour Shaping**
- **Mathematical Algorithms for Machine Learning**

My work spans the full stack of applied AI engineering — understanding the mathematical core (loss functions, embeddings, optimization reasoning) and then implementing it into a deployable system with proper data pipelines, inference structure, storage strategy, and UX-level integration. For example, I work on systems ranging from adaptive search models, vector database indexing, language modelling pipelines, and vision-based inference — including real-time interactive use cases. I approach deep learning as a tool for solving specific problems, not just academic experimentation.

I enjoy moving from high-level modelling to product-ready implementation: for example, systems that analyse group-level affect using vision-transformer-style architectures, LLM-driven voice interaction tools for engine/game integration, tokenizer-oriented staged-learning pipelines, and hybrid semantic search using vector representations. My focus is on designing systems that learn from user interaction over time rather than simply responding to static inputs.

My main interest going forward is applied deep learning deployment — including model architecture selection, understanding optimization trade-offs, and building systems that learn, interact, and evolve meaningfully in response to human input. I want to build systems that are intelligent by design and robust by architecture.

Key Projects & Research:

- **VDBAaS**: A long-term vector database platform designed to support hybrid search and AI-first application workflows.
- **Mob Sentiment Analysis**: Using vision transformers and facial analytics to model emotion at group scale.
- **Unity AI Interaction Models**: A voice-enabled LLM tool fine-tuned for Unity projects that analyses user queries and project context to generate relevant scripts and image templates.
- **Custom Tokenizer Pipeline**: A language-grounded tokenizer system which utilizes a next query prediction model to plan for progressive language learning.

- **Computer Vision Research & Publication:** Worked as a Technical Analyst intern focused on computer vision. Authored a peer-reviewed seminal paper titled *"From Perception to Prediction: A Comprehensive Overview of Computer Vision – Past, Present and Future."* Presented findings at the PAML Workshop, highlighting emerging applications and technological advancements in Computer Vision.