Gokulbarath SK

Robotics & AI Engineer | Full-Stack Developer | System Architect
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Summary

Final-year Mechatronics Engineering student and builder working at the intersection of **robotics, AI/ML, and software engineering**. Hands-on across the full robotics stack – **ROS/ROS2, MoveIt, RViz, Gazebo, URDF, and hardware control via Arduino/ESP32** – and deep AI experience spanning **Large Language Models, agentic systems, multimodal inference, computer vision, and reinforcement learning**. Currently **COO at Avixr Technologies**, and an active open-source contributor (LangChain) with **64 GitHub Stars** across 37 repositories and **1,241+ commits**. Passionate about shipping real-world intelligent systems end-to-end.

Education

Sathyabama Institute of Science & Technology — Chennai, India
Bachelor of Engineering in Mechatronics Engineering (Final Year) — *June 2023 – May 2027*

Bright International School — Ahmedabad, Gujarat
Higher Secondary Education (CBSE) — *2021 – 2023*

Delhi Public School — Gandhinagar, Gujarat
Secondary Education (CBSE) — *Mar. 2021*

Experience

Chief Operating Officer — Apr. 2025 – Present
Avixr Technologies Pvt Ltd — *Chennai, India*

- Lead software architecture and engineering operations, overseeing product development across the company's technology stack.
- Drive technical strategy, team coordination, and delivery of AI and software products.

Vice Chair, IEEE Industry Applications Society – SBC — Jan. 2026 – Present
IEEE Industry Applications Society – Student Branch Chapter — *Chennai, India*

- Drive technical initiatives and member programs spanning manufacturing automation and robotics.
- Previously served as Member (Aug. 2025 – Jan. 2026) before being elected Vice Chair.

Secretary, Robotics Club – SIST — Jan. 2026 – Present
Robotics Club – Sathyabama Institute of Science & Technology — *Chennai, India*

- Coordinate laboratory robotics activities and mentor members on ROS2 workflows and embedded robotics.
- Progressed from Member (Sep. 2025 – Jan. 2026) to Secretary, leading club administration and projects.

Maintenance Engineer Intern — May 2025 – June 2025
Wheels India Limited — *Chennai, Tamil Nadu*

- Gained hands-on experience with **industrial robots** and automated machinery, including diagnostics and hardware-software control integration.
- Studied real-world manufacturing processes and automated production line systems.

Student Coordinator – Robotics Internship — Aug. 2024
Sathyabama Institute of Science & Technology – Dept. of CSE (AI & Robotics) — *Chennai, India*

- Led a robotics internship program, mentoring students on robotic system design, embedded programming, and ROS2 workflows.

Volunteer — Mar. 2026 – Present
Kotlin User Group Chennai — *Chennai, India*

- Support community events around mobile application development and Android/Kotlin ecosystem.

Member — Apr. 2026 – Present
Google Developer Group Chennai — *Chennai, India*

- Active in the developer community around AI, Google Gemini, and emerging technologies.

Open Source Contributions

LangChain | *Ecosystem Contributor – Core Framework & Documentation*

- Identified missing Groq vision support (issue #34589) and authored PR #2259 in langchain-ai/docs, adding the complete **Vision + Multimodal** section (now live in official docs). Enables seamless adoption of vision-capable models like Llama-4 Scout/Maverick.
- Contributed to the core LangChain framework, improving developer experience for LLM-powered application development.

Robotics & ROS Projects

Real-Time Robotic Arm Control | *ROS2, MoveIt, RViz, Arduino, C++, Python* | Demo

- Built an end-to-end **ROS2 control pipeline** driving a physical robotic arm in real time, using **MoveIt** for motion planning and **RViz** for visualization.
- Bridged ROS2 nodes to Arduino-controlled servos over serial, synchronizing RViz with live hardware joint states for closed-loop feedback.

SCARA Servo Control via ROS2 & RViz | *ROS2, RViz, Arduino, URDF, robot_state_publisher* | Demo

- Developed a ROS2 package that maps RViz **joint-state commands** to Arduino servo actuation on a **SCARA manipulator**, with URDF-defined joints and tf2 transforms.
- Implemented a lightweight serial bridge node for low-latency command streaming to embedded hardware.

SCARA Robot Virtual Twin | *ROS2, RViz, URDF, Inverse Kinematics* | Demo

- Created a **virtual digital twin** of a SCARA manipulator in RViz with accurate URDF kinematics and joint articulation.
- Used the twin to validate motion planning and workspace reachability before deploying to hardware.

Custom Three.js URDF Visualizer | *Three.js, JavaScript, URDF Parsing* | Demo

- Engineered a **custom web-based 3D robot visualizer** that parses URDF/Xacro and renders articulated robots in the browser via Three.js – a lightweight alternative to RViz.
- Supports real-time joint updates and dual-camera views for remote monitoring and web visualization.

Robotic Arm Simulation | *ROS Noetic, RViz, URDF* | Demo

- Built a full robotic-arm simulation on **ROS Noetic**, modeling links and joints in URDF and validating motion in RViz.
- Demonstrated cross-distro fluency, porting concepts between ROS1 (Noetic) and ROS2 workflows.

Vision-Guided Robotic Arm Assistance System | *ROS2, OpenCV, Python, Arduino, LLMs*

- Integrated **computer-vision object detection** (OpenCV) with a 6-DOF arm for autonomous pick-and-place, using LLMs for high-level task planning.
- Combined ROS2, Gazebo, and RViz for simulation, URDF modeling, and Three.js web visualization with dual-camera views.

ROS2-Arduino Servo Control | *ROS2, Arduino, C++, Python*

- Developed a ROS2 integration for real-time servo control using Arduino, with RViz visualization and URDF-based robot modeling.

Interactive 2-DOF Arm Simulator | *Python, Gradio, Inverse Kinematics* | GitHub

- Built an interactive robotic arm simulator with real-time **inverse kinematics**, visualization, and step-by-step mathematical explanations using Gradio.

ArduinoSerial2 Library | *Python, PyPI, Serial Communication* | GitHub

- Created a Python library **published on PyPI** for seamless serial communication with Arduino boards, featuring auto-detection and multithreading support.

AI / ML & Software Projects

VVLLM – Multimodal AI Inference Engine | *Python, ONNX Runtime, MLX, PyTorch*

- Architected a proprietary end-to-end **multimodal AI engine** with native Speech-to-Text (Acoustic Encoder), Text-to-Speech (Acoustic Decoder), and Vision-Language Model (Cognitive Core) components.
- Replaced third-party dependencies with custom implementations using **ONNX Runtime** and **Apple MLX** for optimized on-device inference with intelligent weight linking and caching.
- Designed modular architecture supporting real-time voice interaction, vision understanding, and multi-turn conversational reasoning.

GNX CLI – Next-Gen Agentic AI System | *Python, Groq, LLMs* | GitHub

- Developed an AI agent that goes beyond text to autonomously **control Desktop and Android environments** via tool execution, screen understanding, and memory retrieval.
- Implements a modular, **agentic architecture** where a main controller orchestrates memory, planning, and multi-step tool execution pipelines.

Deep Shell | *Python, TypeScript, NLP* | 27+ Stars | GitHub

- Intelligent terminal application using **natural language processing** to interpret, explain, and execute shell commands via conversational AI interface.
- Evolved across 4 major versions (Python → TypeScript), demonstrating iterative software engineering and user-driven design.

EduVid-LLM | *Python, Generative AI, LLMs* | GitHub

- Designed a **planning-centric architecture** for automated educational video generation using LLMs.
- Transforms educational content into structured video scripts and visual assets via multi-stage pipelines.

Snake AI – Reinforcement Learning Agent | *Python, PyTorch, RL* | GitHub

- Implemented an AI-powered Snake game using **reinforcement learning** and neural networks to train an autonomous game-playing agent.

Workout Genie | *React.js, Next.js, AI Integration, Google OAuth* | Live Demo

- Built a **full-stack AI-powered fitness assistant** providing personalized exercise guidance via a conversational AI interface.
- Implemented Google OAuth authentication, user data management, and customized workout recommendations.

Technical Skills

Robotics & ROS: ROS2 (Humble), ROS Noetic, MoveIt, RViz, Gazebo, URDF/Xacro Modeling, tf2, rclpy/rclcpp, Robot State Publisher
Hardware & Control: Arduino, ESP32, Wi-Fi / Wireless Robot Control, micro-ROS / Serial Bridges, Servo & Stepper Control, Inverse Kinematics, 6-DOF & SCARA Manipulators, Embedded Systems
Machine Learning & AI: Large Language Models (LLMs), Model Context Protocol (MCP), Agentic Workflows, Reinforcement Learning, Deep Learning, Diffusion Models, Computer Vision (OpenCV), NLP, PyTorch, TensorFlow, Keras, ONNX Runtime, MLX
Programming Languages: Python, C/C++, JavaScript, TypeScript, Bash
Software & Tools: FastAPI, Flask, Next.js, React.js, Tailwind CSS, Git, SQL, Three.js, Gradio, Streamlit, Docker
Design & CAD: Fusion 360, SolidWorks, AutoCAD, 3D Printing Workflow
Languages: English (Fluent), Tamil (Native), Hindi (Fluent), Gujarati (Fluent)

Certifications & Achievements

CS50's Introduction to Artificial Intelligence with Python – Harvard University — Aug. 2023
Introduction to Deep Learning – Kaggle Learn — Feb. 2024
Automation in Manufacturing – IIT Guwahati (NPTEL) — 2024
GitHub Pull Shark Achievement (x2) – Recognized for sustained open-source contributions
64 GitHub Stars – Across 37 public repositories with 1,241+ total commits

Publications

VLA-Edge: An Edge-Deployed Vision-Language Model Framework for Autonomous Robotic Manipulation via Agentic Reasoning
Gokulbarath SK. Preprint, Zenodo, May 2026. DOI: 10.5281/zenodo.20406012

EduVid-LLM: A Planning-Centric Architecture for Automated Educational Video Generation
Gokulbarath SK. Preprint, Zenodo, Aug. 2025. DOI: 10.5281/zenodo.16914585