

Bala Malla Reddy Kolanu [in](#)

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EDUCATION

- **Purdue University** West Lafayette, IN
Aug 2024 – May 2026
MSE Robotics | GPA: 3.74
- **GITAM University** Hyderabad, India
Jun 2017 – Jun 2021
Bachelor of Technology, Mechanical Engineering | GPA: 7.91

SKILLS

- **Programming:** C++, C, Python, ESP-IDF, RTOS, Linux
- **Autonomy & Robotics:** ROS2, AMCL, SLAM, Nav2, kinematics, path planning, Reinforcement Learning
- **Embedded Systems:** STM32, ESP32, timer/interrupt scheduling, PWM, I2C/UART bring-up, sensor-driver integration
- **Control Theory:** Model Predictive Control, PID control, State space control, state estimation, sensor fusion
- **CAD:** Fusion 360, SolidWorks, Autodesk Inventor, Creo

PROFESSIONAL EXPERIENCE

- **Cambay Engineering** Hyderabad, India
Aug 2022 – May 2024
Mechanical Design Engineer
 - **Design Optimization:** Optimized manufacturing fixtures and assemblies for error-proofing, robustness, and repeatability.
 - **CAD Automation:** Built CAD automation tools that sped up drawing generation and reduced manual errors.
 - **Python Validation:** Automated drawing quality checks and rule-based validations using Python scripts.
 - **Process Improvements:** Identified manufacturing bottlenecks and improved efficiency, standardization, and throughput.
 - **Cross-Functional Collaboration:** Partnered with design, manufacturing, and quality teams to improve engineering workflows.
 - **Documentation:** Documented major design changes and decisions to support iterative refinement and handoff.

ACADEMIC PROJECTS

- **F1tenth Platform** | [Project Link](#) Jan 2026 – Present
Developed a ROS2-based autonomy stack for a 1/10th scale autonomous racecar.
 - **Autonomy Stack:** Created a multi-repo ROS2 stack spanning Hardware interface, mapping, localization, planning, and control.
 - **Localization:** Integrated GPU particle-filter localization (rmgpcu/CuPy) with IMU-fused odometry.
 - **State Estimation:** Built IMU-odom fusion with yaw smoothing, bias estimation, low-pass filtering, and zero-velocity handling.
 - **System Nodes:** Implemented odom calibrator, TF pose publisher, scan-matching TF publisher, and TF speed monitor nodes.
 - **Controller Development:** Implemented Model Predictive Control with dynamic constraints and runtime tuning.
 - **Deployment:** Built launch/config flows for calibration, mapping, and closed-loop tests with joystick safety and speed limits.

PERSONAL PROJECTS

- **Spidey - Hexapod Robot** | [Project Link](#) Sep 2025 – Oct 2025
A six-legged robot with IMU stabilization, Wi-Fi control, and modular firmware architecture.
 - **Software Stack:** Built a modular ESP-IDF C++ stack for kinematics, gait planning, IMU fusion, networking, and control.
 - **Motion Planning:** Implemented a low-level gait planner that allows real-time control to enable adaptive locomotion.
 - **Stabilization:** Designed a Model- Predictive Control (MPC) body stability controller that fuses IMU data to maintain balance on uneven terrain.
 - **Kinematics and Hardware interface:** Created a low-level middleware that handles all the kinematics and manages the servo driver creating a low latency pipeline for gait planner and body stability controller to use.
 - **Remote Interface:** Built HTTP/WebSocket control APIs with JSON telemetry and command routing.
- **RA3-Cranker - 6-axis Robotic Manipulator** | [Project Link](#) Mar 2024 – Present
A six-axis cobot with STM32 based firmware and ROS2 integration.
 - **Firmware Platform:** Developed firmware for STM32G474RE using CubeMX and PlatformIO.
 - **Control Architecture:** Implemented modular multi-joint control with per-axis PID, encoder feedback, and actuator abstraction.
 - **Real-Time Control:** Configured peripheral timers for pulse generation and capture to enable simultaneous control of multiple actuators.
 - **Safety & Homing:** Implemented limit-switch homing via NVIC interrupts with encoder reset, backoff logic, and homing flags.
 - **Runtime Tooling:** Built a UART CLI for fast debugging, tuning and configuration.
 - **Integration:** Built ROS2 nodes for communication with the firmware and integration with higher-level control systems.
 - **ROS2 packages:** Developed ROS2 URDF description and teleop pipelines to enable functionalities like joystick teleop.