AKHIL JOSHI

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SUMMARY

Robotics Engineer with experience in robot design, motion planning, and system integration. Skilled in computer vision algorithms, ROS-based motion control, and inverse kinematics. Experienced with Kinova Gen3 Lite, Kinova Gen3, KUKA, and ViperX 300 arms, optimizing autonomous systems for industrial and medical applications.

EDUCATION

University of California, Riverside **Sept 2023 – Mar 2025**
M.S. in Robotics, Automation, and Mechatronics GPA: 3.60/4.0
Uttarakhand Technical University, India **Aug 2017 – Oct 2021**
B.Tech in Mechanical Engineering GPA: 7.4/10.0

SKILLS

- **Relevant Coursework**: Foundation of Robotics, Design and Fabrication of Robots, Advanced Computer Vision, Machine Learning, Edge Computing
- **Programming Languages**: Python,MATLAB, Simulink,C/C++
- **Robotics Frameworks & Simulations**: ROS1, ROS2, Gazebo, MoveIt!,SLAM,
- **Embedded Systems & Hardware Platforms**: Arduino, Raspberry Pi, Jetson Nano
- **Tools**: SolidWorks, AutoCAD, CATIA, Docker, Git
- **Manufacturing Skills**: Welding, Computer Numerical Control (**CNC**), Lathe Machine, Sheet Metal Fabrication, 3D Printing
- **Design Analysis**: Design for Assembly (**DFA**), Design for Manufacturing (**DFM**), Geometric Dimensioning and Tolerancing (**GD&T**)

PROJECTS

Four DOF arm room cleaning robot *October 2023*

- Designed and developed room cleaning robot arm using inverse kinematics, achieving 92% cleaning coverage in dynamic environments.
- Integrated LIDAR and infrared sensors with SLAM algorithms for real-time obstacle detection and autonomous navigation.
- Synchronized four DOF robotic arms for simultaneous multi-zone cleaning, reducing overall cleaning time by 30%.
- Optimized power management and cleaning path algorithm, extending battery life by 20%.

Litter Locator Drone *December 2023*

- Designed and developed an autonomous drone leveraging **CNNs** for **90%** accurate litter detection across varied terrains.
- Implemented **YOLOv5** architecture for real-time object recognition, enhancing detection speed by **35%**.
- Collected and augmented diverse datasets to improve model robustness in different environmental conditions.
- Integrated AI-driven detection with drone navigation systems, enabling efficient, scalable environmental cleanup solutions.

Self-Checkout System *Jan 2024*

- Developed an automated self-checkout system using **real-time object detection** with **TensorFlow** on **Jetson Nano**.
- Optimized detection algorithms, improving item recognition accuracy by **20%**.
- Integrated hardware and software components to streamline transactions and enhance user experience.
- Reduced checkout times by **40%**, enabling faster, more efficient retail operations.

Lane Curvature Detection *Mar 2024*

- Implemented **Bezier curve**-based lane detection techniques for accurate curvature estimation in autonomous driving scenarios.
- Benchmarked performance against **ENet segmentation** models to validate improvements in lane recognition.
- Improved lane detection accuracy by **15%** using the **TuSimple dataset**, enhancing lane-following reliability.
- Optimized computer vision algorithms to ensure real-time processing for autonomous vehicle navigation.

Fire-Fighting Mobile Robot *Nov 2024*

- Built a mobile robot equipped with a **4-DOF flame-tracking robotic arm** for precise targeting in dynamic environments.
- Applied **PID control** algorithms to enhance the arm's accuracy and stability during flame extinguishing operations.
- Integrated **thermal cameras** and **IR sensors**, achieving **85%** accuracy in real-time flame detection.
- Enhanced robot responsiveness and reliability, enabling effective fire suppression in unpredictable conditions.

PUBLICATIONS

- Sidharth Thangaraja, Pavan R., Avinash V., Ankur Karn, **Akhil Joshi**, Prabandh Battu, G. Sadashiv, Shri Ram Rallapalli, Dinesh Sai. "Fire Fighting Robot," *International Journal of All Research Education and Scientific Methods (IJARESM)*, 2021. Available here.

EXPERIENCE

Robotics and Medical Systems (RaMS) Laboratory, UC Riverside, CA **Apr 2024 – Present**
Graduate Student Researcher

- Developed a robotic cutting system using the Kinova Gen3 arm, achieving **94**% accuracy in detecting and following lines on tissue through **MATLAB** and **ROS** integration.
- Implemented **computer vision** algorithms to process **RGB camera** data, transforming pixel coordinates into the robot base frame for precise trajectory planning; eliminated detection errors through advanced calibration techniques.
- Designed and optimized **robotic motion control**, including **inverse kinematics** and waypoint interpolation, ensuring smooth and accurate line-following with sub-millimeter precision.
- Validated system performance through extensive testing, successfully integrating **robotics**, **computer vision**, and **surgical precision** to meet real-world application standards without any system failures.

UC Riverside, CA **Oct 2024 – Jan 2025**
Mechanical Teaching Assistant, ME 176 Sustainable Product Design

- Guided project-based learning on sustainability topics such as wind power, geothermal energy,marine energy, and passive energy strategies for buildings.
- Provided technical mentorship on data analysis,modeling, and prototyping, ensuring students met project milestones effectively.
- Assessed student performance through detailed evaluations of project reports, presentations, and hands-on activities, ensuring alignment with course objectives.

Mother Miracle Trust, Rishikesh, India **Dec 2021 – July 2023**
System Integration Engineer

- Ordered and assembled computer components, setting up fully functional computer labs equipped with **smart TVs, smart boards, and projectors**.
- Managed and maintained hardware and software for over **100 academic and administrative devices**, optimizing system performance and reducing downtime by **30%**.
- Designed and implemented a **robust laboratory network infrastructure**, increasing data transmission speeds by **25%** and minimizing latency issues.
- Installed and configured **power backup systems**, ensuring uninterrupted operations during power outages.
- Debugged and resolved complex **connectivity, hardware, and software** issues, significantly improving system reliability across the institution.

VOLUNTEER EXPERIENCE

Mother Miracle Trust, Rishikesh, India **Jan 2011 – Apr 2017**
Volunteer Coordinator

- Managed and mentored a team of **20+ volunteers**, streamlining administrative operations, educational programs, and financial activities, increasing overall organizational efficiency by **30%**.
- Initiated and led a **sustainability-focused greenhouse project**, securing funding and improving resource utilization, benefiting **100+ underprivileged children**.
- Designed and implemented educational programs for **500+ children** in underserved communities, focusing on **composting**, **organic fertilization**, and sustainable living practices.
- Distributed food to the entire community, supporting over **25,000 families** who lost jobs or were affected by illness during the COVID-19 pandemic, ensuring timely aid to those most in need.
- Secured **higher education sponsorships** for **15+ students** by cultivating relationships with donors, significantly improving access to academic opportunities.