AKHIL JOSHI

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SUMMARY

Robotics Engineer with experience in robot design, motion planning, and system integration. Skilled in computer vision algorithms and ROS-based motion control, achieving **94%** accuracy in robotic line-following tasks. 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!,Simultaneous Localization and Mapping, Point Cloud Library
- **Embedded Systems & Hardware Platforms**: Arduino, Raspberry Pi, Jetson Nano
- **Tools**: SolidWorks, AutoCAD, CATIA, ANSYS, 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

- **Automatic Hammering Machine** *Oct 2018*
  Designed and programmed an **Arduino-controlled** machine for automating repetitive hammering tasks. Integrated **internal circuitry and ultrasonic sensors** for position detection and force sensors for precise impact control, improving operational efficiency by **30%** while ensuring user safety.

- **Electric Cycle** *July 2021*
  Built a prototype electric cycle by integrating a **250W brushless DC motor** and a **36V lithium-ion battery**. Optimized energy efficiency by **25%** through regenerative braking and enhanced rider safety with a smart throttle control system.

- **Four-Arm Room Cleaning Robot** *Oct 2023*
  Engineered a **four-DOF multi-arm robotic system** utilizing **inverse kinematics** for synchronized cleaning tasks. Deployed **LIDAR** and **infrared sensors** for real-time obstacle detection, achieving **92%** cleaning coverage efficiency in dynamic environments.

- **Litter Locator Drone** *Dec 2023*
  Designed an autonomous drone leveraging **Convolutional Neural Networks (CNNs)** for **90%** accurate litter detection across varied terrains. Implemented **YOLOv5** architecture for real-time object recognition, improving waste detection speed by **35%**.

- **Self-Checkout System (Jetson Nano)** *Jan 2024*
  Developed an automated self-checkout system using **real-time object detection** with **TensorFlow** on **Jetson Nano**. Achieved **40%** reduction in checkout times and improved item recognition accuracy by **20%**.

- **Lane Curvature Detection (Computer Vision)** *Mar 2024*
  Implemented **Bezier curve**-based lane detection and benchmarked against **ENet segmentation** models. Improved lane detection accuracy by **15%** on the **TuSimple dataset**, enhancing autonomous vehicle lane-following reliability.

- **Fire-Fighting Mobile Robot** *Nov 2024*
  Built a mobile robot with a **4-DOF flame-tracking robotic arm** using **PID control** for precise targeting. Integrated **thermal cameras** and **IR sensors**, achieving **85%** accuracy in dynamic flame detection and real-time extinguishing.

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 – Expected Mar 2025**
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**
Collaboration and Volunteerism

- Worked collaboratively with **20+ volunteers** in office administration, teaching **Kindergarten to 10th grade**, and accounting, fostering a cohesive team environment.
- Delivered over **15+ motivational speeches** to students, inspiring enthusiasm for learning and personal development.
- Initiated and coordinated sponsorships to establish a **greenhouse project**, benefiting **100+ underprivileged children** and promoting sustainability.
- Educated **500+ children** in slum areas on **composting, organic fertilizing**, and practical production skills, empowering them with knowledge for self-sufficiency.
- Distributed critical food supplies to **25k+ marginalized families** during the COVID-19 pandemic, addressing urgent needs and supporting vulnerable communities.
- Successfully secured **college sponsorships** for **15+ underprivileged students**, increasing access to higher education through strategic communication with donors.