Dhinesh Rajasekaran

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Education

Master of Engineering - Robotics — Aug. 2022 - May. 2024
University of Maryland, College Park (3.7/4.0 GPA) — *College Park, MD, USA*

Bachelor of Technology - Electrical Engineering — Jul. 2017 - Jun. 2021
SRM Institute of Science and Technology, Chennai (8.8/10.0 GPA) — *Chennai, TN, India*

Technical Skills

Areas of Expertise	**Autonomous Robots**, Embedded Systems, **Industrial Automation**
Robotic Platforms	**Omron** LD series, PF400, **UR** Robotic Arms, **AMRs, AGVs**
Hardware Platforms	AVR, **ARM**, **RealSense**, TI Sensors, IMU, LiDAR, **Cognex Vision**
Programming Languages	**Python**, **C++/C**, Linux/Bash
Tools/Technologies	**Gazebo**, **MoveIt**, MATLAB, **Kalman Filter**, SOLIDWORKS, **AWS**
Proficient in Frameworks	**ROS**, **OpenCV**, PyTorch, PID, Docker, **GIT**
Proficient in Interfaces	I2C, SPI, I2S, UART, RS422, CAN

Career Highlights

- **Robotics Engineer** with **3 years** of experience, **2 patents**, and expertise in **ROS**, **Industrial Automation**, **Perception**, Localization, Embedded Firmware, and **Sensor Fusion**.
- Demonstrated **technical expertise**, **attention to detail**, diligence, and **problem-solving** through successful execution of multiple long-term projects, professional experience and research initiatives.

Professional Experience

Khanjur R&D, Silver Spring — Feb. 2024 - Present
Robotics Engineer — *Silver Spring, MD, USA*

- Developed a **wearable** medical device for **Fluorescence-Guided Brain Surgery**, integrating high-power UV lights, a **camera vision** system, and **on-board data** processing for enhanced surgical precision.
- Developed schematics and **multi-layer control PCBs** for a **robotic** system, integrating **Motors**, LVDT, Load cells, and various **THT** and **SMD components**, adhering to **industry** best practices in PCB design.
- Developed an **Embedded Application** using **Qt**, Python, and **C++** to interface with a **multi-sensor automation** rig, integrating DATAQ toolbox for data acquisition and generating comprehensive QA reports.

National Institutes of Health, Rockville — Sept. 2023 - Dec. 2023
Robotics Research Associate — *Rockville, MD, USA*

- Developed a **robot chemist** utilizing the **Omron** LD series **mobile robot**, **PF400 robotic arm** and an advanced High-Density Storage (HDS) system to seamlessly **automate** intricate chemical process.
- Utilized **OpenCV-based detection algorithms** to **autonomously** track vial movements within the system and tested under various lighting conditions & multiple **industrial cameras** in accessing the efficiency and detection robustness.
- Built the **hardware & calibrated camera** for a **6 DoF** robotic actuator using **ROS** & **Intel Realsense** and designed an **electromagnetic door handle** for human/robotic access to the HDS.

Solinas Integrity, IIT Madras Research Park — Aug. 2021 - Jul. 2022
Robotics Engineer — *Chennai, TN, India*

- Developed a **pipeline inspection robot** detecting leaks, **corrosion**, and defects in pipelines as small as 4-inch & up to **1000 meters** long, utilizing YOLOv3 and withstanding 5 bar underwater pressure.
- Implemented **Sensor Fusion** with **Kalman Filter**, **PID** motor synchronization, and designed ARM-based Robot **Control PCB**. Led mechatronic systems development and 3D printing for crucial components.
- Developed an advanced **robot control station** featuring ATmega 2560-based infotainment PCB and Arduino Pro Mini control **joystick**, programmed in C++ for seamless system **integration**.

Digital Blanket, Bangalore — Sept. 2021 - Jul. 2022
Embedded Engineer — *Bangalore, KA, India*

- Designed a **Wet Floor Detection Sensor** using **FLIR** thermal camera and **ESP32**, with custom firmware for precise detection.
- Created a **ToF** Sensor library for 3**D mapping**, people counting, and presence detection, successfully integrating it with **industrial automation** circuit boards and IoT nodes.
- Developed a **collision avoidance** system using **mmWave TI** sensor and designed a **smart home wireless sensor** platform, incorporating **industrial-grade** sensors for **IAQ**, TVOC, light, and temperature monitoring.

Projects

Smart Kitchen Robot for Making Stuffed Indian Bread Variety:

- Developed the **world's first fully automated** cooking robot requiring only wheat and water inputs.
- Automated aloo paratha making, **stacking**, & storing in **hotboxes** using novel robotic systems, sensors, and smart **IoT** control.

Custom Robotic Arm for Pick & Place Operations using Stereo Vision:

- Designed a 6-DoF manipulator from scratch with a 3D-printed design for pick and place tasks.
- Programmed it using **MoveIT, ROS2**, and a **custom Stereo Depth Estimation pipeline**; compared performance with **UR5e**.

Autonomous Mobile Robot for Shape-Sorting Application:

- Developed an autonomous mobile robot for a demo site to **identify** and **sort** colored shapes.
- Utilized a gripper, **planning** algorithm, **OpenCV**, and **Raspberry Pi** to move shapes to drop-off zones.

ARIAC 2023 - Agile Robotics for Industrial Automation:

- Created a ROS**2**-Gazebo-based **Industrial Robotic Manufacturing System** mirroring the ARIAC 2023 challenge.
- Focused on agility and autonomy in **kitting tasks** using **AGVs**, manipulators, and sensors.

Patents

HEAD GEAR SYSTEM AND METHOD FOR ENSURING THE SAFETY OF A RIDER OF A VEHICLE Dec. 2021
Patent No: 202141060755 Patent

- Patent published for the project "Bone Conduction & Accident Prevention Smart Helmet".

BAKER BOT SYSTEM, SMART KITCHEN ROBOT MACHINE, AND METHOD FOR AUTOMATIC MAKING OF CHAPATI Dec. 2021
Patent No: 202141060759 Patent

- Patent published for the project "Smart Kitchen Robot for Making Stuffed Indian Bread".

Achievements

- One among the **Top 100 projects** at **KPIT Sparkle's** i-Innovate contest from **over 2700 submissions.** 2021.
- **Runner Up** at ASEAN-India Hackathon from **over 3600 participants,** 1st **international hackathon** conducted by AICTE with 10 other Asian countries. 2021.
- **1st Prize** at Hackinfinity conducted by SSN collage of Engineering and **Mr.Cooper** company from **over 52 participants.** 2021.
- **1st Prize** at National level **Smart India Hackathon** Hardware Edition from **over 20 submissions.** 2020.
- **Gold Medal** Winner in **Research Day** conducted by SRM University from **over 45 submissions.** 2020.
- **Certificate of Distinction** for Introduction to **Robotics** by Prag Robotics, Pvt Ltd, Chennai, India. 2019.

Positions of Responsibility

Team Leader - International ASEAN-India Hackathon Jan. 2021 - Feb. 2021

- **Elected as Team lead** among 6 students from **various countries** for 2 months and led the team to **victory** in a 3 day hackathon.
- Played a pivotal role in understanding of problem statement, product design and helped **break the communication barrier.**

Team Leader - Smart India Hackathon Jan. 2020 - Dec. 2020

- Team lead for a group of 6 students at SRM University for 12 months and led the team to **victory** in a 5 day hackathon.
- Guided the team members and coordinated with them **during the pandemic and developed a Proof of Concept.**