# DHEERAJ KALLAKURI

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## EDUCATION

**M.S. Robotics and Autonomous Systems (Artificial Intelligence)** May 2024
Arizona State University, Tempe, AZ GPA:4.00
**B.E. Computer Engineering** May 2019
University of Mumbai, Mumbai GPA:3.56

## PROFESSIONAL EXPERIENCE

**Graduate Student Assistant: Battery Electric & Intelligent Vehicle (BELIV) lab, ASU** February 2023 - Present

- Deployed the perception module for an Intelligent Parking System, achieved a 95% accuracy rate in detecting empty parking spots using a custom YOLOv5 model and ensuring seamless system integration.
- Engineered advanced sensing and perception modules of 2022 Mustang Mach-E autonomous car, enhancing sensor fusion capabilities by 30%.
- Developed an effective test harness and debugging methodology of sensors and software modules for the ROS-MASTER X3 bot, reducing troubleshooting time by 40%.

**Software Engineer: Zeus Learning, Lower Parel, Mumbai** July 2019 - May 2022

- Programmed and deployed interactive end-to-end learning modules and enhanced user engagement by 40% using Dotnet and Angular.
- Designed and implemented frontend components for data visualization and report generation using the React frameworks and improving website efficiency by 35%.
- Created and optimized algorithms for mathematical questions, increasing accuracy by 80% using Typescript.
- Trained and mentored 7 junior developers, boosting team performance by 45% and ensuring project progress through regular client feedback sessions, leading to a 30% increase in client satisfaction.

**Freelance Project Coordinator: Central Railways, Mumbai** September 2020 - February 2021

- Prototyped 5 railway safety and maintenance automation projects using computer vision, machine learning, and IoT, increasing automation by 60%.
- Tested and deployed projects on embedded devices like Raspberry Pi and Arduino, improving operational efficiency from 30% to 65%.
- Interacted with railway officials to demonstrate project functionality, successfully convincing them of an 80% reduction in human resource requirements and time for maintenance and routine tasks.

## ACADEMIC PROJECTS

**Perception of Intelligent Parking System**[*Video Link*] December 2023 – May 2024

- Engineered a perception module to identify the nearest parking spots based on user location, deploying the module on Nvidia Jetson Orion with GoPro cameras, reducing user search time by 80%.
- Built a custom object detection system using YOLOv5 architecture, achieving 94% accuracy in car detection, and defined parking spots by identifying regions of interest in the frame, with data stored in MongoDB.
- Executed comprehensive system integration and debugging, addressing all hardware and software issues for seamless operation by increasing its efficiency from 20% to 80%.
- Conducted 5 rounds of live testing at the ASU campus outdoor parking lot, ensuring dynamic allocation of parking spots, optimizing fuel consumption, traffic flow, and navigation time.

**NHTSA Collision Dataset Analysis**[*Overview*] August 2023 – December 2023

- Performed data preprocessing and cleaning, employed ML foundation models in Python.
- Conducted 52 comprehensive analyses on ADS and ADAS Level 2 data across all US states, covering geospatial, statistical, correlation, and crash analyses, with comparison to human-driven vehicle accidents.
- Constructed a predictive model for crash type based on input features, achieving a substantial accuracy boost from 38% to 74% via hyperparameter tuning and random forest classifier application.

**Generalized Hand Gesture Recognition** [*Video Link*] August 2023 – December 2023

- Implemented multiple hand gesture applications, including video conferencing, sign language interpretation, and media control, on a Raspberry Pi equipped with a 60 FPS camera.
- Utilized MediaPipe architecture and ML classifiers trained on application-specific datasets to create different detection models, optimizing the trade-off between FPS and accuracy.
- Achieved a remarkable reduction in computation load on edge devices, with an 87% FPS drop reduction in video conferencing, 49% in sign language interpretation, and 17% in media control.

**High-Accuracy Keyword Spotting on Edge**[*Video Link*] October 2023 – November 2023

- Developed an audio analysis embedded system for keyword spotting, achieving 96% accuracy using a convolutional neural network, and deployed it as a TensorFlow Lite model on an Arduino Nano BLE Sense.

**Posture Correction Chair using Reinforcement Learning** [*Video Link*] October 2022 – Decemeber 2022

- Created a user-friendly chair with a feedback system that advises users on achieving ideal posture, using a centralized sensor fusion system that collects pressure sensor data and relays it to an Arduino.
- Trained the feedback system with a policy iteration algorithm, achieving 96% accuracy in guiding users to the optimal position.

**M-Lens (IoT-based deep learning device)** [*Video Link*] June 2018 – May 2019

- Built a cloud-based edge computing handheld device for detecting industrial defects in airplane manufacturing, reducing inspection time and manpower by 80%.
- Deployed a custom defect detection model on Raspberry Pi using YOLOv5 architecture and transfer learning, achieving an 85% accuracy rate.

## TECHNICAL SKILLS

**Programming Languages:** Python, C/C++.
**Front-End and Back-End:** React.JS, Javascript, TypeORM, GraphQL, TypeScript, JSON, HTML, C#, Dotnet, CSS, Angular.
**Robotics, Data Engineering:** IoT, Embedded C, AtmelAVR, Arduino boards, RaspberryPi, PLC, ROS2, Matlab, Rviz, OpenCV, Nvidia boards, TensorFlow, PyTorch, pandas, numpy, TFLite, Tiny ML, Exploration Data Analysis, ML Foundations, Mathplotlib, Data Visualization, Statistical Analysis, Predictive Modeling, Data Mining and Analysis, Mechatronics, Simulink, Sensors Fusion.
**Tools, Databases, and OS:** Docker, MariaDB, MongoDB, PostgreSQL, Git, SQL, NoSQL Windows, macOS, Linux, Jira, Trello, Miro, GPU, CUDA, TensorRT, Google Colab, Jupyter Notebook, Vscode, Anaconda.
**Concepts:** Artificial Intelligence, Machine Learning, Reinforcement Learning, Image Processing, Transfer Learning, Data Structures, Object detection, Computer Vision, Perception in Robotics, System engineering, Product Development, Prototyping, Embedded Machine Learning, Neural Networks, Deep Learning.

## PUBLICATIONS

**M-Lens (IoT-based deep learning device)** [*Paper Link*] July 2023

- Published in Internet of Things (IoT): Key Digital Trends Shaping the Future in Springer.

**Real-time Alert System for Auxiliary Transformer Failures** [*Paper Link*] March 2022

- Published paper in IEEE Xplore.

**Implementation of Implantation-Stagger Measuring Unit** [*Paper Link*] June 2021

- Published in the International Journal of Engineering and Management Research (IJEMR), Vol-11 issue-3.

## ACCOMPLISHMENTS

- Recipient of Master's Opportunity for Research in Engineering (MORE)
- Recipient of Engineering Graduate Fellowship