NIKITHA M V

nmv@umich.edu • 206-697-4937 • Linkedin - nikithamv • Github - nikithaquad

EDUCATION

University of Michigan **Ann Arbor, MI**
Master of Science in Electrical and Computer Engineering (Specialization: Autonomous Sys.) December 2023
Coursework: Controls Systems, Linear Systems, Embedded Systems

Indira Gandhi National Open University **Delhi, India**
Post Graduate Diploma, Applied Statistics. Distinction July 2018 – December 2020

Jain University **Bangalore, India**
Bachelor of Technology in Electronics and Communication July 2013 - July 2017

ACADEMIC RESEARCH EXPERIENCE

Graduate Research Assistant - LAB for PROGRESS - UMich **May 2023 – Current**

- Calibrated LIDAR, GPS, IMU and camera sensors for state estimation to detect the position and velocity of the system (M-bot).
- Collected the data from individual sensors and experimented with the accuracy of the data using Kalman and non-linear algorithms.
- Aim to design a platform for the lab that helps us understand the sensor activity, sensor fusion and critical parts of motion that help us design debug sensor operations and optimized algorithms.
- Programmed state estimation algorithms - Kalman filter, Extended Kalman filter, UKF and Particle filter.

- **Research Assistant - Precision Systems Design Laboratory (PSDL) – UMich** **Sept 2022 - Jan 2023**

Motion Sickness Mitigation in Autonomous Vehicles

- **Control engineering**: Programmed adaptive PID algorithm that adapts to load, speed, system dynamics, and disturbance parameters when subject to different conditions.
  Designed and simulated control block in MATLAB to evaluate the influence of PID algorithm. Transformed the designed block from MATLAB to functional control block in LabVIEW.
- Develop a model-based solution for the motion seat considering vehicle and seat dynamics to eliminate jitter and trajectory command disturbances.

- **Research Assistant - Embedded Lab - Jain University** **June 2022 – Current**

- Calibrated camera for object detection on Raspberry Pi 4 controller. Interfaced the load sensor and measured the weight of the food, computing the calorie consumed.
- Programmed ESP8266 module and mapped the sensor collected data to the cloud. Used this data to map the approximate calorie content of the food consumed.
- Studied and experimented with various object detection and CNN algorithms. Of the algorithms evaluated, MobileNetV2 CNN algorithm had highest accuracy- 93% on Food 101 dataset.

WORK EXPERIENCE

Gartner **Bangalore, India**
Data Research Specialist July 2017 - August 2022

- Researched large data models such as the Hierarchical Data Model and Time-Series Data Model to address labor and technology market challenges.
- Built a data extraction tool and data model that integrates data from various sources and provides real-time insights into market trends, competitor performance, and customer preferences. The build tools reduced the number of work hours by 66%.
- Implemented a predictive analytics model using machine learning algorithms to forecast employee trends, enabling initiative-taking retention strategies, and reducing attrition by 20%.
- Designed a data model for sentiment analysis, employing natural language processing techniques to analyze work environment, culture, management, and employee growth, leading to improved customer satisfaction and an ~10% decrease in negative reviews.

Tools and Technology - Linear algebra, Mathematical Modelling, Null and Hypothesis – Z-test, Chi-test, Linear Regression, Correlation, and Time Series Forecasting.

CURRENT PROJECTS

Control and Embedded Engineering Projects

- Adaptive Cruise Control - Designed and simulated an Adaptive Cruise Control (ACC) that behaves like the typical cruise control on the road. The controller is designed to adapt various scenarios such as maintaining position and velocity of the car with respect to other cars. Designed and simulated vehicle dynamics subsystems and used haptic wheel as steering and potentiometer to control vehicle speed. Designed and tuned PID parameters for the automatic steering subsystems. The final designed system was developed by integrating all the subsystems along with communication protocol CAN. **Technical – NXP S32K144, RTOS, Emb. C.**
- Designed a control algorithm to perform magnetic levitation on an iron ball. Modeling the dynamics of non- linear systems using Newtonians methods and linearization strategies. The control strategies involved are PID and Loop shaping methods.

Perception Projects

- Wi-Fi SLAM – The project aims to incorporate signal strength, time of flight and orientation information from Wi-Fi and Bluetooth signals along with IMU calibrated data in particle filter-based localization. Furthermore, it incorporates a map of the simulated raw field strength and identify spatial features to aid in loop-closure for the robot. **Software and libraries: Pywifi, gtsam, IMU calibration**.
- Jigsaw puzzle solving - Using edge/feature detection, image stitching and transformation to find the best match and solve the jigsaw puzzle. Currently finding the best possible match for each puzzle piece using minimum distance and trying to use rotation and affine functions to obtain the transformation. **Technical: Image Segmentation, OpenCV, SIFT, C++.**

RELATED COURSEWORK AND SKILLS

- Control Systems - Control Theory, Linear Control Systems.
- Perception - Computer Vision, Mobile Robotics.
- Math and Algorithms - Linear Algebra, Advanced Mathematics (Calculus), Data Structures(Trees, Dynamic Programming)
- Statistics - Linear Regression, Probability Distribution, Bayesian Distribution, Null Hypothesis.

Skills	Basic	Intermediate	Expert
Languages	C++ (ROS2 library)	Python, C++ (STL, OOP)	Embedded C
Framework	ROS2	TensorFlow, Keras, Simulink, MATLAB	
Platforms	Linux, LabVIEW	Arduino, Raspberry	
Microcontrollers		8051, PIC, ARM, NXPS32K144	

PUBLICATIONS

- **Autonomous Quad Copter for Agricultural Land Surveillance** - The autonomous quad is potentially designed for live monitoring of the entire agricultural field without the presence of the farmer in the farm. Tuned the PID algorithm in achieve stability for certain critical environments. **Technical: Ardupilot, Arduino, Mission Planning**. https://youtu.be/IpZvkRK4yZk
  Nikitha M V, Sunil M P and Hariprasad S A, 12(1), 2021, pp. 892-901.

- **A Novel Ultra-Low Power and PDP 8T Full Adder Design Using Bias Voltage** - The 8T full adder is designed based on a new logic 3T XOR and 2:1 multiplexer. V. Nafeez, M. V. Nikitha, and M. P. Sunil, 2017 2nd International Conference for Convergence in Technology (I2CT), Mumbai, India, 2017, pp. 1069-1073, Doi: 10.1109/I2CT.2017.8226292.
  Technical: Cadence