**Manojpriyadharson Kannan**  
Automotive Engineer specialized in advanced vehicle dynamics and control systems, autonomous systems, test engineering, and model-based design & validation

PROFILE

**Skills and Ambition**

Experienced in model-based design, software development, and validation, I specialize in control strategy design, MIL/SIL/HIL testing, and algorithm optimization for automotive and high-tech systems. Proficient in Python, C++, MATLAB/Simulink, and real-time simulation frameworks, I develop scalable, AI-driven, and embedded software solutions.

With expertise in path planning, obstacle avoidance, localization, and ROS-based autonomous systems, I leverage tools like PreScan, Autoware Auto, dSPACE, JIRA, and GIT to drive software innovation and automation. Skilled in Agile, ASPICE, and CI/CD, I aim to contribute to innovative software development projects, focusing on scalable, high-performance, and sustainable solutions across automotive, embedded, and high-tech industries.

**Personal Details**

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| * Nationality | Indian |
| * Current Residence | Eindhoven, Netherlands |
| * Date of Birth | 08-March-1995 |
| * Availability/Notice Period | Two calendar months |
| * Driving License | Class B |
| * Work Permit | HSM Visa (till 2026) |

**Key competences**

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| * Programming Languages | MATLAB/Simulink (4+ years), Python (3+ years), C++ (1 year), ROS (2+ years) |
| * OS | MS Office (5+ years), Linux (3+ years), Windows (3+ years) |
| * Management Tools | JIRA (3+ years), Git (3+ years), Github (3+ years), Bitbucket (3+ years), Polarion (3+ years), IBM Doors, Jenkins (3+ years) |
| * Hardware | Microcontrollers, GPS RTK system |
| * CAE software | ANSYS (2 years) |
| * CAD software | Catia (2 years), Creo (2 years), |
| * Other software | dSPACE tools, Siemens Prescan, Autoware Auto, ROS, Vector tools (CANoe & CANalyzer) |
| * Methodologies/Norms/Standards | ISO 26262, Agile methodology, V model, ASPICE, AUTOSAR, BDD, ROS, Sensor fusion algorithms |
| * Authorizations/Certifications | TMap certified test engineer  Nanodegree on self-driving cars (UDACITY) |
| * People Skills | Stakeholder management, Team Collaboration, Agile Leadership |

AUTONOMOUS SYSTEMS & SW DEVELOPMENT PROJECTS

UDACITY NANODEGREE ON SELF DRIVING CARS | October 2024 - Present | Expected Completion Date: April 2025 |

* Probabilistic Robot Localization Simulation
  + Implemented Bayesian localization for robot navigation using color-based sensing.
  + Developed a belief update system to handle sensor noise and motion uncertainty.
  + Utilized Python, NumPy, and Matplotlib for visualization.
  + Applied concepts from probabilistic robotics and sensor fusion.
* Kalman Filter for Object Tracking
  + Designed a tracking system using Lidar sensor data and a Kalman filter.
  + Generated synthetic vehicle motion data with velocity, acceleration, and position.
  + Implemented filtering techniques to reduce noise and enhance measurement accuracy.
  + Compared ground truth, raw Lidar data, and Kalman filter outputs via visual analysis.
* A\* path planning algorithm
  + Developed a modular Python implementation of A\* search for optimal pathfinding.
  + Implemented helper functions dynamically within a PathPlanner class.
  + Integrated test cases and map visualization for validation.
* Traffic Light Classifier using Computer Vision
  + Implemented HSV-based color classification for traffic light recognition.
  + Standardized and preprocessed images to improve accuracy.
  + Applied computer vision techniques for real-time classification.
  + Evaluated performance with misclassification analysis.
* CRC-Based Data Integrity Mechanism for Automotive UART Communication
  + Designed and implemented a CRC-8 SAE J1850-based error detection mechanism for UART communication in automotive ECUs.
  + Developed a Python prototype for rapid testing and validation before porting to an embedded system.
  + Evaluated error detection performance against various data corruption scenarios, ensuring reliable data integrity.
  + Optimized the implementation for minimal computational overhead, making it suitable for real-time applications.
* Extending prior research in autonomous driving for articulated vehicles in constrained spaces
  + Path planning algorithm redesign: Leveraging Model-Based-Design (MBD) principles to create a modular and reusable framework, with ongoing integration of machine learning techniques to optimize computational efficiency.
  + Modular Framework Development: Building a standardized architecture for path planning and obstacle avoidance, enabling easy customization for various vehicle types and operational domains.

Link to the above projects could be found in the following link: [Udacity\_Projects](https://github.com/Manojkannan0803/Portfolio) | [Path\_Planner\Research](https://github.com/Manojkannan0803/Path-planner/tree/main)

INDUSTRY EXPERIENCE

**Technical Consultant** | August 2021 - Present | 3+ years | Eindhoven, The Netherlands

Digital twin Development of ASML machine

* **Developed and optimized digital twin plant models** of cutting-edge lithographic machines in MATLAB Simulink, adhering to MAAB guidelines, which led to a 20% improvement in simulation accuracy and ensured high-fidelity results.
* Designed and implemented **control strategies for closed loop simulations** of lithographic machine subsystems, ensuring alignment with system requirements and enhancing overall performance.
* Generated optimized **C/C++ code** from Simulink models for integration into Software-in-the-Loop (SIL) frameworks, bridging high-level modeling with embedded software testing.
* Analyzed low-level code to extract functionality and implemented equivalent behavior in high-level Simulink models, improving model accuracy and system understanding.
* Conducted in-depth **requirements analysis** and translated system requirements into actionable user stories in JIRA, aligning team deliverables with stakeholder expectations and boosting team productivity.
* Enhanced software reliability through **Model-in-the-Loop (MIL)** and **Software-in-the-Loop (SIL)** testing within the V-model, coupled with **TMap methodology**, ensuring compliance with industry standards.
* Automated model and machine interactions using **Python scripts**, reducing manual effort, increasing configurability, and improving testing efficiency by over 30%.
* Delivered key simulation features and comprehensive release notes under a rigorous three-month release plan, showcasing effective resource management and timely delivery of high-quality results.
* Leveraged **GitHub** for version control, **CI/CD** pipelines, and **Polarion** for maintaining requirements, design decisions, and other artifacts, promoting consistent project documentation and efficient collaboration.
* Collaborated with developers to expand the **BDD framework** for functional testing, improving test case accuracy and ensuring alignment with both business and system requirements.

Autonomous Valet parking system – Capgemini Automotive

* Enhanced the Stanley controller code, improving application performance, scalability, and reliability, significantly elevating the efficiency of the autonomous parking system within a short development lifecycle.
* Integrated PreScan scenarios with Autoware Auto using ROS for sensor simulation and autonomous driving logic, developing custom maps and routes to thoroughly test and validate vehicle behavior in varied environments.
* Configured and validated HIL setup by seamlessly linking PreScan, Autoware Auto, and the RCU, ensuring smooth operation, synchronization, and reliability of the entire autonomous driving system.
* Applied Scrum methodology throughout the project lifecycle, leveraging tools such as JIRA and GIT for agile project management and version control, while maintaining a solid understanding of Linux environments.

Digital twin project - Racetrack

* Contributed to the development and testing of a digital twin for a racetrack, enhancing Python-based virtual simulations for improved performance and accuracy, while utilizing 2D visualizations to depict car positioning.
* Developed comprehensive test plans, scripts, and use cases, ensuring thorough system evaluation, while adhering to Scrum methodology and utilizing JIRA and GIT for agile project management.

**Student Researcher | 03/2020 – 01/2021 | Arnhem, The Netherlands**  
**HAN Automotive Research Institute**

Autonomous docking manoeuvring of articulated vehicles in the presence of obstacles

* Developed and optimized a bi-directional path planning algorithm for autonomous docking of articulated vehicles in confined areas, using A\* search and lattice-based motion planning.
* Designed and improved motion primitive libraries to enhance computational efficiency and reduce final pose error in path planning.
* Implemented advanced heuristic functions incorporating spatial obstacle information for optimized path cost estimation.
* Integrated static and dynamic obstacle avoidance modules ensuring collision-free path generation, including consideration of moving vehicles with rectilinear motion.
* Conducted real-world benchmark tests at a distribution center using GPS-RTK to study and replicate driver maneuvers for realistic validation.
* Validated path planning and tracking algorithms in both simulation (MATLAB/Simulink) and scaled model environments to ensure robust performance.
* Applied kinematic vehicle modeling techniques to enable low-speed, precise maneuvering of articulated vehicles.
* Collaborated with HAN Automotive Research (HAN-AR) to advance automation in logistics through innovative Connected and Automated Transport (CAT) solutions.

**Early career: Design Engineer Researcher | 02/2016 – 09/2017 | Chennai, India**  
**Caresoft Global Private Limited**

ACADEMIC PROJECTS

**HAN-UAS, Arnhem, The Netherlands (Sep 2019 – Jan 2020)**Vehicle Vertical Dynamics Modeling and Analysis

* Developed a half-car vertical dynamics model in MATLAB/Simulink to analyse suspension performance.
* Derived and implemented the rear axle suspension system dynamics, combining air spring and leaf spring characteristics using differential equations.
* Conducted experimental validation through vehicle testing, including real-time data acquisition and post-processing to ensure model accuracy.
* Evaluated vertical dynamic response to determine the optimal speed for traversing road bumps, improving ride comfort and vehicle stability.

**HAN-UAS, Arnhem, The Netherlands (Sep 2019 – Jan 2020)**System Identification and Temperature Control Design

* Performed system identification using black-box and grey-box modeling techniques to determine the transfer function of a room temperature control system.
* Designed and implemented a feedback control system with specified transient and steady-state characteristics, ensuring precise temperature regulation.
* Validated system performance through simulation and experimental testing.

**Czech Technical University, Prague, Czech Republic (Mar 2019 – May 2019)**

Suspension System Design and Structural Analysis

* Engineered a rear-driven double-wishbone suspension system with helical springs for a saloon car, adhering to specified load and performance criteria.
* Simulated vertical dynamic response using a quarter-car model to analyze suspension behavior under bump negotiation scenarios.
* Conducted finite element analysis (FEA) on critical suspension components to evaluate stress distribution, deformation, and safety factors under operational loads.