

SINAN KARAHAN, Ph.D.

Robotics & Autonomy Engineering Leader | Localization, Navigation, Planning, Sensor Fusion & Control

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EXECUTIVE PROFILE

Technical and organizational leader with 25+ years of experience in autonomous driving, robotics, spacecraft guidance/navigation/control, sensor fusion, localization, path planning, control, simulation, machine learning, and embedded algorithm deployment. Proven record leading multidisciplinary engineering teams and delivering production systems that integrate software with GNSS, IMU, LiDAR, camera, radar, wheel odometry, actuators, and other hardware. Deep expertise in Bayesian estimation, Kalman filtering, map matching, sensor calibration, motion algorithms, optimization, and robotics software using C++, ROS, and ROS2.

CORE LEADERSHIP & TECHNICAL STRENGTHS

People Leadership & Team Development | Robotics Software Roadmaps | Localization & Navigation | Path and Trajectory Planning | Sensor Fusion & State Estimation | Controls & GNC | ROS/ROS2 | C++ | Simulation & Validation | Hardware-Integrated Software | Cross-Functional Delivery | GNSS/IMU/LiDAR/Camera/Radar Fusion | Kalman, Extended, Unscented & Particle Filters | Sensor Calibration | Functional Safety

PROFESSIONAL EXPERIENCE

Gatik, Inc. — Santa Clara, CA

Sep 2024–Present

Technical Lead, Localization

- Lead localization products for autonomous trucks, including navigation software that fuses GNSS, IMU, LiDAR, camera, and wheel-odometry inputs.
- Developed and deployed a navigation Kalman filter with lane-level localization, wheel odometry, and map matching.
- Use ROS and ROS2 to collect and analyze data for characterization and validation of sensor-fusion, localization, and map-matching performance.
- Develop Extended and Unscented Kalman filters, estimation algorithms, and sensor-calibration methods for production autonomy systems.

Karahan Consulting — Menlo Park, CA

Nov 2023–Aug 2024

President

- Provided engineering consulting in robotics, navigation, sensor fusion, sensor calibration, filtering and estimation, control systems, GNC, space systems, AR/VR, and autonomous driving.

E-Space, Inc. — Los Gatos, CA

Aug 2022–Aug 2023

Director, GNC Sensor / Actuators Design

- Technical lead and Director for spacecraft sensors and actuators supporting navigation, guidance, and attitude control.
- Selected, tested, and deployed IMU, magnetometer, and GNSS sensors for a commercial communications satellite; led characterization and validation of sensor performance.
- Developed attitude-control and estimation algorithms, navigation actuators, and sensor bias/temperature calibration methods.
- *Management scope:* This was an individual contributor role at the equivalent level of Director/Principal Engineer level. There were no direct reports, and no hiring responsibilities. There was complete roadmap and resource ownership GNC Sensor hardware and algorithms.

TDK InvenSense — San Jose, CA

Apr 2019–Aug 2022

Director, Algorithms

- Directed an algorithm team of Ph.D.- and M.S.-level engineers delivering sensor fusion, machine learning, filtering, estimation, calibration, and related product-development programs.
- Led development and release of motion, sensor-fusion, calibration, and activity-detection algorithms for handheld devices, wearables, robots, and industrial sensor applications.
- Delivered a random-forest machine-learning solution for Industry 4.0 acoustic/vibration sensing that improved wafer-dicing defect detection by 100%.
- *Management scope:* Number of direct reports: 12 engineers with all PhD/Masters degrees, two managers. Was responsible for hiring, performance reviews, promotions, mentoring, staffing, resource allocation, roadmap planning, and milestone ownership.

XMotors.ai / Xiaopeng Motors — Mountain View, CA

Feb 2018–Mar 2019

Principal Research Scientist, Autonomous Driving / Team Lead

- Led a 20-engineer autonomous-driving team responsible for sensor fusion, perception, path planning, navigation, and control; oversaw implementation and vehicle testing.
- Developed and deployed loosely and tightly coupled GNSS-IMU fusion Kalman filters with map matching.
- Developed radar, LiDAR, and camera-fusion Kalman-filter solutions for perception systems.

- *Management scope*: Technical leader of 20 engineers. The position did not involve hiring, performance management. Roadmap and resource ownership, and delivery accountability for the autonomous vehicle design in terms of sensor fusion, navigation, perception, control, and deployment of the architecture on hardware platforms.

SF Motors / Seres — Sunnyvale, CA

May 2017–Feb 2018

Lead Research Scientist, Autonomous Driving

- Lead development of autonomous-driving sensor fusion, perception, and localization using IMU, camera, radar, LiDAR, and map data.
- Tested solutions on prototype vehicles.
- Developed path-planning and navigation algorithms for lane changing and lane following using model predictive control.
- Developed and tested simulation engines for autonomous-driving systems.
- Completed ISO 26262 functional-safety certification

Carbon Robotics, Inc. — San Francisco, CA

Jan 2017–May 2017

Director of Robotics and Algorithms

- Developed kinematic and dynamic robotics algorithms for sensor fusion, navigation, trajectory planning, control, and vision for industrial robots.
- Built, tested, and released algorithms using 3D animation tools, ROS/ROS2, and OpenCV.
- *Management scope*: 3 direct reports. Position involved hiring/team development, roadmap ownership, and cross-functional delivery responsibilities.

NextInput, Inc. — San Jose, CA

Jul 2016–Jan 2017

Software Architect - Algorithm Lead Engineer

- Developed mobile device touch-sensing and nonlinear response-correction algorithms in C++ and deployed them on hardware.

Nixie, Inc. — Palo Alto, CA

Apr 2016–Jul 2016

Software Architect - Algorithm Lead Engineer

- Developed and deployed camera/IMU-based quadcopter navigation and Kalman-filter algorithms on drone hardware.

InvenSense, Inc. — San Jose, CA

Oct 2012–Apr 2016

Principal Engineer and Director, Advanced Algorithms

- Lead algorithm development for motion, sensor fusion, calibration, quadcopters, handheld devices, wearables, and other embedded sensor applications; deployed features across multiple products.
- Invented embedded sensor-calibration algorithms delivering significant gains in accuracy, speed, size, power consumption, and memory footprint.
- Developed 6-axis and 9-axis Kalman-filter sensor-fusion algorithms and indoor-location solutions using particle filters, map matching, Wi-Fi/Bluetooth beacons, pedestrian dead reckoning, and GPS.
- Filed 9+ patent applications related to sensor fusion and calibration.
- *Management scope*: Number of direct reports: 4. Position involved hiring/performance responsibilities, roadmap planning, staffing, resource allocation, and delivery milestones.

Apple, Inc. — Cupertino, CA

Nov 2010–Jan 2012

Research Scientist / Motion Algorithms Lead

- Developed and deployed 9-axis Kalman-filter sensor-fusion algorithms on iPhone using gyroscope, accelerometer, and magnetometer inputs in C++ on iOS platform.
- Developed compass-calibration algorithms and implemented Core Motion / Core Location API features for orientation, sensor data, sensor fusion, gyroscope, and compass calibration.

EARLIER EXPERIENCE

Principal Algorithm Scientist, Sensor Platforms | Principal Research Scientist, NASA Ames & University of California | Consultant/Advisor, Spence Engineering Services | Principal Algorithm Engineer, Sensys Instruments / ThermoWave | Spacecraft Engineer, Octant Technologies | Robotics Software Engineer, The Motion Factory | Simulation Group Leader / Principal Software Engineer, Integrated Systems | Adjunct Professor, Robotics, Santa Clara University

EDUCATION

- Ph.D., Mechanical Engineering, University of California, Davis — nonlinear systems, scientific computation, control theory, estimation/filtering, robot kinematics/dynamics, optimization, probability, and statistics.
- M.S., Mechanical Engineering, University of California, Davis
- B.S., Mechanical Engineering, Middle East Technical University

ADDITIONAL LEADERSHIP, PATENTS & PROFESSIONAL ACTIVITIES

- Board of Advisors: TuringSense; Lumo Body Tech.
- 9+ patent applications in sensor fusion and calibration.
- IEEE Life Member; ASME Member; Industrial Vice Chair, IFAC Symposium on Nonlinear Control Systems.