

Sinan Karahan

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Summary

Accomplished technical leader with extensive experience leading research teams for Autonomous Driving, Robotics, Sensor Fusion, Perception, Navigation, Path Planning, Control, Simulation and Machine Learning.

Strong background in Sensor Fusion, Sensor Calibration, Motion Algorithms, Filtering and Estimation, Signal Processing, Optimization, Robotics, and Autonomous Driving. Expert in Bayesian Filtering and Estimation algorithms such as Kalman Filters, Unscented Filters, and Particle Filters.

Work Experience

Gatik, Inc.

Mountain View, California

TECHNICAL LEAD, MAPPING AND LOCALIZATION

September 2024 - Present

- Technical Lead of Mapping and Localization products for Autonomous Driving.
- Implementing localization and navigation software fusing GNSS, IMU, Lidar, Camera and Wheel Odometry sensors for autonomous trucks.
- Collect and analyze data using ROS and ROS2 for characterization and validation of sensor fusion, localization and map matching.
- Developing Extended and Unscented Kalman Filters and estimation algorithms.
- Developing sensor calibration algorithms.

Karahan Consulting

Menlo Park, CA

PRESIDENT

November 2023 - August 2024

- Engineering consulting services on Robotics, Navigation, Sensor Fusion and Sensor Calibration, Kalman Filtering, Estimation, Control Systems, GNC, Space, AR/VR and Autonomous Driving Applications.

E-Space, Inc.

Los Gatos, California

DIRECTOR OF GNC SENSOR / ACTUATORS DESIGN

August 2022 - August 2023

- Technical lead and director of Sensors and Actuators for spacecraft navigation, guidance and attitude control.
- Selected, tested and deployed IMU, Magnetometer, GNSS sensors for a commercial communications satellite. Collected and analyzed data for characterization and validation of sensors.
- Developed attitude control and estimation algorithms, actuators for navigation and attitude stabilization.
- Developed bias and temperature calibration algorithms for sensors.

TDK InvenSense

San Jose, CA

DIRECTOR, ALGORITHMS

April 2019 - August 2022

- Director of the Algorithm team. Lead PhD-MS level engineers in Sensor Fusion, Machine Learning, Filtering, Estimation, and related product development efforts.
- Directed and developed motion, sensor fusion, calibration, activity detection algorithms for handheld devices, wearable devices and advanced technologies for sensor applications. Released several versions on Motion Sensors, Robots and other industrial devices.
- Developed Machine Learning algorithm for Industry 4.0 smart factory projects based on acoustic and vibration sensors. Successfully implemented a random forest-based ML solution and improved wafer dicing defect detection by 100%.

XMotors.ai - Xiaopeng Motors

Mountain View, CA

PRINCIPAL RESEARCH SCIENTIST, AUTONOMOUS DRIVING

February 2018 - March 2019

- Team Lead of 20 engineers. Lead and oversaw implementation of Sensor Fusion, Perception, Path Planning, Navigation, Control of Autonomous Vehicles. Deployed and tested the features on multiple test vehicles.
- Developed and deployed loosely and tightly coupled GNSS-IMU fusion Kalman Filter algorithms with map-matching.
- Developed Kalman Filters for perception solutions including radar, LIDAR, and camera fusion.

SF Motors - Seres

Sunnyvale, CA

LEAD RESEARCH SCIENTIST, AUTONOMOUS DRIVING

May 2017 - February 2018

- Lead Scientist and Team Lead for building autonomous driving applications of sensor fusion + perception + localization using IMU, Camera, Radar, LIDAR sensors along with Map fusion. Tested the solutions and prototype vehicles.
- Developed Path Planning and navigation algorithms for lane changing, lane following with Model Predictive Control.
- Developed and tested simulation engines for autonomous driving.
- ISO-26262 certified: "Road vehicles – Functional safety".

Carbon Robotics, Inc.

San Francisco, CA

DIRECTOR OF ROBOTICS AND ALGORITHMS

January 2017 - May 2017

- Developed kinematic and dynamic robot algorithms for Sensor Fusion, Navigation, Trajectory Planning, Control, and Vision for industrial robots.
- Built, tested and released the algorithms in 3D animation tools, ROS and ROS2, and OpenCV.

NextInput, Inc.

SOFTWARE ENGINEER

San Jose, CA

July 2016 - January 2017

- Developed touch sensing and nonlinear touch response correction algorithms for pressure-sensitive touch screens in C++.
- Built the algorithms and deployed in experimental hardware.

Nixie, Inc.

SOFTWARE ENGINEER

Palo Alto, CA

April 2016 - July 2016

- Developed quadcopter / drone navigation algorithms for camera and IMU based drone navigation.
- Implemented a Kalman Filter for the navigation and deployed the solution on the drone hardware.

InvenSense, Inc

PRINCIPAL ENGINEER AND DIRECTOR, ADVANCED ALGORITHMS

San Jose, CA

October 2012 - April 2016

- Algorithm Team Lead and Director.
- Project lead for motion, sensor fusion, calibration algorithms for handheld devices, wearable devices, quadcopters and other sensor applications. Successfully deployed the features on several products.
- Invented and implemented sensor calibration algorithms targeting embedded platforms. Algorithms provided breakthrough performance in terms of accuracy, speed, size, power consumption and memory footprint.
- Developed and implemented 6-axis and 9-axis Kalman Filter sensor fusion algorithms (accelerometer, gyroscope, magnetometer) to enable motion sensing applications.
- Developed Indoor location applications using Particle Filters, Map Matching, Wi-fi/Bluetooth Beacons, Pedestrian Dead Reckoning and GPS.
- 9+ patent applications filed on sensor fusion and calibration features.

Apple, Inc

RESEARCH SCIENTIST / MOTION ALGORITHMS LEAD

Cupertino, CA

November 2010 - January 2012

- Developed first ever 9-axis Kalman Filter / Estimation sensor fusion algorithms on the iOS / iPhone platform using gyroscope, accelerometer and magnetometer sensors in C++. Deployed the 9-axis sensor fusion algorithms on the iPhone.
- Developed intelligent compass calibration algorithms using magnetometer measurements, and device attitude estimates in C++.
- Implemented iOS CoreMotion / CoreLocation API features for accessing device orientation, sensor data, sensor fusion results, gyroscope and compass calibrations.

Sensor Platforms, Inc.

PRINCIPAL ALGORITHM SCIENTIST

San Jose, CA

April 2009 - November 2010

- Developed gyro-free sensor fusion solution with Unscented Kalman Filters that provided breakthrough performance.
- Technology development included Kalman Filtering, signal processing, modeling of complex dynamic systems, and nonlinear optimization.
- Implemented sensor calibration algorithms that enabled extremely accurate tracking.
- Deployed sensor fusion and calibration algorithms on the hand-held device with ARM Cortex M3 platform.

NASA AMES & University of California

PRINCIPAL RESEARCH SCIENTIST

Moffett Field, CA

June 2006 - September 2009

- Lead a team on NASA / University of California collaboration for civilian Air Traffic Control under NASA's Airspace Systems Program.
- Developed and deployed models of air traffic flow interacting with convective weather activity. Designed simulation, control and optimization algorithms for minimizing the impact of convective weather on air traffic flow. Published results in related journals
- Built and managed a team of six engineers for the computational simulation software development for air traffic flow and control models.

Spence Engineering Services

CONSULTANT/ADVISOR

Fremont, CA

January 2004 - June 2006

- Developed models in MATLAB, Simulink, and C++ for Motor Drive Electronics, Sensors, Attitude Dynamics, Gyroscope, and Orbit Models for the Space Based Infrared Telescope satellite payload system. Integrated, tested and debugged the models in a complex hardware-in-the-loop simulation setup.
- Key contributor to the development, implementation, and troubleshooting of complex dynamics and hardware models and components of the satellite.

Sensys Instruments and ThermoWave, Inc.

SENIOR ALGORITHM ENGINEER

Fremont, CA

April 2001 - October 2003

- Developed numerical algorithms in MATLAB and C++ for processing optical data and performing film layer and grating structure measurements on wafers for integrated metrology instruments.
- Implemented computational algorithms in C++ for solving electromagnetic and optical equations, interpolation and optimization of nonlinear multi-variate functions, signal processing, and statistical calculations.
- The startup Sensys Instruments was acquired by ThermoWave on December 2001.

Octant Technologies, Inc.

SPACECRAFT ENGINEER

San Jose, CA

January 1999 - April 2001

- Designed and developed Spacecraft/Satellite dynamics simulation models, Orbital Dynamics Models, Feedback Controllers, Kalman Filters, Nonlinear Estimators, and Monte-Carlo simulations.
- Implemented complex mathematical models in Simulink, MATLAB and Matrixx. Performed analysis, design and validation on dynamic models.

The Motion Factory, Inc.

SOFTWARE ENGINEER

San Jose, CA

March 1998 - December 1998

- Developed kinematic and dynamic robot models for game development and character animation tool in C++.
- Built the algorithms in 3D animation tools and OpenCV.

Integrated Systems, Inc.

SIMULATION GROUP LEADER / PRINCIPAL SOFTWARE ENGINEER

Santa Clara, CA

June 1990 - February 1998

- Project and technical lead of the software development team (5 developers). Mentored developers, interviewed and hired candidates. Managed all levels of development including coding, debugging, testing, beta, and production.
- Designed and implemented numerical integration algorithms for the solution of differential equations and for linearizing nonlinear models. Implemented the algorithms in C and C++ for simulation and modeling of continuous and discrete-event dynamic systems.

Santa Clara University

ADJUNCT PROFESSOR

Santa Clara, CA

September 1989 - June 1990

- Taught graduate-level Robotics course in the Electrical & Electronics Engineering department.
- Quarter 1: Robot Kinematics and Dynamics, Quarter 2: Robot Control, Quarter 3: Robot Trajectory Planning.

Advisory Roles

TuringSense, Inc. <http://www.turingsense.com>

Los Gatos, California

MEMBER: BOARD OF ADVISORS

August 2022 - August 2023

- Developed kinematics based tennis motion and arm swing detection application using IMU sensors.

Lumo Body Tech, Inc.

MEMBER: BOARD OF ADVISORS

San Jose, CA

April 2019 - August 2022

- Built running exercise sensors suite with step and calorie counting using IMU sensors.

Honors & Awards

1995 **Earle C. Anthony Fellowship**, University of California

Davis, CA

1981-1984 **Teaching Assistantship**, University of California

Davis, CA

1981-1989 **Tuition Fellowship**, University of California

Davis, CA

Presentations

SXSW 2018

Austin, TX

HOW FUTURE TECH WILL SHAPE OUR ENGAGEMENT WITH OTHERS

March 14, 2018

- AI technology has started an innovation which may change the way we engage with others in the future. We may find ourselves socializing with more than other human beings. Learn from some of China's top AI marketers about the future interactions of us. [Link](#)

Education

University of California

Davis, CA

PHD, MECHANICAL ENGINEERING

1984 - 1989

- Dissertation title: "Approximate Linearization of Nonlinear Systems."
- Study focus areas: Scientific computation; classical, modern, and nonlinear, control theory; estimation and filtering including Kalman Filters; kinematics, dynamics and control of robots; optimization; probability and statistics.

University of California

Davis, CA

M.S., MECHANICAL ENGINEERING

1981 - 1983

Middle East Technical University

Ankara, Turkey

B.S., MECHANICAL ENGINEERING

1973 - 1979

Professional Activities and Memberships

International Federation of Automatic Control

Monterey, CA

INDUSTRIAL VICE CHAIR, SYMPOSIUM ON NONLINEAR CONTROL SYSTEMS

Aug. 23-25, 2016

- Organized Industrial relations and activities for the conference: https://www.math.ucdavis.edu/static/conferences/nolcos_2016/

Institute of Electrical and Electronics Engineers (IEEE)

LIFETIME MEMBER

American Society of Mechanical Engineers (ASME)

MEMBER

Sigma Xi, the Scientific Research Society

MEMBER