

# dheeravenkatraman

robotics | perception | machine learning | github: dheera | dheera@dheera.net

## objective

Explore disruptive innovations in generative AI, large language models (LLMs), machine learning, and computer vision. Strong interests in applications of the above to robotics, sustainability, and society. Interested in entrepreneurship and Asia development. US citizen.

## education

### Massachusetts Institute of Technology (MIT)

Ph.D. Electrical Engineering 2015 | M.Eng. EE 2007 | S.B. Physics 2007 | S.B. EECS 2006

## skills

<b>Human Languages</b>	English, Chinese/Mandarin, and basic level German
<b>Computer Languages</b>	Python, C, C++, JavaScript/NodeJS, Java, SQL, HTML, CSS, LaTeX
<b>Frameworks</b>	PyTorch, ROS, ROS2, OpenCV, TensorFlow, Flask, Tornado, Express, NumPy, SciPy
<b>Algorithms</b>	Diffusion models for generative AI, neural radiance fields (NeRF), object detection, segmentation, denoising, monocular depth estimation, classical machine learning techniques, sensor fusion, path planning
<b>Hardware</b>	Prototyping simple robots with readily-available hardware components and actuators, system architecture and design, microcontrollers, basic DIY EE skills, basic 3D printing design skills, optics and imaging

## selected recent experience

### Amazon Web Services (AWS) | Principal Applied Scientist | Santa Clara, CA, USA | 2022-present

Computer vision research involving generative AI, diffusion models, and neural radiance fields (NeRF). Prior to that, worked on vision-based mapping and localization algorithms for robotics.

### Freedom Robotics | Robotics Software Engineer | San Francisco, CA, USA | 2020-2022

Architected/implemented the on-prem part of an enterprise robot monitoring and management solution currently deployed with a top 10 auto manufacturer. Brought the solution from proof-of-concept, which brought the startup its largest contract to date, and followed through to implementation and post-deployment improvements. Developed integrations for multiple brands of industrial AGVs.

### Robby Technologies (Y Combinator S16) | Co-Founder and CTO | Palo Alto, CA, USA | 2016-2020

Scaled the company from hand-building the first few robots to leading a team of engineers to design, manufacture, and deploy a fleet of autonomous sidewalk delivery vehicles in the Bay Area. Implemented a full perception stack including object detection, segmentation, and tracking and associated data collection and training pipelines. Designed and implemented a novel, robust semantic localization algorithm.

### MIT RLE Optical and Quantum Communications Group | Research Assistant | Cambridge, MA, USA | 2007-2014

Ph.D. research. Responsible for the experimental implementation of a single-photon LIDAR that was published in Science. Also constructed an optical coherence tomography experiment to de-bunk claims that certain advantages of quantum OCT were necessarily quantum, by implementing an unconventional classical setup that also achieved the purported "quantum" advantages.

### MIT-China Innovation and Entrepreneurship Forum (MIT-CHIEF) | Founding Team Member and Technology Director | 2011-2013

Responsible for technical conference infrastructure and logistics for the first 2 years, including a database-backed website, registration system, on-site kiosk displays, bilingual marketing and conference materials, video production, photography, and graphic design.

## a few of my side projects ...

**ROSshow/ROSboard:** Visualize ROS topics and sensor data (including PointClouds!) using ASCII art and streamed to a web browser

**Numerous contributions to the ROS ecosystem** including C++ drivers for multiple popular sensors and motor drivers

**Clubsearch.io:** Reverse-engineered the Clubhouse internal API and built a multi-lingual Clubhouse room search engine

**DIY camera-based ADAS / lane keep system** implemented on an actual car from scratch (NVIDIA AGX Xavier-based) (not comma.ai!)

**Astrophotography denoising** with neural networks to reduce the length of my imaging sessions

**Indoor self-driving trash can robot** to reduce the number of trash cans I need at home (LIDAR SLAM-based)

**BotParty:** Built 10 WebRTC-based telepresence robots for <\$120 in parts each, for telepresence gatherings during the COVID pandemic

**Digital 4x5 back Gigapixel camera** that scans and auto-stitches the image plane of a 4x5 view camera with an IMX477 sensor

**Luxo:** A servo-activated robotic Pixar lamp that actually jumps

**High-res, wide angle thermal landscapes** to visualize geological forces at work in Iceland