Allen Zeng

AI & Machine Learning Software Engineer

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Experience

Toyon Research Corporation Jan 2018 — Present

Senior AI/ML Software Engineer — Algorithms & Applied Research

Leadership and Project Management

- Secured and managed two Small Business Innovation Research (SBIR) contracts worth **$280k**.
- Currently overseeing research, development, and execution of a **Phase 2 SBIR worth $1.8M**.
- Led cross-functional teams of 2–5 engineers, mentoring junior developers and supervising interns.
- Presented 50+ technical briefings to customers and authored comprehensive scientific reports.

Satellite-based Pattern-of-Life Analysis

- Developed and optimized an **Oriented-RCNN model** for object detection and classification in gigapixel-scale ($\geq 30k \times 30k$ px) satellite images, recognizing objects 5-500 meters in size.
- Designed and implemented a Siamese network for object re-identification and tracking over time.
- Created **SatLabeler**, a high-performance labeling tool for EO and SAR images, used to create and verify **200k+ object annotations** without tiling.
- Automated CI/CD pipelines and defined devcontainers for scalable labeling, training, and inference.
- Successfully delivered the software product as an AWS cloud container for customer use.

Autonomous Ground Robot Mapping and Semantic Understanding

- Built a human-in-the-loop panoptic segmentation pipeline using a Segment Anything Model (SAM) to label 600+ GB of LIDAR and video data.
- Benchmarked 3D object detection models such as PointPillars and TR3D, optimizing for deployment.
- Developed a real-time **3D plane detection and meshing algorithm**, compressing 5.2 million points/sec LIDAR point clouds into 1 MB/room 3D models.

Augmented Reality Tracking of Handheld Tools

- Trained and deployed a 6-DOF **pose estimation** CNN for real-time handheld tool tracking on a Microsoft HoloLens 2, using Unity Barracuda and ONNX.
- Generated synthetic training data via **3D reconstruction** of Azure Kinect RGB-D imagery, and rendering textured 3D models on to randomized backgrounds.

WellMind Sep 2021 — Jun 2022

Cofounder — Software

- Developed a personalized behavioral solution for mild-to-moderate depression and anxiety, leveraging smartwatch health data and explainable AI; founded by UCSD NEATLabs and Rady MBA students.
- **1st Overall** and **1st in Social Impact** at StartR Demo Day, out of 21 teams. 1st in Audience Choice and 2nd Most Promising Venture at Rady Lab-to-Market Incubator, of 30 teams.
- Secured **$10k in pre-seed funding** through grants and startup pitch competitions.

Education

University of California, San Diego Sep 2020 — Jun 2022

Electrical and Computer Engineering, M.S. GPA: 3.9

- Specialization: Intelligent Systems, Robotics, and Control
- MicroMBA in Technology Management and Entrepreneurism

University of California, Berkeley Aug 2014 — Dec 2017

Electrical Engineering and Computer Science, B.S.

Skills

Libraries/Tools	`PyTorch, NumPy, Matplotlib, OpenCV, Open3D, Shapely, Git, Docker, CuPy`
Languages	`Python, C++, MATLAB, Bash`
Technologies	Deep Learning, Convolutional Neural Networks (CNNs), Vision Transformers (ViT), Large Language Models (LLMs), Geometric Computer Vision, Structure From Motion (SFM)