Allen Zeng

Computer Vision & AI/ML 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

- Led cross-functional teams of 2–4 software and hardware engineers, and supervised labeling interns.
- Wrote, won, and managed 2 Small Business Innovation Research (SBIR) contracts worth **$280k**.
- Presented 50+ monthly briefings to customers, and authored interim and final technical reports.

Satellite-based Pattern-of-Life: Object Detection, Classification, and Matching

- Trained an Oriented-RCNN model with PyTorch and MMRotate to find aircraft and ships in gigapixel satellite images ($\geq 30k \times 30k$ px), tagging detected objects with oriented bounding boxes.
- Utilized a Siamese architecture to match objects across images, tracking their movements over time.
- Created *SatLabeler* for **labeling over 200k objects** in EO and SAR satellite images without tiling.
- Defined devcontainers and CI/CD processes for the labeling, training, and inference libraries.

Autonomous Ground Robot Mapping and Semantic Understanding

- Developed a plane detection and low-polygon modeling algorithm for colored point cloud data, which compresses **5.2 million points/sec into 1 MB/room** polygon mesh 3D models.
- Implemented a Segment Anything Model and human-in-the-loop data labeling program to label over 600 GB of video and LIDAR data, producing panoptic segmentation masks for subsequent training.
- Compared the application of various 3D object detectors, training models like PointPillars and TR3D.

Augmented Reality Tracking of Handheld Tools

- Trained a 6-DOF pose estimation CNN for tracking dynamically-moving handheld tools, **deployed on a HoloLens 2** augmented reality (AR) headset with Unity Barracuda and ONNX.
- Generated training data by imaging tools with an Azure Kinect RGB-Depth camera, performing object 3D reconstruction and texturing, then rendering the 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 (solo pitch), out of 21 teams.
- **1st in Audience Choice** and **2nd Most Promising Venture** at Rady Lab-to-Market Incubator Final Pitch, out of 30 teams.
- Raised **$10k** in pre-seed from competitions and grants, not including private funding.

Education

University of California, San Diego Sep 2020 — Jun 2022

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

- Intelligent Systems, Robotics, and Control Specialization
- 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`
Languages	`Python, C++, MATLAB, Bash`
Technologies	Deep Learning, Convolutional Neural Networks (CNN), Vision Transformers (ViT), Diffusion Models, Geometric Computer Vision, Multi-Camera Calibration, Augmented/Virtual Reality