Eric Lee Turner

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OVERVIEW

Tech lead and manager with a strong background in research, algorithm development, and software engineering. Core areas of focus include AR/VR/XR, Surface Reconstruction, Depth Sensing, Foveated Rendering, Computer Graphics, Computational Geometry, SLAM, Multiview Stereo, Signal Processing, and Computer Vision.

EDUCATION

University of California - Berkeley
Ph.D. in Electrical Engineering and Computer Sciences — May 2015
M.S. in Electrical Engineering and Computer Sciences — May 2013

Carnegie Mellon University
B.S. in Electrical and Computer Engineering — May 2011
Minors in Physics, Computer Science

WORK EXPERIENCE

Google — 03/2016 - Present
Staff Software Engineer - XR Team
- Engineering Manager and Production Lead of XR World Geometry.
- Tech lead and manager for Depth Perception in AR, leading 20+ engineers on depth sensing, foveated rendering, and surface reconstruction.
- Tech lead for multiple ARCore features, including Depth API and Semantics API. Coordinated with 1P and 3P developers to use these APIs across 3500+ applications, including Google Maps LiveView, Snapchat, Tiktok, Facebook.
- Developed real-time passive depth sensing for off-the-shelf mobile hardware, enabling single-camera depth sensing up to 40 meters in range, expanding ARCore Depth API to 60+ meters in range.
- Tech lead on real-time 3D reconstruction techniques with noisy depth on smartphones.
- Integrated depth functionality for Portrait Mode in Pixel 3.
- Daydream AR/VR - Tech lead on foveated rendering techniques for mobile VR headsets, creating foveation API for VRCore.
- Developed custom hardware-foveation displays for VR.

Indoor Reality, Inc. — 06/2015 - 03/2016
Chief Technology Officer (CTO) and cofounder
- Principal Investigator (PI) on multiple federal grants totalling $2 Million.
- Tech lead in developing hardware, software, and algorithms used for automatic and rapid indoor building 3D modeling via backpack-mounted scanning system.
- Developed software for data collection, algorithmic processing, and visualization.
- Supervisor for visualization and deployment development team.

Signetron, Inc. — 07/2015 - 03/2016
Software Architect
- Algorithm and software development for rapid indoor modeling, automatic building energy audits, and virtual tours from handheld scanning system.
- Principal engineer on software and hardware development, including localization and 3D modeling algorithms.
- Supervisor for team of software engineers.

EECS Department - UC Berkeley — 01/2015 - 05/2015
Graduate Student Instructor
- Course EE 122: Introduction to Communication Networks

- Taught discussion sections, held office hours, graded homeworks/exams.

@Maps 08/2014 - 12/2014
Principal Engineer
- Developed hardware systems and surface reconstruction software algorithms for indoor building 3D modeling.
- Research and development of camera calibration procedures.

Speir Technologies 01/2013 - 01/2014
Software Development Consultant
- Developed prototype demo application and 3D modeling algorithms for remote viewing medical ultrasound scanning.
- Developed client-server model for remote medical scanning, sensor drivers interface, and 3D meshing techniques for live streaming of patient geometry.

MIT Lincoln Laboratory 05/2011 - 08/2011
Summer Intern - Group 104: Intelligence and Decision Theory
Developed algorithms for creation of synthetic test data for Synthetic Aperture Radar (SAR) Coherent Change Detection (CCD) track-finding.

ECE Department - Carnegie Mellon 01/2011 - 05/2011
Teaching Assistant
Course 18-391: Noisy Signal Processing
Wrote homework reference solutions, taught weekly office hours.

Qualcomm 05/2010 - 08/2010
Software Summer Intern - QCT Modem Integration Team
Developed/automated methodology for optimizing and removing redundancies in client specs of processor builds.

Flatirons Solutions 05/2008 - 08/2008
Summer Intern
Developed flight path modeling application for FAA. Wrote application to estimate cost/efficiency analysis for air traffic routes, interfaced with Google Earth.

RESEARCH EXPERIENCE

Video and Image Processing Lab - U.C. Berkeley 08/2011 - 05/2015
Ph.D. Graduate Student
3D and 2D surface reconstruction algorithms for architectural modeling. Automatic reconstruction of indoor building environments from LiDAR and imagery data on an ambulatory backpack-mounted scanning system. System hardware design and assembly, including developing sensor drivers and processing architecture. Analysis of building geometry for room-layout and energy efficiency modeling.

Spiral Project - Carnegie Mellon 08/2010 - 05/2011
Honors Research Undergraduate
Analysis of efficiency and error for Synthetic Aperture Radar (SAR) algorithm for logic-in-memory implementation.

Spiral Project - Carnegie Mellon 05/2009 - 08/2009
Summer Research Undergraduate
Implementation and analysis of search techniques for Spiral's code optimization engine. Developed genetic search algorithm for optimization of hardware-dependent software implementations of DCT, FFT, and Matrix Multiplication.

Robotics Institute - Carnegie Mellon 09/2008 - 12/2008
Research Assistant
Design of user interface for LiDAR scans exported from variety of autonomous robotic systems.

TECHNICAL SKILLS

Programming Languages: C/C++, Java, Python, Matlab, BASH, x86
Markup Languages: HTML, LaTeX, Markdown
Software: Unity, Visual Studio, Git, SVN
Frameworks: Eigen, Boost, OpenCV, OpenGL, GLSL, Halide, Qt, Android, Doxygen

AWARDS

Awarded Best Student Paper - GRAPP 2014 01/2014
9th International Joint Conference on Computer Vision, Imaging, and Computer Graphics Theory and Applications

Awarded NSDEF Fellowship 09/2013 - 05/2016
Funded by Office of Naval Research (ONR)

CMU Meeting of the Minds 05/2011
- Won First Place Lockheed Martin ECE Undergraduate Project
- Won Third Place CIT Honors Research Poster Competiton

PUBLICATIONS

Mind the GAP: Geometry Aware Passthrough Mitigates Cybersickness,CHI 2025

Learned Monocular Depth Priors in Visual-Inertial Initialization, ECCV 10/2022

DEPTHLAB: Real-Time 3D Interaction with Depth Maps for Mobile Augmented Reality, ACM UIST 10/2020

Depth from Motion for Smartphone AR, SIGGRAPH Asia 12/2018

Limits of Peripheral Acuity and Implications for VR System Design, Journal of Society for Information Display 2018

Sensitivity to Peripheral Artifacts in VR Display Systems, Society for Information Display 2018

Phase-Aligned Foveated Rendering for Virtual Reality Headsets, 25th IEEE Conference on Virtual Reality and 3D User Interfaces 03/2018

Foveated Pipeline for AR/VR Head-Mounted Displays, Information Display 11/2017

Identification of Energy Conservation Measures Towards Zero Carbon Building Energy Performance with the Rapid Building Energy Modeler and the Energy Analysis Engine, ZCB 2016 09/2016

Automatic Indoor 3D Surface Reconstruction with Segmented Building and Object Elements, Fifth Joint 3DV Conference 10/2015

3D Modeling of Interior Building Environments and Objects from Noisy Sensor Suites, Ph.D. Thesis, Department of Electrical Engineering and Computer

Sciences, University of California Berkeley 05/2015

Multistory Floor Plan Generation and Room Labeling of Building Interiors from Laser Range Data, Communications in Computer and Information Science 2014

Fast, Automated, Scalable Generation of Textured 3D Models of Indoor Environments, Journal of Selected Topics in Signal Processing 08/2014

Image-Based Position of Mobile Devices in Indoor Environments, Multimodal Location Estimation of Video and Images 2014

Floor Plan Generation and Room Labeling of Indoor Environments from Laser Range Data, GRAPP 2014 01/2014

Reduced-Complexity Data Acquisition System for Image Based Localization in Indoor Environments, IPIN 2013 10/2013

Image Based Localization in Indoor Environments, International Conference on Computing for Geospatial Research and Applications 07/2013

Watertight Planar Surface Meshing of Indoor Point-Clouds with Voxel Carving, Third Joint 3DV Conference 06/2013

Watertight Floor Plans Generated From Laser Range Data, Master's Thesis 05/2013

Inserted Simulated Tracks into SAR CCD Imagery, Society for Modeling & Simulation International (SCS) 2013 Autumn Simulation Multi-Conference (AutumnSim'12) 10/2012

Watertight As-Built Architectural Floor Plans Generated from Laser Range Data, 3DIMPVT 10/2012

Sharp Geometry Reconstruction of Building Facades Using Range Data, ICIP 2012 09/2012

Local Interpolation-based Polar Format SAR: Algorithm, Hardware Implementation and Design Automation, Japan Society for the Promotion of Science 06/2012

Polar Format Synthetic Aperture Radar in Energy Efficient Application-Specific Logic-in-Memory, ICASSP 2012 05/2012

Energy Efficient Application-Specific Logic-in-Memory for Interpolation in Synthetic Aperture Radar, High Performance Embedded Computing (HPEC) 09/2011

PATENTS

Surfel Reprojection of Semantic Data for Accelerated AR Perception, GP-304970-00-PCT September 2022

Achieving Metric Scale of the Face Using Phone Front-Facing Camera, GP-303816-00-US March 2022

Visual Inertial Odometry Initialization With Machine Learning Depth on

Mobile Devices, GP-303334-00-US October 2021

Merging Outdoor Building Facades into AR Depth Images, GP302840-00-PCT June 2021

Surfel-based Temporal Fusion for Depth Processing, GP-300969-00-PCT May 2020

PHASE ALIGNED FOVEATED RENDERING, Patent 17801804.0 - 1216 July 2019

DUAL-PATH FOVEATED GRPAHICS PIPELINE, Patent 17783618.6 - 1209 June 2019

EARLY SUB-PIXEL RENDERING, Patent 17778139.0 - 1210 June 2019

DEPTH FROM MOTION FOR SMARTPHONE AR, GP-203795-00-PR February 2019

METHODS FOR INDOOR 3D SURFACE RECONSTRUCTION AND 2D FLOOR PLAN RECOVERY UTILIZING SEGMENTATION OF BUILDING AND OBJECT ELEMENTS, Patent 10,127,718 November 2018

5DOF PHASE-ALIGNED FOVEATED RENDERING, GP-202593-00-US November 2017

LOW RESLUTION RGB RENDERING FOR EFFICIENT TRANSMISSION, GP-201053-02-US November 2016