

Zheng (Thomas) Tang

RESEARCH SCIENTIST · EXPERT IN COMPUTER VISION AND MACHINE LEARNING

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Summary

Current Research Scientist at Amazon - Amazon One · Ph.D. in Electrical & Computer Engineering at the University of Washington (Advisor: Prof. Jenq-Neng Hwang) · 9-month internship at NVIDIA working on city-scale vehicle tracking and ReID with papers accepted to CVPR'19 and ICCV'19 · Leader of the winning team at the 2nd AI City Challenge Workshop in CVPR'18 · Organizing committee member of the 4th AI City Challenge Workshop in CVPR'20 · 2 finalist best student paper awards in ICPR'16

Education

University of Washington (UW)

Seattle, WA, USA

PH.D. IN ELECTRICAL & COMPUTER ENGINEERING

Sep. 2014 - Jun. 2019

- Advised by Prof. Jenq-Neng Hwang (IEEE Fellow) at the Information Processing Lab
- Dissertation topic: Robust Video Object Tracking via Camera Self-Calibration

University of Washington (UW)

Seattle, WA, USA

M.S. IN ELECTRICAL ENGINEERING

Sep. 2014 - Mar. 2016

- GPA: 3.83/4.0

Beijing University of Posts and Telecommunications (BUPT)

Beijing, China

B.S. IN TELECOMMUNICATIONS ENGINEERING WITH MANAGEMENT (JOINT PROGRAMME)

Sep. 2010 - Jun. 2014

- GPA: 88.73/100

Queen Mary University of London (QMUL)

London, UK

B.S. IN TELECOMMUNICATIONS ENGINEERING WITH MANAGEMENT (JOINT PROGRAMME)

Sep. 2010 - Jun. 2014

- First Class Honours

Work Experience

Amazon

Seattle, WA, USA

RESEARCH SCIENTIST

Jul. 2019 - PRESENT

- Working on the research team for **Amazon One**, a fast and convenient identity service using people's palm for payment, entry and more
- Developed recognition algorithm of a **non-contact biometric identification system** for palm signatures captured using light of varying polarity

NVIDIA

Santa Clara, CA, USA

INTELLIGENT VIDEO ANALYTICS INTERN

Jun. 2018 - Mar. 2019

- Created **CityFlow**, a city-scale benchmark for multi-target multi-camera (MTMC) vehicle tracking and ReID, accepted at **CVPR'19 (Oral)**
- Proposed **PAMTRI**, a pose-aware multi-task network for vehicle ReID using highly randomized synthetic data, accepted at **ICCV'19**
- Joined the organizing committee of the **4th AI City Challenge Workshop** in **CVPR'20** that attracted 315 participating teams across 37 countries

University of Washington

Seattle, WA, USA

RESEARCH ASSISTANT

Jun. 2015 - Jun. 2018

- Developed evolutionary camera calibration and clustering-based data association for vehicle tracking using fusion of visual and semantic features that achieved rank #1 in **Track 1 (Traffic Flow Analysis)** of the **2nd AI City Challenge Workshop** in **CVPR'18**
- Designed multi-camera tracking based on fusion of adaptive appearance models, CNN features and license plate information that achieved rank #1 in **Track 3 (Multi-camera Vehicle Detection & ReID)** of the **2nd AI City Challenge Workshop** in **CVPR'18**
- Proposed multi-kernel vehicle tracking based on 3D deformable models that outperformed the state-of-the-art object tracking methods, selected as the winning method of **Track 2 (AI City Applications)** at the **1st AI City Challenge Workshop** in **SmartWorld'17**
- Developed a 3D human pose estimator to enable overlaying AR for medical simulation under 6-DoF camera motion, where a two-step evolutionary pose optimization for camera and humans (2EPOCH) is proposed (funded by ArchieMD Inc.)
- Implemented multi-view 3D tracking of soccer players and the ball that enabled real-time soccer analytics (funded by a startup company)
- Developed single-camera people tracking that is robust against occlusion and cluttered background to provide useful features for object ReID across multiple cameras (funded by Madrona Venture Group)

Prism Skylabs

San Francisco, CA, USA

ENGINEERING INTERN

Jul. 2015 - Aug. 2015

- Developed adaptive segmentation and tracking based on multi-kernel feedback that achieved top single-camera tracking accuracy (**74.82%**) on the **NLPR_MCT** benchmark
- Proposed evolutionary camera self-calibration from tracking of humans to automatically back project 2D trajectories into 3D, which received **2 Finalist Best Student Paper Awards** in **ICPR'16**

Teaching Experience

University of Washington

TEACHING ASSISTANT OF EE 508: STOCHASTIC PROCESSES IN ENGINEERING

Seattle, WA, USA

Mar. 2019 - Jun. 2019

- Designed topics for final projects, provided tutorials on hidden Markov model and held weekly office hours

Publications

JOURNAL ARTICLES

MOANA: An online learned adaptive appearance model for robust multiple object tracking in 3D

Zheng Tang, Jenq-Neng Hwang

IEEE Access 7.1 (2019) pp. 31934–31945. 2019

ESTHER: Joint camera self-calibration and automatic radial distortion correction from tracking of walking humans

Zheng Tang, Yen-Shuo Lin, Kuan-Hui Lee, Jenq-Neng Hwang

IEEE Access 7.1 (2019) pp. 10754–10766. 2019

Online-learning-based human tracking across non-overlapping cameras

Young-Gun Lee, Zheng Tang, Jenq-Neng Hwang

TCSVT 28.10 (2018) pp. 2870–2883. 2018

CONFERENCE PAPERS

The 4th AI City Challenge

Milind Naphade, Shuo Wang, David C. Anastasiu, Zheng Tang, Ming-Ching Chang, Xiaodong Yang, Liang Zheng, Anuj Sharma, Rama Chellappa, Pranamesh Chakraborty

Proc. CVPR Workshops, 2020, Virtual

PAMTRI: Pose-aware multi-task learning for vehicle re-identification using highly randomized synthetic data

Zheng Tang, Milind Naphade, Stan Birchfield, Jonathan Tremblay, William Hodge, Ratnesh Kumar, Shuo Wang, Xiaodong Yang

Proc. ICCV, pp. 211–220, 2019, Seoul, Korea

CityFlow: A city-scale benchmark for multi-target multi-camera vehicle tracking and re-identification

Zheng Tang, Milind Naphade, Ming-Yu Liu, Xiaodong Yang, Stan Birchfield, Shuo Wang, Ratnesh Kumar, David Anastasiu, Jenq-Neng Hwang

Proc. CVPR, pp. 8797–8806, 2019, Long Beach, CA, USA

Joint multi-view people tracking and pose estimation for 3D scene reconstruction

Zheng Tang, Renshu Gu, Jenq-Neng Hwang

Proc. ICME, pp. 1–6, 2018, San Diego, CA, USA

Single-camera and inter-camera vehicle tracking and 3D speed estimation based on fusion of visual and semantic features

Zheng Tang, Gaoang Wang, Hao Xiao, Aotian Zheng, Jenq-Neng Hwang

Proc. CVPR Workshops, pp. 108–115, 2018, Salt Lake City, UT, USA

Inter-camera tracking based on fully unsupervised online learning

Young-Gun Lee, Zheng Tang, Jenq-Neng Hwang, Zhijun Fang

Proc. ICIP, pp. 2607–2611, 2017, Beijing, China

Multiple-kernel adaptive segmentation and tracking (MAST) for robust object tracking

Zheng Tang, Jenq-Neng Hwang, Yen-Shuo Lin, Jen-Hui Chuang

Proc. ICASSP, pp. 1115–1119, 2016, Shanghai, China

Camera self-calibration from tracking of moving persons

Zheng Tang, Yen-Shuo Lin, Kuan-Hui Lee, Jenq-Neng Hwang, Jen-Hui Chuang, Zhijun Fang

Proc. ICPR, pp. 260–265, 2016, Cancún, México

Honors & Awards

2019 **People's Choice Award**, Code for the Kingdom (C4TK) Hackathon

Seattle, WA, USA

2018 **Winner of Track 1 (Traffic Flow Analysis)**, 2nd AI City Challenge Workshop in CVPR'18

Salt Lake City, UT, USA

2018 **Winner of Track 3 (Multi-camera Vehicle Detection & ReID)**, 2nd AI City Challenge Workshop in CVPR'18

Salt Lake City, UT, USA

2017 **Winner of Track 2 (AI City Applications)**, 1st AI City Challenge Workshop in SmartWorld'17

San Francisco, CA, USA

2016 **Finalist IBM Best Track 3 Student Paper Award**, ICPR'16

Cancún, México

2016 **Finalist Intel Best Track 3 Student Paper Award**, ICPR'16

Cancún, México

Skills

Programming	C/C++ (expert), Python (expert), Java (proficient), MATLAB (expert), JavaScript (proficient), \LaTeX (expert)
Frameworks & Tools	PyTorch (expert), TensorFlow (expert), MXNet (proficient), Caffe (proficient), Git (expert), React (proficient)
Languages	English (proficient), Mandarin (native), Cantonese (native), Spanish (elementary)