# Zheng (Thomas) Tang

Applied Scientist, Metropolis at NVIDIA · Expert in Computer Vision and Machine Learning

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## Summary

Current Applied Scientist, Metropolis at NVIDIA · Previous Research Scientist, Amazon One at Amazon (2019 - 2021) · Ph.D. in Electrical & Computer Engineering at the University of Washington · 9-month internship at NVIDIA with 2 papers accepted to CVPR'19 and ICCV'19 · 2 filed U.S. patents and 16 publications · Associate Editor of T-CSVT · Member of the Organizing Committee for the AI City Challenge Workshops in CVPR · Leader of the winning team at the 2nd AI City Challenge Workshop in CVPR'18 · Finalist of 2 Best Student Paper Awards at 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

**NVIDIA** *Redmond, WA, USA*

Applied Scientist, Metropolis *May 2021 - PRESENT*

- Researching in pose estimation and action recognition for pedestrians and vehicles to be deployed to traffic video analytics in smart cities
- Organizing the **AI City Challenge Workshops** in conjunction with **CVPR** that have attracted 1,000+ participating teams across 40+ countries

**Amazon** *Seattle, WA, USA*

Research Scientist, Amazon One *Jul. 2019 - May 2021*

- Worked on the research team that developed and launched **Amazon One**, an identity service using people's palm for payment, entry and more
- Invented a novel way to utilize various modalities of sensor data for automated user identification that was filed for a **U.S. patent**

**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 to **CVPR'19 (Oral)**
- Proposed **PAMTRI**, a pose-aware multi-task network for vehicle ReID using highly randomized synthetic data, accepted to **ICCV'19**

**University of Washington** *Seattle, WA, USA*

Research Assistant *Jun. 2015 - Jun. 2018*

- Built clustering-based vehicle tracking and camera self-calibration that won in **Track 1** of the **2nd AI City Challenge Workshop** in **CVPR'18**
- Developed multi-camera tracking from visual and semantic features that won in **Track 3** of the **2nd AI City Challenge Workshop** in **CVPR'18**
- Created a 3D human pose estimator to enable overlaying AR for medical simulation under 6-DoF camera motion (funded by ArchieMD Inc.)
- Proposed evolutionary camera self-calibration from tracking, a finalist of **2 Best Student Paper Awards** at **ICPR'16** (funded by Prism Skylabs)
- Invented adaptive segmentation and tracking with top accuracy (**74.82%**) on the **NLPR_MCT** benchmark (funded by Madrona Venture Group)

## Professional Service

**IEEE Transactions on Circuits and Systems for Video Technology (T-CSVT)** *Remote*

Associate Editor *Jan. 2021 - PRESENT*

- Promptly assigned papers for review and offered decisions that helped reduce decision-making time by **52.5 days** compared to 2019
- Provided active feedback to the editors on the innovation, coverage and quality of papers that supported the impact factor of **4.133**

# Selected 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
*T-CSVT* 28.10 (2018) pp. 2870–2883. 2018

## Conference Papers

The 5th AI City Challenge
Milind Naphade, Shuo Wang, David C. Anastasiu, Zheng Tang, Ming-Ching Chang, Xiaodong Yang, Yue Yao, Liang Zheng, Pranamesh Chakraborty, Christian E. Lopez, Anuj Sharma, Qi Feng, Vitaly Ablavsky, Stan Sclaroff
*Proc. CVPR Workshops*, pp. 4263–4273, 2021, 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

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

# Patents

Utilizing Sensor Data for Automated User Identification
Zheng Tang, Prithviraj Banerjee, Manoj Aggarwal, Gerard Medioni
U.S. Patent Application No. 17/209,845 (Pending), 2021

Neural Network System for Object Identification
Zheng Tang, Stan Birchfield, William Hodge, Ratnesh Kumar, Milind Naphade, Jonathan Tremblay, Shuo Wang, Xiaodong Yang
U.S. Patent Application No. 16/442,375 (Pending), 2019

# Honors & Awards

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| 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

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| **Programming** | Python (expert), C/C++ (expert), Java (proficient), JavaScript (proficient), MATLAB (expert), 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) |