Dr. Peter Tu

Chief Scientist, Computer Vision  
GE Research

**EDUCATION**

* D. Phil in Engineering Science (1995), Oxford University   
  [Area: Computer Vision]
* B. Sc. in Systems Design Engineering (1990), University of Waterloo

**RESEARCH EXPERIENCE**

In 1990 Dr. Tu joined Sony Research in Tokyo Japan, where he develeped a number of computer vision algorithms for man-machine interfaces. While at Oxford University, his research was devoted to the development of computer vision methods for the autumatic analysis of seismic imagery. In 1997 Dr. Tu became a senior research scientist working at General Electric’s Global Research center. In partnership with Lockheed Martin, he has developed a set of latent fingerprint matching algorithms for the FBI Automatic Fingerprint Identification System (AFIS). Dr. Tu has also developed optical methods for the precise measurement of 3D parts in a manufacturing setting. Dr. Tu was the principal investigator for the FBI ReFace project, which is tasked with developing an automatic system for face reconstruction from skeletal remains. In 2006, he was the principal investigator for the National Institute of Justice’s 3D Face Enhancer Program. This work was focused on improving face recogntion from poor quality surveillance video. In 2008, Dr Tu led the GE video analytics team that participated in the DHS STIDP demonstration program - the goal of STIDP is to establish an effective defence against suicide bomber attack. Dr Tu is the prinicipal investigator for the DARPA sponsored effort associated with group level behavior recognition at a distance. Currently Dr. Tu is a Chief Scientist for computer vision with a focus on multi-view video analysis with the aim of acheiving reliable behavior recognition in complex environments. He has helped to develop a large number analytic capabilities including: person detection from fixed and moving platforms, crowd segementation, multi-view tracking, person reacquistion, face modelling, face expression analysis, face recognition at a distance, face verification from photo IDs and articulated motion analysis. Dr Tu has over 75 peer reviewed publications and has filed more than 50 U.S. patents.

**SELECTED PATENTS AND PUBLICATIONS**

* **CLOUD TRACKING FOR SOLAR IRRADIANCE PREDICTION**   
  Ming-Ching Chang, Yi Yao, Guan Li, Yan Tong, Peter Tu   
  ICIP 2017
* **IN-BED PATIENT MOTION AND POSE ANALYSIS USING DEPTH VIDEOS FOR PRESSURE ULCER PREVENTION** Ming-Ching Chang, Ting Yu, Kun Duan Jiajia Luo, Peter Tu, Michael Priebe, Elena Wood, Max Stachura   
  ICIP 2017
* **Multi-Modal Sensor Fusion for Pressure Ulcer Wound Assessment and Care**   
  Ming-Ching Chang, Ting Yu, Peter Tu,   
  IEEE TRANS. ON INDUSTRIAL INFORMATICS SPECIAL SECTION ON MULTISENSOR FUSION AND INTEGRATION FOR INTELLIGENT SYSTEMS 2016
* **Crowd Analytics via One Shot Learning and Agent Based Inference**  
  Peter Tu, Ming-Ching Chang, Tao Gao   
  GlobalSip 2016
* **Efficient Large-scale Photometric Reconstruction Using Divide-Recon-Fuse 3D Structure from Motion**  
  Yueming Yang, Ming-Ching Chang, Longyin Wen, Peter Tu, Honggang Qi and Siwei Lyu   
  AVSS 2016
* **Cross-cultural training analysis via social science and computer vision methods**   
  Peter Tu, Jixu Chen, Ming-Ching Chang, Ting Yu, Tai-Peng Tian, Gabriela Rubin, Julia Hockett, Aubrey Logan-Terry   
  6th International Conference on Applied Human Factors and Ergonomics (AHFE 2015) and the Affiliated Conferences, AHFE 2015
* **A Live Video Analytic System for Affect Analysis in Public Space**  
  Jixu Chen, Ming-Ching Chang, Peter Tu   
  Face and Gesture, 2015
* **Video Surveillance: Past, Present, and Now the Future**   
  Fatih Porikli, François Brémond, Shiloh L. Dockstader, James Ferryman, Anthony Hoogs, Brian C. Lovell, Sharath Pankanti, Bernhard Rinner, Peter Tu, and Péter L. Venetianer , IEEE Signal Processing Magazine May 2013
* **Action Recognition from Experience.**   
  Peter Tu, Thomas Sebastian, Dashan Gao.   
  AVSS 2012.
* **A Systems Level Approach to Perimeter Protection**  
  Peter H. Tu, Ting Yu, Dashan Gao, Ram Nevatia, Sung Chun Lee, Hale Kim, Phill Kyu Rhee, and Joong-Hwan Baek   
  IEEE Workshop on the Applications of Computer Vision (WACV'12)
* **LPSM: Fitting Shape Models by Linear Programming**  
  JilinTu, Brandon Laflen, Xiaoming Liu, Musodiq Bello, Jens Rittscher and Peter Tu   
  FG 2011
* **Appearance-based person reidentification in camera networks: Problem overview and current approaches**   
  G. Doretto and T. Sebastian and P. Tu and J. Rittscher   
  Journal of Ambient Intelligence and Humanized Computing, pp. 1–25, Springer Berlin / Heidelberg, 2011.
* **Face Recognition at a Distance System for Surveillance Applications**  
  Frederick W. Wheeler, Richard L. Weiss and Peter H. Tu  
  BTAS 2010
* **Site-adaptive face recognition.**  
  Jilin Tu, Xiaoming Liu, and Peter Tu   
  BTAS 2010
* **Intelligent Video for Protecting Crowded Sports Venues.**  
  Nils Krahnstoever, Peter Tu, Ting Yu, Kedar Patwardhan, Don Hamilton, Bing Yu, Chris Greco, Gianfranco Doretto.  
  AVSS 2009
* **On Optimizing Subspaces for Face Recognition.**  
  Jilin Tu, Xiaoming Liu, and Peter Tu.  
  ICCV 2009
* **Automatic Facial Landmark Labeling with Minimal Supervision.**  
  Yan Tong, Xiaoming Liu, Frederick W. Wheeler, and Peter Tu.  
  CVPR 2009
* **Collaborative Real-Time Control of Active Cameras in Large-Scale Surveillance Systems.**  
  Nils Krahnstoever, Ting Yu, Ser-Nam Lim, Kedar Patwardhan, and Peter Tu.  
  In Proc. the Workshop on Multi-camera and Multi-modal Sensor Fusion Algorithms and Applications (M2SFA2) in conjunction with ECCVâ€™08, Marseille, France, Oct., 2008
* **Distributed Data Association and Filtering for Multiple Target Tracking.**  
  Ting Yu, Ying Wu, Nils Krahnstoever, and Peter Tu.  
  CVPR 2008
* **Unified Crowd Segmentation.**   
  Peter Tu, Thomas Sebastian, Gianfranco Doretto, Nils Krahnstoever, Jens Rittscher, Ting Yu, ECCV 2008
* **Boosted Deformable Model for Human Body Alignment.**  
  Xiaoming Liu, Ting Yu, Thomas Sebastian, and Peter Tu.  
  CVPR 2008

**AWARDS**

* Received British Overseas Research Scholarship
* Received ARCO British Benefaction Scholarship
* Awarded NSERC research scholarship
* Received the Sir Sanford Fleming award for highest overall academic

performance in Systems Design Engineering

* Awarded 3 upper year scholarships for ranking first in faculty
* Received APEO and University of Waterloo entrance scholarships