

# Teng-Yok Lee

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Software Development Engineer  
Amazon Web Services  
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## Research Interests

- Computer Graphics
- Scientific/Information Visualization
- Visual Analytics
- Image Processing
- HPC/GPGPU

## Education

**PhD, Computer Science & Engineering**  
*The Ohio State University*

Sep., 2005 – Dec., 2011  
Columbus, OH

Thesis: Data Triage and Visual Analytics for Scientific Visualization  
Advisor: Prof. Han-Wei Shen

**M.S., Computer Science & Information Engineering**  
*National Chiao Tung University*

Sep., 2000 – Jun., 2002  
Hsinchu, Taiwan

**B.S., Computer Science & Information Engineering**  
*National Chiao Tung University*

Sep., 1996 – Jun., 2000  
Hsinchu, Taiwan

## Experience

**Software Development Engineer**  
*Amazon Web Services*

Mar., 2013 – Present  
Seattle, WA

**Post Doctorate** (with Prof. Han-Wei Shen)  
*The Ohio State University*

Jan., 2012 – Feb. 2013  
Columbus, OH

- Design new visualization algorithms for flow visualization, including massive particle advection for large scale vector fields (published in IEEE TVCG, ACM/IEEE SC '12, and IEEE LDAH '12) and analysis of flow traces in time-varying vector fields.
- Design algorithms for efficient computation/compression/query of data statistics from large scale scientific data (published in IEEE LDAH '12 and DoE CoDA poster session).
- Develop advanced web-based visualization prototypes and feature tracking algorithms for scientists in Pacific Northwest National Laboratory
  - a. URL: <http://www.cse.ohio-state.edu/~leeten/PNNL/trunk/PNNL.html>
- Co-advise 3 junior PhD students for time-varying data visualization (published in IEEE LDAH '12), isosurface evaluation and selection by information theory (in progress), and interaction/rendering/ for word-cloud-based text visualization (presented in IEEE InfoVis '12 poster session).

**Research Aide** (with Dr. Tom Peterka)

Jun. - Aug., 2011  
Argonne, IL

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## *Argonne National Laboratory*

- Develop prototypes to compute information-theoretic statistics with scientific simulation codes (NEK5000 and FLASH) for situ data analysis.

### **Summer Graduate Intern** (with Dr. Fatih Porikli)

Jun. – Aug., 2008  
Cambridge, MA

## *Mitsubishi Electric Research Laboratories*

- Develop real time GPU algorithms for phase estimation and visualization of ultrasound videos for respiration-gated radiation therapy video analysis (1 US patent for the visualization system and 1 PacificVis paper for the visualization algorithm).

### **Summer Graduate Intern** (with Dr. Fatih Porikli)

Jun. – Sep., 2007  
Cambridge, MA

## *Mitsubishi Electric Research Laboratories*

- Develop real time image/video processing algorithms on GPU via nVidia CUDA, including background estimation (60x speed up), image registration with object tracking (60x speed up), SIFT, GPU-based radix sort (12x faster than qsort()), and block matching.

### **Graduate Research Associate** (with Prof. Han-Wei Shen)

Jan., 2006 – Dec., 2011  
Columbus, OH

## *The Ohio State University*

- Develop information-theoretic frameworks for flow visualization, including streamline placement and evaluation, and view-dependent flow visualization (published in IEEE TVCG and IEEE PacificVis '11).
- Design new visualization frameworks for time-varying data based on Time Activity Curves (TAC). Apply Dynamic Time Warping to detect salient patterns in TACs of scientific data, and extend it to detect multiple patterns in multivariate cases (published in IEEE PacificVis '09 and IEEE TVCG).
- Develop a new image-based volume rendering algorithm for unstructured grids, especially a GPU-based pipeline for data resampling, compression, and rendering (published in Eurographics VG '06).

### **Engineer**

## *Compal Electronics, Inc.*

Nov., 2004 – Aug., 2005  
Taipei City, Taiwan

- Develop application-layer video streaming software in C/C++ on Sony/Ericsson platform.

## **Awards**

### **Mike Liu Graduate Fellowship Award**

May 2011

One or more partial &/or full fellowship for full-time graduate students. Fellowship winners are chosen primarily for their academic merit and research achievements.

Columbus, OH

## Refereed Publications

1. **Exploring Flow Fields Using Space-filling Analysis of Streamlines**  
A Chaudhuri, **T.-Y. Lee**, H.-W. Shen, and R. Wenger.  
*IEEE Transactions on Visualization and Computer Graphics*, 20(10): 1392-1404, Oct., 2014.
2. **Efficient Range Distribution Query for Visualizing Scientific Data.**  
A Chaudhuri, T.-H. Wei, **T.-Y. Lee**, H.-W. Shen, and T. Peterka.  
In *PacificVis '14: Proceedings of the IEEE Pacific Visualization Symposium*, pp. 201-208, Yokohama, Japan, 2014 (acceptance rate: 29/99 = 29%).
3. **Efficient Local Statistical Analysis via Integral Histograms with Discrete Wavelet Transform.**  
**T.-Y. Lee** and H.-W. Shen.  
*IEEE Transactions on Visualization and Computer Graphics* (Special Issue for *IEEE SciVis '13*, acceptance rate: 31/126 = 24%), 19(12):2693-2701, Dec., 2013.
4. **Feature Tracking and Visualization of Madden-Julian Oscillation in Climate Simulation.**  
**T.-Y. Lee**, X. Tong, H.-W. Shen, P. C. Wong, S. Hagos, and L. Leung.  
*IEEE Computer Graphics and Applications* (Theme Issue on *Big Data Visualization*), 33(4): 29-37, 2013.
5. **Evaluating Isosurfaces with Level-set-based Information Maps.**  
T.-H. Wei, **T.-Y. Lee**, and H.-W. Shen.  
*Computer Graphics Forum* (Special Issue for *EuroVis 2013*, acceptance rate: 49/177 = 28%), 30(3):1-10, 2013.
6. **Exploring Vector Fields with Distribution-based Streamline Analysis.**  
K. Lu, A. Chaudhuri, **T.-Y. Lee**, H.-W. Shen, and P. C. Wong.  
In *PacificVis '13: Proceedings of the IEEE Pacific Visualization Symposium*, pp.257 - 264, Sydney, Australia, 2013 (acceptance rate: 34/118 = 29%).
7. **Parallel Particle Advection and FTLE Computation for Time-Varying Flow Fields.**  
B. Nouanesengsy, **T.-Y. Lee**, K. Lu, H.-W. Shen, and T. Peterka.  
In *SC '12: Proceedings of the ACM/IEEE International Conference for High Performance Computing, Networking, Storage and Analysis*. Salt Lake City, UT, Nov., 2012 (acceptance rate: 100/472 = 21%).
8. **Salient Time Steps Selection from Large Scale Time-Varying Data Sets with Dynamic Time Warping.**  
X. Tong, **T.-Y. Lee**, and H.-W. Shen.  
In *LDAV '12: Proceedings of the IEEE Symposium on Large-Scale Data Analysis and Visualization*, pp. 49 - 56, Seattle, WA, Oct., 2012 (acceptance rate: 18/34 = 53%).
9. **Flow-guided File Layout for Out-of-core Pathline Computation.**  
C.-M. Chen, B. Nouanesengsy, **T.-Y. Lee**, and H.-W. Shen.  
In *LDAV '12: Proceedings of the IEEE Symposium on Large-Scale Data Analysis and Visualization*, pp. 109 - 112, Seattle, WA, Oct., 2012 (acceptance rate: 18/34 = 53%).
10. **Scalable Computation of Distributions from Large Scale Data Sets.**  
A. Chaudhuri, **T.-Y. Lee**, B. Zhou, C. Wang, T. Xu, H.-W. Shen, T. Peterka and Y.-J. Chiang.  
In *LDAV '12: Proceedings of the IEEE Symposium on Large-Scale Data Analysis and Visualization*, pp. 113 - 120, Seattle, WA, Oct., 2012 (acceptance rate: 18/34 = 53%).
11. **Flow-Guided File Layout for Out-Of-Core Stream-line Computation.**  
C.-M. Chen, L. Xu, **T.-Y. Lee**, and H.-W. Shen.  
In *PacificVis '12: Proceedings of the IEEE Pacific Visualization Symposium*, pp. 145 - 152, Songdo, Korea, March, 2012 (acceptance rate: 30/89 = 34%).

12. **Load-Balanced Parallel Streamline Generation on Large Scale Vector Fields.**  
B. Nouanesengsy, **T.-Y. Lee**, and H.-W. Shen.  
*IEEE Transactions on Visualization and Computer Graphics* (Special Issue for *IEEE Visualization 2011*, acceptance rate: 49/194 = 25%), 17(12):1785-1794, 2011.
13. **View Point Evaluation and Streamline Filtering for Flow Visualization.**  
**T.-Y. Lee**, O. Mishchenko, H.-W. Shen, and R. A. Crawfis.  
In *PacificVis '11: Proceedings of the IEEE Pacific Visualization Symposium*, pp. 83–90, Hong Kong, China, 2011 (acceptance rate: 27/81 = 33%).
14. **An Information-Theoretic Framework for Flow Visualization.**  
L. Xu, **T.-Y. Lee**, and H.-W. Shen.  
*IEEE Transaction on Visualization and Compute Graphics* (Special issue for *IEEE Visualization '10*, acceptance rate: 45/185 = 26%), 16(6):1216–1224, 2010.
15. **CycleStack: Inferring Periodic Behavior via Temporal Sequence Visualization in Ultrasound Video.**  
**T.-Y. Lee**, A. Chaudhuri, F. Porikli, and H.-W. Shen.  
In *PacificVis '10: Proceedings of the IEEE Pacific Visualization Symposium*, pp. 89–96, Taipei, Taiwan, 2010 (acceptance rate: 27/84 = 32%).
16. **Visualization and Exploration of Temporal Trend Relationships in Multivariate Time-Varying Data.**  
**T.-Y. Lee**, and H.-W. Shen.  
*IEEE Transaction on Visualization and Compute Graphics* (Special Issue for *IEEE Visualization '09*, acceptance rate: 54/202 = 27%), 15(6): 1369–1366, 2009.
17. **Visualizing Time-Varying Features with TAC-based Distance Fields.**  
**T.-Y. Lee**, and H.-W. Shen.  
In *PacificVis '09: Proceedings of the IEEE Pacific Visualization Symposium*, pp. 1–8, Beijing, China, 2009 (acceptance rate: 26/66 = 40%).
18. **An Image-Based Modelling Approach To GPU-based Unstructured Grid Volume Rendering.**  
N. Shareef, **T.-Y. Lee**, H.-W. Shen, and K. Mueller.  
In *VG '06: Proceedings of the International Workshop on Volume Graphics*, pp. 31–38, Boston, MA, USA, 2006 (acceptance rate: 13/38 = 34%).

## Posters/Other Publications

1. **Visual Analytics of Large-Scale Climate Model Data.**  
P. C. Wong, H.-W. Shen, R. Leung, S. Hagos, **T.-Y. Lee**, X. Tong, K. Lu.  
In *LDAV '14: Proceedings of the IEEE Symposium on Large Data Analysis and Visualization 2014*, Paris, France, November 2014.
2. **Efficient Range Distribution Query in Large-scale Scientific Data.**  
A. Chaudhuri, **T.-Y. Lee**, H.-W. Shen, and T. Peterka  
A poster in *LDAV '13: IEEE Symposium on Large Data Analysis and Visualization 2013*, Atlanta, Georgia, October 2013 (**Best Poster**).
3. **Exploring Flow Fields Using Fractal Analysis of Field Lines.**  
A. Chaudhuri, **T.-Y. Lee**, H.-W. Shen, M. Khoury and R. Wenger  
A poster in *VisWeek '12: IEEE Visualization*, Seattle, WA, Oct 2012 (**Best Poster**).
4. **Exploring Vector Fields with Distribution-based Streamline Analysis.**  
K. Lu, A. Chaudhuri, **T.-Y. Lee**, A. G. Suttmitter, H.-W. Shen, and P. C. Wong  
A poster in *Vis '12: IEEE Visualization*, Seattle, WA, 2012.
5. **Interactive Word Cloud Rendering with Semantic Zooming.**  
X. Liu, **T.-Y. Lee**, and H.-W. Shen  
A poster in *InfoVis '12: IEEE Information Visualization*, Seattle, WA, 2012.
6. **Exploring Large Scale Scientific Data Using Information Theory**  
A. Chaudhuri, **T.-Y. Lee**, H.-W. Shen, T. Peterka, C. Wang, T. Xu, B. Zhou, and Y.-J. Chiang  
A poster in *CoDA '12: DoE Conference on Data Analysis*, Santa Fe, New Mexico, Feb., 2012.
7. **Scalable Parallel Building Blocks for Custom Data Analysis.**  
T. Peterka, R. Ross, W. Kendall, A. Gyulassy, V. Pascucci, H.-W. Shen, **T.-Y. Lee**, and A. Chaudhuri.  
In *LDAV '11: Proceedings of the IEEE Symposium on Large Data Analysis and Visualization*, pp. 105–112, Providence, Rhode Island, Oct. 2011.
8. **A Flow-Guided File Layout for Out-Of-Core Streamline Computation.**  
C.-M. Chen, L. Xu, **T.-Y. Lee**, and H.-W. Shen.  
A poster in *LDAV '11: IEEE Symposium on Large-Scale Data Analysis and Visualization*, Providence, Rhode Island, Oct. 2011.
9. **Visual Analytics for Enabling Extreme Scale Scientific Discovery**  
H.-W. Shen, **T.-Y. Lee**, A. Chaudhuri, and B. Nouanesengsey.  
In *SciDAC 2011*, Denver, Colorado, July, 2011.
10. **A Study of Parallel Particle Tracing for Steady-State and Time-Varying Flow Fields.**  
T. Peterka, R. Ross, B. Nouanesengsey, **T.-Y. Lee**, H.-W. Shen, W. Kendall, and J. Huang.  
In *IPDPS '11: Proceedings of the IEEE International Parallel & Distributed Processing Symposium*, pp. 580–591, Anchorage, Alaska, May 2011 (acceptance rate: 112/571 = 20%).
11. **Enhanced Visualizations for Ultrasound Videos.**  
F. Porikli, and **T.-Y. Lee**.  
United States Patent Application 20100246914, Sep., 2010.
12. **Visualizing Time-Varying Features with TAC-based Distance Fields.**  
**T.-Y. Lee**, and H.-W. Shen.  
OSU-CISRC-10/08-TR53.

13. **Visual Discovery of Box Office and Oscars in Movie Data.**  
Y. Tu, and **T.-Y. Lee.**  
Submitted to *IEEE InfoVis Contest*, 2007.

## Presentations

1. **Information Theory for Visualization and Data Analysis.**  
In *CScADS Summer 2011 Workshop 2: Scientific Data and Analytics for Extreme Scale Computing*, Jul., 2011.
2. **Visualizing Time-Varying Features with TAC-based Distance Fields.**  
In *Grad Research Poster Exhibit*, Department of Computer Science & Engineering, The Ohio State University, Apr., 2009.
3. **Visualizing Time-Varying Features with TAC-based Distance Fields,**  
In *Demonstrations at Ohio State University in IEEE VisWeek 2008*, Oct. 22, 2008.

## Academic Activities/Services

IEEE Member.

Reviewer for ACM SIGGRAPH 2013.

Reviewer for IEEE Visualization 2009, 2010, 2011, 2012, 2014.

Reviewer for Eurographics/IEEE Symposium on Visualization (EuroVis) 2010, 2012, 2013.

Reviewer for IEEE Pacific Visualization Symposium 2008, 2009, 2010, 2011, 2012, 2013, 2014.

Reviewer for IEEE Computer Graphics & Applications.

Reviewer for IEEE Transaction on Visualization and Computer Graphics.

Reviewer for SPIE Journal of Electronic Imaging.

Student Volunteer for IEEE Vis 2008, 2010, 2011.