連　震　杰

Professor Jenn-Jier James Lien

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Robot Arm

Robotics Lab., NCKU
國立成功大學機器人實驗室

DLP 3D Scanner

Current Employment:

2012/08~Current - Professor, Dept. of CSIE, NCKU, Tainan, Taiwan – 41 Faculties
 - AI Professor,
  1) Medical Device Innovation Center (MDIC with NCKU hospital)
  2) Musculoskeletal Research Center (MRC with NCKU hospital)
2015/08~2018/07 - Vice Chairman of Department of Computer Science and Information Eng.
  & Director of Institute of Manufacturing Information and Systems (IMIS)
2017/01~2018/12 - Deputy secretary general, Chinese Institute of Automation Engineers, TW
2002/08~2011/07 - Assistant Professor and then Associate Professor

Education:

1993/08~1998/04 Ph.D. Electrical and Computer Engineering, University of Pittsburgh.
  Research Assistant: Research conducted at the Robotics Institute (RI),
    School of Computer Science (SCS), Carnegie Mellon University
    (CMU).
  Advisor: Professor Takeo Kanade, RI, SCS, CMU.
    - Member of National Academy of Engineering
    - Fellow of the American Academy of Arts and Sciences
  Advisor: Professor Ching-Chung Li, ECE, U. of Pittsburgh.
  Advisor: Professor Jeffrey F. Cohn, Dept. of Psychology and Psychiatry,
    U. of Pittsburgh.
(RI, SCS, CMU) Dissertation Title: "Automatic Recognition of Facial Expressions Using
    Hidden Markov Models and Estimation of Expression Intensity"

1991/08~1993/05 M.S. Electrical and Computer Engineering, Washington U., St. Louis, MO.
1985/09~1989/05 B.S. Biomedical Engineering, Chung Yuan Christian University, Taiwan.

Robotics Lab. at NCKU:

2002/08~Current Position: Director of Robotics Lab.

People: Around 25 graduate students and several visiting engineers from machine & tool companies and robot arm companies.

Research Fields:
1) Artificial Intelligence (AI) - Deep Learning
2) Image Processing, Computer Vision and Pattern Recognition
3) Biomedical Research - Gait Analysis, Medical Device Innovation
4) Visual-Guided Robot Arm Control and Automation
5) Automatic Optical Inspection and Structured-light 3D Scanner
6) Embedded Computer Vision
7) Human-Computer Interaction and Augmented Reality
8) Intelligent Video Surveillance as a Service (VSaaS, Cloud Computing)

Ongoing Biomedical Projects:
1) 3D tooth mold scanning for dental implant
2) Adjustable motion control shoes for pronated foot patients - MRC
3) Food calorie calculator as a service (CCaaS, Cloud Computing with App.)- MDIC
4) Medical aid by visual-guided robot arm

Industrial Cooperation:

(Each cooperation company is ranked top 1 or 2 biggest company in its marketing.)

2014/01~Current Research Fields: **Deep learning**-robot arm, tool inspection & life prediction

-Develop deep learning application algorithms for the fields of structured-light 3D inspection and reconstruction, visual-based robot arm grasping, and tool wear monitoring and life prediction in industry 4.0.

Cooperation Companies: TongTai Machine & Tool Co., Ltd., and Hiwin (Robot Arm) Technology Corp. in Taiwan.

2009/01~2013/12 Research Fields: **Embedded CV**- Surveillance, HCI, and ADAS.

-Develop embedded computer vision algorithms for the markets of surveillance, human-computer interactions (HCI), and ADAS (Advanced Driver Assistance System).

Cooperation Company: Texas Instruments (IC design, USA), Faraday Technology Corp. (ASIC design), and Advantech (Embedded Computing & Automation).

2004/01~2008/12 Research Fields: **Computer Vision & Pattern Recognition** (CVPR)- AOI.

-Develop CVPR algorithms to AOI (Automatic Optical Inspection) machines.

Cooperation Company: AUO (TFT-LCD), InnoLux (TFT-LCD), MoTech Industries, Inc. (Solar Cell), and E-Ton Solar Tech (Solar Cell).

Former Employment:

1999/01~2002/07 Visionics Corporation, Jersey City, NJ, USA (Startup Company, IPO VSNX at Nasdaq in 2002)
- It is an award-winning face recognition software company.
Position: Senior Research Scientist/DARPA Project Lead.
Award: 2000, 2002 DARPA FERET Face Recognition Competition: No.1.
Grant: 2000 Received US$ 5 million research grant from DARPA's surveillance project BAA00-29: Human Identification at a Distance (HID).

1998/05~1998/12 Carnegie Mellon University (CMU), School of Computer Science (SCS), the Robotics Institute (RI), Vision Autonomous Systems Center (VASC).
Position: Visiting Research Scientist
Project: Automated Face Analysis (at Face Group).

1993/01~1993/08 Surface Systems, Inc. St. Louis, Missouri
Position: R&D Engineer.
Project: Hardware/circuit design and software simulation for weather forecast and software design for water pollution analysis.

Award:

2008   Excellent teaching award at NCKU, year 2008

2007   3 best paper awards: CVGIP2007、PSIVT 2007、IMECS 2007
1) W.S. Chu, J.C. Chen, and J.J. Lien, "Face Recognition Using Kernel Fisher's Discriminant Transformation in Image Sets," Computer Vision, Graphics and Image Processing (CVGIP), Taiwan, August 2007. (Oral, Best Paper Award) Acceptance Rate = 7% (13/176)
2) C.W. Fang and J.J. Lien, "Fast Directional Image Completion," IEEE Pacific Rim Symposium on Image Video and Technology (PSIVT), Chile, December 2007. (Oral, Best Paper Award) Acceptance Rate = 4.5% (7/155)
3) H.C. Hsin, J.J. Lien, and T.Y. Sung, "A Hybrid SPIHT-EBC Image Coder," International MultiConference of Engineers and Computer Scientists (IMECS), Hong Kong, 2007. (Oral, Best Paper Award)

2007   Final round competition for the best paper award: ACCV 2007
1) C.C. Wang and J.J. Lien, "AdaBoost Learning for Human Detection Based on Histograms of Oriented Gradients," ACCV, Japan, pp. 885-895, November 2007. Final round recommendation rate 1% (8/640).

2006   Microsoft Research Asia Fellowship Award: One of my Ph.D. students won this award and did one year internship at Microsoft Research Lab - Asia.

2000   2000, 2002 FERET Face Recognition Competitions: No. 1. Worked at Visionics.

2000   Received US$ 5 Millions research grant from DARPA's surveillance project BAA00-29: Human Identification at a Distance (HID).

Industry Invited Talk:

2017 MSRA (Microsoft Research Lab – Asia) Academic Day: Talk Title - Quick & Accurate Robot Arm Control by Using Vision with Deep Learning.

2012 TI (Texas Instruments) Technology Day: Talk Title - Intelligent NVR at Powerful DM8168: ARM for Embedded CMS with Intelligent Search and DSP for Programmable IVA.

2010 TI (Texas Instruments) Asia Technology Day: Talk Title - Embedded IVA at TI Platforms: Omni-Camera Calibration & ePTZ at DM365 and Detection, Tracking and Recognition at DSP DM6437.

Selected Conference Papers:
1. Y. Cheung, Y.T. Huang and <u>J.J. Lien</u> "Visual Guided Adaptive Robotic Interceptions with Occluded Target Motion Estimations" IEEE/RSJ International Conference on Intelligent Robotics and Systems (IROS), Germany, 2015. (Oral) Acceptance Rate = 3.4% (72/2134)
2. Y. Cheung, Y.T. Huang and <u>J.J. Lien</u> "Adaptive Robotic Interceptions of Moving Targets with a Target Motion Estimation-based Visual Tracking Controller", IEEE International Conference on Systems, Man, and Cybernetics (IEEE SMC) , Hong Kong , 2015. Acceptance Rate = 15% (141/946)
3. C.T. Tu and <u>J.J. Lien</u>, "Facial Sketch Synthesis Using Direct Combination Model," IEEE International Conference on Multimedia & Expo (ICME), pp. 1196-1201, Singapore, 2010. (Oral) Acceptance Rate = 15% (93/620) ISBN: 978-1-4244-7491-2
4. C.T. Tu and <u>J.J. Lien</u>, "Efficient and Robust Facial Feature Point Estimation Using Direct Combined Model," IEEE International Conference on Image Processing (ICIP), Hong Kong, 2010. ISBN: 978-1-4244-7993-1
5. C.H. Fang, J.C. Chen, C.C. Tseng, and <u>J.J. Lien</u>, "Human Action Recognition Using Spatio-Temporal Classification," ACCV, Xi An, China, pp. 98-109, September 2009.
6. S.H. Hsieh, C.W. Fang, T.H. Wang, C.H. Chu, and <u>J.J. Lien</u>, "Weighted Map for Reflectance and Shading Separation Using a Single Image," ACCV, Xi An, China, pp. 85-95, September 2009.
7. W.S. Chu, J.C. Chen, and <u>J.J. Lien</u>, "Kernel Discriminant Analysis Based on Canonical Difference for Face Recognition in Image Sets," ACCV, Japan, pp. 700-711, November 2007.
8. S.F. Lui, J.Y. Wu, H.S. Mao, and <u>J.J. Lien</u>, "Learning-Based Super-Resolution Using One Single Image with Multi-Resolution Wavelet Synthesis," ACCV, Japan, pp. 96-105, November 2007.
9. M.C. Sung, T.H. Wang, and <u>J.J. Lien</u>, "High Dynamic Range Scene Realization Using Two Complementary Images," ACCV, Japan, pp. 261-270, November 2007.
10. C.C. Tseng and <u>J.J. Lien</u>, "Synthesis of Exaggerative Caricature with Inter and Intra Correlations," ACCV, Japan, pp. 314-323, November 2007. (Oral) Acceptance Rate = 7% (46/640).
11. C.C. Wang and <u>J.J. Lien</u>, "AdaBoost Learning for Human Detection Based on Histograms of Oriented Gradients," ACCV, Japan, pp. 885-895, November 2007, Springer-Verlag Berlin, Heidelber. (Oral, recommend to the best paper competition 8/640). ISBN:3-540-76385-6 978-3-540-76385-7
12. C.W. Fang and <u>J.J. Lien</u>, "Fast Image Replacement Using Multi-resolution Approach," Asian Conference on Computer Vision (ACCV), India, pp. 509-520, January 2006. (Oral) Acceptance Rate = 13% (64/500).
13. W.T. Su and <u>J.J. Lien</u>, "Heuristic Pre-Clustering Relevance Feedback in Region-Based Image Retrieval," ACCV, India, pp. 294-304, January 2006. (Oral) Acceptance Rate = 13% (64/500).
14. Y.T. Tsai and <u>J.J. Lien</u>, "Efficient Object Segmentation Using Digital Matting for Mpeg Video Sequences," ACCV, India, pp. 591-601, January 2006.
15. C.C. Wang and <u>J.J. Lien</u>, "Automatic Vehicle Detection Using Statistical Approach," ACCV, India, pp. 171-182, January 2006.
16. <u>J.J. Lien</u>, T. Kanade, J. F. Cohn, and C.C. Li, "Subtly Different Facial Expression Recognition and Expression Intensity Estimation," IEEE Conference on Computer Vision and Pattern Recognition (CVPR), pp. 853-859, Santa Barbara, CA, June 23-25, 1998. ISBN: 0-8186-8497-6
17. J.F. Cohn, A.J. Zlochower, <u>J.J. Lien</u>, and T. Kanade, "Feature-Point Tracking by Optical Flow Discriminates Subtle Differences in Facial Expression," Third IEEE International Conference on Automatic Face and Gesture Recognition (FG), pp. 396-401, Nara, Japan, April 14-16, 1998. ISBN: 0-

8186-8344-9

18   J.J. Lien, T. Kanade, J. F. Cohn, and C.C. Li, "Automated Facial Expression Recognition Based on FACS Action Units," Third IEEE International Conference on Automatic Face and Gesture Recognition (FG), pp. 390-395, Nara, Japan, April 14-16, 1998. ISBN: 0-8186-8344-9

Selected Journal Papers:

1. C.T. Tu, P.C. Lin, and J.J. Lien, " Free-hand Sketches for 3D Model Retrieval Using Cascaded LSDA," Multimedia Tools and Applications, pp. 1-17, 2016. (SCI) Impact Factor = 1.374, Ranking =31.37% (32/102)

2. J.C. Chen, P.H. Wu, and J.J. Lien, "Discriminant Metric Learning Approach for Face Verification," KSII Transactions on Internet and Information Systems, Vol. 45, No. 10, pp. 134-153, 2015. (SCI) Impact Factor = 0.561, Ranking =84.89% (118/139)

3. C.C. Tseng, J.C. Chen, C.H. Fang, and J.J. Lien, "Human Action Recognition Based on Graph-embedded Spatio-temporal Subspace," Pattern Recognition, Vol. 45, No. 10, pp. 3611-3624, 2012. (SCI & EI) Impact Factor = 2.682, Ranking =7.29% (18/247)

4. C.C. Tseng and J.J. Lien, "Colored Exaggerative Caricature Creation Using Inter- and Intra-Correlations of Feature Shapes and Positions," Image and Vision Computing, Vol. 30, No. 1, pp. 15-25, 2012. (SCI & EI) Impact Factor = 1.578, Ranking =21% (21/99)

5. J. Y. Wu and J.J. Lien, "3D Facial Surface Reconstruction Using Integrated Orthographic Projection Models to Approximate Perspective Projection Model, " International Journal of Innovative Computing, Information and Control, Vol. 8, No. 1B, pp. 807-825, 2012. (SCI & EI) Impact Factor = 1.667, Ranking = 20% (12/60)

6. W.S. Chu, J.C. Chen, and J.J. Lien, "Kernel Discriminant Transformation for Image Set-Based Face Recognition," Pattern Recognition, Vol. 44, No. 8, pp. 1567-1580, 2011. (SCI & EI) Impact Factor = 2.682, Ranking =7.29% (18/247)

7. T.H. Wang, C.W. Fang, M.C. Sung, and J.J. Lien, "Photography Enhancement Based on the Fusion of Tone and Color Mappings in Adaptive Local Region," IEEE Transactions on Image Processing, Vol. 19, No. 12, pp. 3089-3105, 2010. (SCI & EI) Impact Factor = 2.918, Ranking = 5.26% (13/247)

8. C.T. Tu and J.J. Lien, "Automatic Location of Facial Feature Points and Synthesis of Facial Sketches Using Direct Combined Model," IEEE Transactions on Systems, Man, and Cybernetics: Part B, Vol. 40, No. 4, pp. 1158-1169, 2010. (SCI & EI) Impact Factor = 2.361, Ranking = 11.8% (2/17)

9. W.T. Su, J.C. Chen, and J.J. Lien, "Region-Based Image Retrieval System with Heuristic Pre-Clustering Relevance Feedback," Expert Systems with Applications, Vol. 37, No. 7, pp. 4984-4998, 2010. (SCI & EI) Impact Factor = 1.926, Ranking = 20% (15/75)

10. J.C. Chen and J.J. Lien, "A View-Based Statistical System for Multi-View Face Detection and Pose Estimation," Image and Vision Computing, Vol. 27, No. 9, pp. 1252-1271, 2009. (SCI & EI) Impact Factor = 1.496, Ranking = 31% (72/229)

11. T.H. Wang and J.J. Lien, "Facial Expression Recognition System Based on Rigid and Non-Rigid Motion Separation and 3D Pose Estimation," Pattern Recognition, Vol. 42, No. 5, pp. 962-977, 2009. (SCI & EI) Impact Factor = 3.279, Ranking = 7% (17/229)

12. C.W. Fang and J.J. Lien, "Rapid Image Completion System Using Multi-Resolution Patch-Based Directional and Non-directional Approaches," IEEE Transactions on Image Processing, Vol. 18, No. 12, pp. 2769-2779, 2009. (SCI & EI), Impact Factor = 3.315, Ranking = 6.55% (15/229)

14. C.C. Wang and J.J. Lien, "Automatic Vehicle Detection Using Local Features – A Statistical Approach," IEEE Transactions on Intelligent Transportation Systems, Vol. 9, No. 1, pp. 83-96, 2008. (SCI & EI) Impact Factor = 2.844, Ranking =2% (2/91)

15. J.J. Lien, T. Kanade, C.C. Li and J.F. Cohn, "Detection, Tracking, and Classification of Action Units in Facial Expression," IEEE Journal of Robotics and Autonomous Systems, Special Issue: Face Expression in Human-Robot Interaction, System 31, pp. 131-146, 2000. (Invited Paper), (SCI) Impact Factor = 0.415, Ranking = 48% (21/44)

16. J.F. Cohn, A.J. Zlochower, J.J. Lien, and T. Kanade, "Automated Face Analysis by Feature Point Tracking Has High Concurrent Validity With Manual FACS Coding," Journal of Psychophysiology, 35(1), 1999. (SCI& EI) Impact Factor = 0.537, Ranking = 78% (156/201)

Selected Book Chapters:

1. C.T. Tu and <u>J.J. Lien</u>, Pattern Recognition, Machine Intelligence and Biometrics - Facial Occlusion Reconstruction Using Direct Combined Model, Chapter 20, pp. 527~544, HEP/Springer, 2011. ISBN-13: 978-364-222-406-5.

2. J.F. Cohn, A. Zlochower, <u>J.J. Lien</u>, T. Kanade, What The Face Reveals - Automated Face Analysis by Featured Point Tracking Has High Concurrent Validity With Manual FACS Coding, Chapter 17, pp. 371~387, Oxford University Press, 2005. ISBN 0-19-517964-1.

3. J.F. Cohn, A. Zlochower, <u>J.J. Lien</u>, T. Kanade, and W. Hau, Automated Face Analysis, Progress in Infancy Research, Vol. 1, Chapter 5, pp. 155~182, Lawrence Erlbaum Associates, Inc., January 2000. ISBN 0-8058-3493-1.

Available upon request for more references