Jenn-Jier James Lien

Visiting Research Scientist (since 05/98)

Vision Autonomous Systems Center
The Robotics Institute, Smith Hall
Carnegie Mellon University
5000 Forbes Avenue
Pittsburgh, PA 15213

Contact: 5525 Ellsworth Ave. #15
Pittsburgh, PA 15232
Tel/Fax: (H) (412) 683-0219
Tel: (O) (412) 268-3275
E-mail: jjlien@cs.cmu.edu
http://www.cs.cmu.edu/~jjlien

Objective: **Research and development position involving computer vision, video processing, image understanding, motion analysis, object tracking, pattern or object detection, extraction & recognition, geometric registration, gesture, face & facial expression recognition, face identification, MPEG-4 application - teleconferencing, and human-computer interface/interaction.**

Education:

08/93~ 04/98 Ph.D. Electrical Engineering, University of Pittsburgh.
Research Assistant: Research conducted at the Carnegie Mellon University, the Robotics Institute, VASC (Vision Autonomous Systems Center).

(CMU-VASC)Dissertation Title: "Automatic Recognition of Facial Expressions Using Hidden Markov Models and Estimation of Expression Intensity"

Advisor: Professor Takeo Kanade

(U. of Pitt) Research Title: "Automatic Registration of Multi-Resolution Multi-Sensor Satellite Images Using Wavelet Decomposition"
Advisor: Professor Ching-Chung Li

08/91~05/93 M.S. Electrical Engineering, Washington University, St. Louis, Missouri.
Research Title: "Ultrasonic Imaging System: Hardware and Software"

09/85~05/89 B.S. Biomedical Engineering, Chun Yuan University, Taiwan.
Research: Designed a laser acupuncture system with a diode laser & created a user interface (using C & 8086/88 assembly languages) as technical assistance for electrocardiogram (EKG) analysis.

Expertise: Computer Vision: **Motion estimation (object tracking or optical flow),** robust estimation and outlier process.

Pattern Recognition or Classification: **Hidden Markov Models, Bayes decision theory,** neural networks and fuzzy logic.

Texture, pattern & object detection, extraction & recognition, **gesture, face & facial expression recognition**, **face identification**, **lip-reading** and handwriting recognition**.**

Compression: **MPEG-4 application – teleconferencing** (**automated facial action coding), principal component analysis (eigenspace)**, Karhunen-Loeve expansion and **vector quantization**.

Video Processing and Image Analysis: **Motion line & edge linking & extraction,** corner detection, geometric transformations, histogram processing, **segmentation**, thinning, morphology (dilation & erosion) and **connected component labeling**.

Signal Processing, Time-Frequency Analysis, Wavelets and Probability & Stochastic Processes.

Geometric Registration and Alignment.

Computer Architecture, Automata Theory & Formal Languages, Switching Theory and Fault Tolerance.

Hardware Design:

Computer Circuits and Systems Design: **M68000** microprocessor, TTL or **CMOS** logic, and A/D & D/A conversion.

VLSI Circuit Design and Architecture: **Spice** (**simulation** software) and **Magic** (**layout** software).

Solid-State Power Control Circuits and Applications.

User Interface:
(apply patent) Create a user interface for automatically recognizing facial expressions programming in **C, Motif, X Toolkit** & **Xlib** under UNIX environment (finished) and in **C++** & **Visual C++** under Windows 95/NT environment (under developing).

Computer Languages: **C++, Visual C++, C, assembly language** (including Z-80, 80x86/88, M68000), matlab.

Operating
Systems: Windows NT/95, UNIX, MS-DOS, and Macintosh.

Employment:
01/93~08/93 Surface Systems, Inc. St. Louis, Missouri.
R&D assistant engineering: Hardware design for temperature detector and software design using C, FoxPro and Excel for data processing.

Military
Experience: Served as an electronic maintenance officer in military service.
09/89~07/91 Leader of division responsible for maintenance of Hercules Missiles, RFTS (Radio Frequency Test Set) and ETS (Electronic Test Set).

Invited Talks:
Microsoft, Siemens and DEC.

Demonstration
Experience: Demonstrated the user interface with my research results to visitors from HP, ATR, NTT, Sharp, and Toshiba.

Publications:

1998 James Jenn-Jier Lien, Takeo Kanade, Ching-Chung Li, and Jeffrey F. Cohn, **"Automatic Recognition of Facial Expressions Using Hidden Markov Models and Estimation of Expression Intensity,"** 1998. (submitted to *IEEE transactions on Pattern Analysis and Machine Intelligence*.)

1998 James Jenn-Jier Lien, Takeo Kanade, Ching-Chung Li, and Jeffrey F. Cohn, **"Determination of Hidden Markov Model Topology for Facial Expression Analysis**," 1998. (submitted to *IEEE transactions on Pattern Analysis and Machine Intelligence*.)

1998 James Jenn-Jier Lien, Takeo Kanade, Jeffrey F. Cohn, and Ching-Chung Li, **"Subtly Different Facial Expression Recognition and Expression Intensity Estimation,"** *IEEE Conference on Computer Vision and Pattern Recognition*, Santa Barbara, CA, June 23-25, 1998.

1998 James Jenn-Jier Lien, Takeo Kanade, Jeffrey F. Cohn, and Ching-Chung Li, **"Automated Facial Expression Recognition Based on FACS Action Units,"** *Third IEEE International Conference on Automatic Face and Gesture Recognition*, pp. 390-395, Nara, Japan, April 14-16, 1998.

1997 James Jenn-Jier Lien, Takeo Kanade, Adena J. Zlochower, Jeffrey F. Cohn, and Ching-Chung Li, **"Automatically Recognizing Facial Expressions in the Spatio-Temporal Domain Using Hidden Markov Models,"** *Workshop on Perceptual User Interfaces*, pp. 94-97, Alberta, Canada, October 1997.

(The methods I developed have been applied at following researches:)

1998 J.F. Cohn, A.J. Zlochower, J.J. Lien, and T. Kanade, "Automated Face Coding: A Computer-Vision Based Method of Facial Expression Analysis," *Journal of Psychophysiology*, 1998.

1998 A.J. Zlochower, J.F. Cohn, J.J. Lien, and T. Kanade, "Automated Face Coding: A Computer Vision Based Method of Facial Expression Analysis in Parent-Infant Interaction," *International Conference on Infant Studies*, Atlanta, Georgia, April 1998.

1998 J.F. Cohn, A.J. Zlochower, J.J. Lien, 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*, pp. 396-401, Nara, Japan, April 14-16, 1998.

1997 J.F. Cohn, A.J. Zlochower, J.J. Lien, Y.T. Wu, and T. Kanade, "Automated Face Coding: A Computer-Vision Based Method of Facial Expression Analysis," *7th European Conference on Facial Expression, Measurement, and Meaning*, Salzburg, Austria, July 1997.

1997 J.F. Cohn, A.J. Zlochower, J.J. Lien, Y.T. Wu, and T. Kanade, "Facial Expression Can Be Measured by Image Processing of Video Sequences," *Biennial Meeting of the Society for Research in Child Development*, pp. 98, Washington, D.C., April 1997.

1996 J.F. Cohn, A.J. Zlochower, J.J. Lien, Y.T. Wu, and T. Kanade, "Facial Expression Analysis: Preliminary Results of a New Image-Processing Based Method," *Proceedings of the 9th Conference of the International Society for Research on Emotions*, pp. 329-333, Toronto, Canada, August 1996.

References:

(Advisor) **Dr. Takeo Kanade**
Director of the Robotics Institute
School of Computer Science
Carnegie Mellon University
Pittsburgh, PA 15213
Tel: (412) 268-3016, E-mail: tk@cs.cmu.edu, http://www.cs.cmu.edu/~tk

(Advisor) Dr. Ching-Chung Li
Department of Electrical Engineering
University of Pittsburgh
Pittsburgh, PA 15216
Tel: (412) 624-9679, E-mail: ccl@vms.cis.pitt.edu

Available upon request for more references