

OBJECTIVE

A software engineer position with no lack of new challenges and exposures to new technologies.

EDUCATION

- Jan., 1997 — July, 1998** Master's degree in Computer Engineering, Depart. of Electrical and Computer Engineering, Univ. of Michigan at Dearborn, MI 48128, USA.
- Sep., 1989 — Dec., 1994** Ph.D. degree in Optical Information Processing, Depart. of Physics, Fudan Univ., Shanghai 200433, P. R. China.
- Sep., 1985 — July, 1989** Bachelor's degree in Physics, Depart. for Intensive Undergraduate Instruction, Nanjing Univ., Nanjing, Jiangsu 210008, P. R. China.

SPECIALTIES

- Optical/ultrasonic occupant detection, and other vision-based vehicle applications such as lane/vehicle/pedestrian/obstacle detection
- Neural network system design and training
- Fuzzy logic control/diagnostic systems, expert systems
- Machine vision and inspection systems
- Data acquisition and digital signal processing including image, video, audio, and other time series
- Fourier analysis, wavelet analysis, and statistical analysis
- Other methods such as Kalman filter, multi-variable nonlinear optimization, etc.

COMPUTER SKILLS

- More than 18 years programming experience
- C/C++, Java, FORTRAN, Assembly, Pascal, and Basic languages
- Windows (API/MFC/COM) programming, embedded programming
- Familiar with the following compilers:
 - Microsoft Visual Studio
 - Borland C++ or C++ Builder
 - Metrowerks CodeWarrior
 - Mitsubishi TM
 - Matlab and Matlab Simulink
- Familiar with the following microprocessors:
 - Motorola HC11 and HC12 families
 - Mitsubishi M16C and M32C families
- Familiar with the following data communication protocols:
 - Serial port, parallel port, USB

- CAN (GMLAN), J1850 with CANoe/CANalyzer

WORK EXPERIENCE

Apr, 2006 — Present Principle Algorithm Engineer at Autoliv Electronics America, Southfield, MI 48034.

- Developed algorithm for detecting and recognizing European speed signs using monochrome stereovision camera system.
- Developed algorithm for dynamic calibration of stereovision camera system using natural scenes only. A patent application has been filed based on this work.
- Developed automatic exposure control algorithm for stereovision system that uses Micron cameras multi-slope response.
- Developed algorithm for high-beam automation using single monochrome camera.
- Developed AISViewer – a Windows-based software tool for data visualization and analysis. It handles vision, radar, and other signals available on the private CAN such as CFD, DMU, ESP, and GPS.
- Developed ObjMarker – a Windows-based software tool for data marking. This tool creates the ground-truth data sets that can be used in performance evaluation for systems that detect lanes, vehicles, pedestrians, and general obstacles. This tool provides sophisticated algorithm for data interpolation with motion tracking, so that minimum effort is needed for marking long data sequences.

Oct., 1998 — Feb. 2006 Senior Software Engineer at Automotive Technologies International, Inc., Auburn Hills, MI 48326.

- Developed algorithms for ultrasonic occupant out-of-position system including data preprocessing, modular neural networks, and post-processing. This project was sponsored by NHTSA.
- Implemented static single-frequency ultrasonic occupant out-of-position system on the vehicle platform of Taurus, Golf, Mazda and Jaguar, including defining and executing data collection matrix, writing embedded software for data acquisition and processing. This system has been available on some Jaguar models via Autoliv.
- Implemented dynamic multi-frequency ultrasonic occupant out-of-position system on the vehicle platform of Taurus and Jaguar, including defining and executing data collection matrix, writing embedded software for data acquisition and processing.
- Developed algorithms for optical occupant multi-class identification and position tracking system including image preprocessing, image feature extraction, modular neural networks, and post-processing. This project was sponsored by NHTSA.
- Implemented multi-camera occupant classification system on the vehicle platform of Taurus. This system uses 3 analog CCD cameras and 3 clusters of near-IR LEDs for illumination. This system has blockage-tolerant capability.
- Implemented single-camera occupant classification system on the vehicle platform of Taurus, Monte Carlo and Durango, including defining and executing data collection matrix, writing embedded

software for image acquisition and processing. This system uses one digital CMOS camera and one high-power near-IR LED for illumination.

- Implemented dynamic single-camera occupant position tracking system on the vehicle platform of Taurus. The system uses the same camera for occupant classification, and is able to continuously measure the distance between the occupant and the airbag unit up to 1 inch. This system is being tested at TRC – NHTSA’s testing facility in Ohio.
- Participated in the development of MNNCAD – a visual software tool for constructing, training and evaluating modular neural network systems. This software tool uses COM technology.
- Conducted a simulation study that explained the side-lobe generated by ultrasonic transducer in an unsymmetrical holder. This study also provided a solution to minimize unwanted side-lobes, which helped Autoliv in moving their ultrasonic occupant safety system into production.
- Developed X-Mapper – a software tool for ATI’s ultrasonic transducer alignment fixture. This fixture, consisting of an array of 57 ultrasonic receivers, can be used in easy field mapping and installation alignment.
- Developed a 3-D occupant posture tracking system using an array of ultrasonic receivers and a multi-channel Hexamite ultrasonic range finder. This system was used in data collection for dynamic optical occupant position tracking system.
- Developed an algorithm for automatic gain adjustment of CMOS cameras with linear or multi-slope response. [The experiments show that this algorithm guarantees convergence within approximately 10 frames even for extreme initial conditions.](#)
- Participated in the development of anticipatory crash sensing system, including developing algorithms for pedestrian detection and tracking based on single camera, and algorithms for oncoming vehicle detection and classification based on single camera and a laser scanner.
- Participated in the development of ultrasonic truckload monitoring system, including sensor calibration, data collection and analysis. This project was sponsored by Skybitz.
- Have been developing algorithms for human face detection and tracking. The intended application is occupant classification and prevention of SIDS (i.e. Sudden Infant Death Syndrome).
- Co-inventor of the following US patents:
 - 6,529,809** [Method of developing a system for identifying the presence and orientation of an object in a vehicle](#)
 - 6,757,602** [System for determining the occupancy state of a seat in a vehicle and controlling a component based thereon](#)
 - 7,009,502** [Method for controlling output of a classification algorithm](#)
 - Application 20030036835** [System for determining the occupancy state of a seat in a vehicle and controlling a component based thereon](#)
 - Application 20070282506** [Image Processing for Vehicular Applications Applying Edge Detection Technique](#)
 - Application 20080051957** [Image Processing for Vehicular Applications Applying Image Comparisons](#)

Aug., 2001 — Dec., 2004 Part-time Research Consultant at Visitek, Inc., Ann Arbor, MI 48103.

- Participated in the development of vision-based multiple obstacle detection and recognition system for moving vehicles, including scene segmentation and cluster classification. This project was sponsored by TACOM.

- Developed software and key algorithms for stereovision, motion extraction, multi-domain (i.e. color, texture, depth and motion) scene segmentation, and cluster classification using neural networks.

Oct., 1995 — Sep., 1998 Research scientist at Depart. of Electrical and Computer Engineering, Univ. of Michigan at Dearborn, MI 48128.

- Developed an image compression system for communication from a remotely controlled vehicle. This system achieves extraordinary compression ratio by using a radially decreasing sampling resolution. This project was sponsored by TACOM.
- Developed a fuzzy diagnostic system for vacuum leak detection of the automobile engine, including novel algorithms for automated fuzzy rule generation. This project was sponsored by Ford and National Science Foundation.
- Developed a vision-based inspection system for VFD (i.e. Vacuum Fluorescent Devices), including image acquisition and processing, automated learning and testing. This project was sponsored by Jabil Circuit. This system has been integrated into Jabil's production line, and it has significantly improved the accuracy and the speed of inspection.
- Developed a vision-based system for inspecting soldering points on high-density circuit boards, including high-resolution image acquisition and automated learning from Gerber files. This project was sponsored by Jabil Circuit.
- Developed image color and spatial clustering algorithms, which is the pre-stage for automated image understanding. This is part of the Univ. of Michigan Digital Library Project.
- Developed algorithms for moving target detection and tracking. This project was sponsored by Night Vision.
- Developed a formant-corrected pitch shifting system for audio signals. This system is able to change the pitch of a speech while maintaining the personal characteristics of the voice.

Oct., 1990 — Sep., 1995 Research assistant at Laboratory of Laser Physics and Optics, Fudan Univ., Shanghai 200433, P. R. China.

- Developed an automated optical system for 3-D profilometry (i.e. measurement of arbitrary 3-D surfaces) using laser and phase shifting technique. This project was sponsored by Science and Technology Division, Fudan Univ.
- Investigated on methods for 2-D optical phase measurement and reconstruction. This project was sponsored by Chinese National Science Foundation.
- Developed Fourier phase methods for real-time target discrimination and tracking. This project was sponsored by Chinese National Science Foundation.
- Investigated on the theory of 3-D vision and developed software tool for making stereograms from 3-D data. The later version of this software tool (called Stereogram Maker) can be downloaded free at www.swiftgear.com.
- Implemented an interactive system for controlling a large-scale distributed photometer, including data acquisition and processing. This project was sponsored by Depart. of Electrical Light Sources and Illuminating Engineering, Fudan Univ.

TEACHING EXPERIENCE

- May, 1997 — July, 1997 Teacher assistant of *Operating System*, Depart. of ECE, Univ. of Michigan - Dearborn.
- May, 1996 — July, 1996 Teacher assistant of *Operating System*, Depart. of ECE, Univ. of Michigan - Dearborn.
- Mar., 1995 — July, 1995 Lecturer of *Modern Optical Experiment*, Depart. of Physics, Fudan Univ.
- Sep., 1990 — Jan., 1991 Teacher assistant of *Mathematical Physics*, Depart. of Physics, Fudan Univ.
- Mar., 1990 — July, 1990 Teacher assistant of *Modern Physics*, Depart. of Physics, Fudan Univ.

HONORS

- June, 1997 Winner of a Best Paper Award by IEA/AIE'97 for the paper entitled "Fast rule generation and membership function optimization for a fuzzy diagnostic system", Atlanta, USA
- Jan., 1997 Winner of Campus Programming Competition (Univ. of Michigan at Dearborn)
- Sep., 1993 — July, 1994 Winner of T. D. Lee Physics Gold Award (Fudan Univ.)
- Sep., 1991 — July, 1992 Winner of Guanghua Prize (Fudan Univ.)
- Sep., 1990 ³/₄ July, 1991 Winner of T. D. Lee Physics Gold Award (Fudan Univ.)
- Sep., 1989 — July, 1990 Winner of Guanghua Prize (Fudan Univ.)

EXTRA-CURRICULAR ACTIVITIES

- Jan., 1997 — Present Member of ACM.
- Dec., 1995 — Present Member of IEEE.

SELECTED PUBLICATIONS

- [1] TQ Chen, D. S. Breed, and Krista Xu, "[Development of an optical occupant position sensor system to improve frontal crash protection](#)," 18th Intl Tech. Conf. on the Enhanced Safety of Vehicles, Nagoya, Japan, May 19-22, 2003.
- [2] M. Kussul, A. Z. Reznik, E. Sadovaya, A. Sitchov, and TQ Chen, "[A visual solution to modular neural network system development](#)," *IJCNN'2002*, Honolulu, Hawaii, USA.
- [3] TQ Chen, and Yi Lu, "Color image segmentation — an innovative approach," *Pattern Recognition*, Vol. 35, 2002.
- [4] Yi Lu and TQ Chen, "An efficient color clustering algorithm for image retrieving," *IEEE International Forum on Multimedia and Image Processing*, Anchorage, Alaska, 1998.

- [5] Yi Lu, J. Miller and **TQ Chen**, "Moving vehicle detection and tracking in image sequences," *Asian Conference on Computer Vision*, Hong Kong, Jan. 1998.
- [6] Yi Lu, **TQ Chen**, C. F. R. Weiman and B. Novak, "Video compression for remotely controlled vehicles," *Journal of Real Time Imaging*, 1997.
- [7] Yi Lu and **TQ Chen**, "Fast rule generation and membership function optimization for a fuzzy diagnostic system," *IEA/AIE'97*, Atlanta, Georgia, USA.
- [8] **TQ Chen** and Yi Lu, "Efficient and accurate algorithms in a machine vision inspection," *IEA/AIE'97*, Atlanta, Georgia, USA.
- [9] **TQ Chen**, Chun Zhang and Keshu Xu, "A Fourier phase method for locating of moving object," *Applied Optics*, 1995.
- [10] **TQ Chen** and Keshu Xu, "3-D information acquiring and processing system using phase-shifting technique," *SPIE Proc.*, Vol. 1731, 1991.

REFERENCE

Available upon request.