# Gaile G. Gordon

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## SUMMARY

Over 20 years experience in computer vision related R&D and R&D management.  Proven track record transitioning technology from R&D to production in both commercial and consumer markets. Product experience spans custom hardware (e.g. ASICs), firmware, software APIs, to end user applications.  Effective in wide range of environments including startups, government and private contract research, and large multinational corporations.  Ph.D. from Harvard on three-dimensional face recognition and surface description. MS and BS from the MIT AI Lab.

## PROFESSIONAL EXPERIENCE

**Enlighted, Inc.,** Sunnyvale, CA                                                    2016 - present
Senior Director, Technology

Enlighted is the major smart building success story with their Internet-of-Things approach to energy savings for offices, warehouses, factories, and other commercial buildings.  Looking forward to designing tons of new products based on their rich and pervasive sensor networks and pushing the sensor design to new levels.

**Intel Corporation,** Menlo Park, CA                                              2012 - 2016
Principal Engineer, 3D Vision
Perceptual Computing

TYZX was acquired by Intel in July 2012 and became part of the Perceptual Computing Group. Played key role in taking TYZX stereo vision technology to the next logical step - into the consumer market.  Led camera interface and manufacturing software teams for Intel RealSense active stereo depth camera. Go-to domain expert for depth sensors and 3D computer vision. Projects were high profile Intel efforts, featured heavily at Intel CEO Keynotes from 2013, 2014, 2015. First product introduced by HP in Dec 2015. Also focused on second generation product deployment in embedded markets such as drones, robotics, and automotive.
http://www.intel.com/content/www/us/en/architecture-and-technology/realsense-overview.html

**TYZX, Inc.,** Menlo Park, CA                                                         2000 - 2012
Co-founder, Vice President Advanced Development

TYZX produced the world's fastest stereo vision systems as well as 3D image analysis applications for its partners in the security, automotive and robotics industries.   The

company was started in 2000 based both on the hardware stereo vision system and person tracking technology originally developed at Interval Research by myself and a co-founder, and on our conviction that small, low power, cheap 3D sensors would become the enabling technology for pervasive consumer price-point interactive products.   This approach was ahead of the market, but has gained acceptance rapidly as the technology costs have dropped and interest in gesture interfaces and autonomous systems has increased (e.g. later competitors include PrimeSense, and Microsoft Kinect).

TYZX shipped products based on three generations of custom stereo correlation ASICs. Its 3D Embedded Vision Systems were used for evaluation of OEM product integration projects and as deployment platforms in lower volume markets.  TYZX also created and sold a distributed Person Tracking system based on a network of TYZX embedded cameras. Notable public installations of our tracking system: Top of the Rockefeller Center, Indianapolis Airport, Guinness World Records on Hollywood Boulevard.  Contract development activities focused on image analysis projects for customers in the automotive, mining, entertainment, industrial food processing, industrial safety, and person safety markets.

 As VP Advanced Development, my responsibilities included directing contract software development, product software architecture and development, and patent activities. I was a member of the Board of Directors.  I was also frequently involved with sales activities, and handled customer support, and IT for the company.


**Interval Research Corporation**, Palo Alto, CA                                 1996 - 2000
An independent research laboratory and incubator funded by Paul Allen. Interval used its research to start new companies, license technology, and build partnerships with other companies. Its commercialization efforts were broadly aimed at the consumer market including communication, education, and entertainment applications.

> Tyzx Advanced Development Team
> Founder, Director of Vision (10/99 - 4/00)
> Acting VP of Engineering (7/99 - 10/99)
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> The Tyzx advanced development project was focused on a commercial opportunity in the area of person tracking for "brick and mortar" retail stores.  The business provided an information service for retailers providing real-time analytics on in-store consumer traffic patterns, purchase patterns, and sales associate productivity.   This was enabled by a 3D person tracking system based on stereo vision that tracks the location of all the people in a store on a continuous basis.  Tyzx was on the verge of spinning out as a new company when Interval was closed.
>
> ● Directed software development and algorithm design for computer vision systems.
> ● Led team that created original proof of concept tracking system that served as the primary demo for partners and funders over the course of the project.  Demo performed successfully and was completed on time with an aggressive three month schedule.

- Member of the Executive Staff.  Contributed to recruiting three major national chains as customer partners. Represented technical team at meetings with potential funders. First round of funding was nearly completed at time of closing (raised $13.5 million of required $17.5 million).
- Worked extensively with consultants and customers to define scope of the product.
- Handled all patent activity.  Inventor on 3 of 4 patents filed for Tyzx technology.

<u>Research Project: Visual Analysis of People</u>
Project Coordinator (6/96 - 6/99)

- Led a team of 4 computer vision researchers and engineers investigating robust face detection and tracking, real time 3D pose tracking, and the novel use of real-time stereo data in combination with traditional color imagery.
- Collaborated with several other projects including one focused on development of real-time stereo vision hardware.
- Team's work accepted for publication and presentation at the primary international graphics (SIGGRAPH) and vision conferences (ICCV, CVPR) and key journals (IJCV) in the computer vision field.  Face tracking demonstration piece (Mass Hallucinations) installed for a six-month show at the San Jose Tech Museum.
- Selected as interim Research Area Director (May - July 99). Responsibilities included oversight of 5-6 research projects as well as providing input to the VP of Technology on research direction for new projects.

**TASC, Inc.**, Reading, MA                                                                                         1991 - 1996
Principal Member of Technical Staff

<u>FERET Program</u>
Principal investigator and project manager for a $900K research contract funded by DARPA to develop advanced 3D face recognition algorithms for both still images and video sequences.

- Identified opportunity and authored initial competitive proposal. Recognized at contract award for delivering business in new technical area and with new customer.
- Awarded 2 follow-on options in competitive down-select.
- Instrumental in shifting direction of FERET program from still images to video sequences.
- Primary technical contributor for algorithm design and implementation. Supervised work of 3 additional team members over the course of 3 year project. Responsible for budget oversight and customer interface.
- Successfully demonstrated computation of 3D face models from video sequences using structure from motion techniques.
- Delivered 2D face recognition system based on frontal and profile still images which showed significantly better performance than frontal view system.
- Implemented recognition systems in C++ in UNIX/SGI development environment including extensive underlying image processing and support libraries. Image

processing software also served as core technology on several other projects at TASC. Capabilities include image segmentation, pattern matching, classification, motion tracking, and 3D pose extraction and modeling from image sequences.

<u>Airborne Range Sensor Program</u>
Program manager for research program funded by Rome Laboratories (USAF) aiming to develop range sensing algorithms based on image sequences taken from a low cost airborne platform. Resulting system aimed to perform video photogrammetry of terrain and ground structures. Co-authored proposal.

<u>Contributions to other projects at TASC</u>
Technical lead for automated visual inspection efforts in the automotive industry, content based image access, hyperspectral data analysis and shape analysis for 3D medical and dental imagery.

## PRIOR RELATED EXPERIENCE

**Camex, Inc.,** Boston, MA                                                    1988-1989
Consultant to Scanned Graphics Group on issues concerning boundary segmentation and manipulation algorithms for high resolution (newspaper quality) images.

**Digital Equipment Corporation**, Shrewsbury, MA                    1983-1986
Developed an automated visual inspection system for magnetic tape heads. System included line detection algorithms based on the Hough Transform for automatically analyzing the alignment of the magnetic gap of the tape head. Served as the basis of my SM and SB theses.

**The National Bureau of Standards**, Gaithersburg, MD                1981-1983
Robotics Division
Designed and tested a software servo controller based on position and velocity feedback for a six axes robot manipulator.  Wrote a coordinate transformation package used to relate locations from one station to another in an automated manufacturing facility.

## EDUCATION

**Harvard University**
**Ph.D., Computer Science, 1991**
**MS, Computer Science 1989**
Thesis with Prof. David Mumford on Face recognition using range data and curvature descriptors.

**Massachusetts Institute of Technology**
**MS, Department of Electrical Engineering and Computer Science 1986**
**BS, Department of Electrical Engineering and Computer Science 1985**

Masters thesis with Prof. W. Eric L. Grimson. Designed automated visual inspection process for tape heads in conjunction with Digital Equipment.

**Publications.** Author of more than 25 conference papers, journal papers and book chapters. Co-author of book on face recognition. http://www.gailegordon.com/publications

**Patents.** 14 US Patents (9 Issued, 5 pending) http://www.gailegordon.com/publications


## OTHER PROFESSIONAL ACTIVITIES

**Invited Speaker.** Harvard University Robotics Laboratory, MIT AI Laboratory, CSIRO (Australian Government Research Laboratory), GETIS (G.E.Medical Systems, France), INPE (National Institute for Space Research, Brazil), Brown University.

**Peer Reviewer.** Invited participant in grant review panels for NIH and NSF. Reviewer for major journals for computer vision research (*Computer Vision and Image Understanding, IEEE Transactions on Pattern Analysis and Machine Intelligence, Journal of Visual Communications and Image Representation, Spatial Vision , and Journal of Electronic Imaging*).

**Conferences**. Member of the Program Committee for the International Conference on Automatic Face and Gesture Recognition (1996, 1998), and for the International Conference on Audio- and Video-based Biometric Person Authentication (1999).


**National Science Foundation Summer Institute in Japan** (Summer 1990)
Participation in this program was awarded on a competitive basis and included an internship at the Electrotechnical Laboratory, a Japanese Government research laboratory, as well as introductory Japanese language and cultural study.


## AWARDS

Harvard University Research Fellowship 1986-1991
MIT Graduate Assistantship, 1986
National Science Foundation Fellowship, Honorable Mention 1986
Lilian Moller Gilbreth Scholarship Award, Society of Women Engineers 1984/85
Digital Equipment Corp., Women's Advisory Committee Scholarship Award 1984/85
New England Consulting Engineers Council Scholarship 1984/85
RCA Scholar, Society of Women Engineers 1983/84
National Merit Scholar 1981/82
National Society for Professional Engineers Scholarship 1981/82