Elias Daniel Guestrin, PhD

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OBJECTIVE

To obtain an R&D position related to one or more of the following areas: eye tracking, mathematical modeling, imaging systems, computer vision, and signal and image processing.

SKILLS AND EXPERTISE

- Eye tracking technologies (a.k.a. eye-tracking, gaze tracking, gaze-tracking, eye-gaze tracking, gaze estimation, and point-of-gaze estimation technologies)
- Gaze-based human-computer interaction
- Mathematical modeling / numerical simulations (MATLAB/Simulink)
- Numerical methods for equation solving and optimization (MATLAB, Numerical Recipes in C/C++, C/C++ MINPACK)
- Imaging: sensors, interfaces (esp. IEEE1394/IIDC/DCAM), optics, camera calibration, illumination and software (PointGrey, Matrox Imaging Library)
- Computer vision / image processing (MATLAB, OpenCV and custom algorithms in C/C++)
- Signal processing (MATLAB/Simulink)
- Control systems (MATLAB/Simulink)
- Programming: C/C++ (Microsoft Visual Studio, real-time multithreaded programming/debugging), MATLAB/Simulink, LabVIEW, Turbo Pascal, Mathematica, BASIC, Assembler, PLC ladder logic
- Development of custom electronics from concept to prototyping to final implementation (OrCAD Capture and Layout)
- Manufacturing processes: machining (cutting, bending, drilling, tapping, milling, turning, sinker electrical discharge machining), moulding (injection, extrusion and blow), printing (serigraphy, hot stamping)

PERSONAL TRAITS

- Effective and accurate communication
- Problem solving, strong analytical skills and attention to details
- Creativity, development of new ideas
- Initiative and self-motivation
- Appreciation for diversity of thinking
- Collaboration

WORK/RESEARCH EXPERIENCE

Senior Researcher (Independent Contractor) Sep 2015-Dec 2015

University of Toronto, Toronto, ON, Canada – Institute of Biomaterials & Biomedical Engineering, Eye Movements & Vision Research Laboratory

Provided research support for the development of advanced gaze estimation systems.

Research Scientist Mar 2015-Aug 2015

EyeCheck Solutions Inc., Kitchener, ON, Canada

Worked on projects related to eye screening and optical measurements for prescription eyeglasses.

Director of Advanced R&D Jun 2014-Dec 2014

Eyediya Technologies Inc., Toronto, ON, Canada

Worked on low-cost and low-power yet robust and accurate eye tracking solutions.

Senior Postdoctoral Fellow Nov 2013-Apr 2014

University of Toronto, Toronto, ON, Canada – Department of Electrical & Computer Engineering, and Institute of Biomaterials & Biomedical Engineering, Eye Movements & Vision Research Laboratory

Contributed to the foundations of a low-cost / low-power eye tracking platform for mobile devices.

Independent Researcher Aug 2013-Oct 2013

Developed a model for visible-spectrum eye tracking under natural head movements.

Contractor (short term, part-time) May 2013-Aug 2013

University of Toronto, Toronto, ON, Canada – Department of Electrical & Computer Engineering, and Institute of Biomaterials & Biomedical Engineering, Eye Movements & Vision Research Laboratory

Assembled and tested five single-camera eye trackers to be used in various research projects.

Postdoctoral Fellow Aug 2009-Aug 2011

Toronto Rehabilitation Institute, Toronto, ON, Canada – Research Department, Rehabilitation Engineering Laboratory

Developed gaze-based assistive technologies for severely motor-impaired individuals.

Graduate Student / Postdoctoral Fellow Sep 2000- Sep 2011

University of Toronto, Toronto, ON, Canada – Department of Electrical & Computer Engineering, and Institute of Biomaterials & Biomedical Engineering, Eye Movements & Vision Research Laboratory

Developed novel, cutting-edge video-based remote eye tracking technologies. These technologies use one or more video cameras to determine where a person is looking in space, without making physical contact with the person. The major milestones of my work on eye tracking include the development of:

- A general 3-D mathematical model for video-based point-of-gaze estimation that contributed significantly to shift the remote eye tracking field from 2-D black-box mapping techniques sensitive to head movements to 3-D model-based gaze estimation methods that are insensitive to head movements.
- The first remote eye tracker reported in the literature that could estimate the point-of-gaze accurately in the presence of head movements using only eye images captured by a single camera without moving parts (minimal system complexity). It had accuracy better than 1º of visual angle, comparable to the best commercial remote eye trackers.
- The first remote eye tracker successfully demonstrated with infants. It could accurately measure relative eye movements without personal calibration and estimate the point-of-gaze after completing a single-point personal calibration routine (minimal subject cooperation); in contrast, commercial eye trackers use multiple calibration points (typically 5-9 points). The point-of-gaze estimation accuracy was 0.4-0.6º of visual angle in the presence of head movements. This technology can enable applications with infants and mentally challenged individuals, which are very difficult or impossible with commercial eye trackers.

Exchange Research Student Apr 1999-Jun 1999

Universitat Politècnica de Catalunya, Barcelona, Spain – Department of Electronic Engineering

Developed virtual instrumentation with LabVIEW to monitor 3-phase power systems.

Undergraduate Research Student Mar 1997-Aug 2000

Universidad Tecnológica Nacional - Facultad Regional Paraná, Argentina

Developed a DC servomotor, including modeling, system identification, controller design (proposed a novel formula for tuning PID controllers), and hardware/software implementation.

EDUCATION

University of Toronto, Toronto, ON, Canada
Department of Electrical & Computer Engineering, and Institute of Biomaterials & Biomedical Engineering

PhD degree May 2003-Oct 2009
Thesis: "Remote, non-contact gaze estimation with minimal subject cooperation"
Supervisor: Prof. Moshe Eizenman

MASc degree Sep 2000-Apr 2003
Thesis: "A novel head-free point-of-gaze estimation system"
Supervisor: Prof. Moshe Eizenman

Universidad Tecnológica Nacional - Facultad Regional Paraná, Argentina

Electronics Engineering degree (graduated with honors) Apr 1992-Apr 1999
Thesis: "Position control with a DC motor"
Supervisor: Prof. Eduardo J. Adam

SCHOLARSHIPS, FELLOWSHIPS, AWARDS AND PRIZES

Postdoctoral Fellowship (CAD$ 90,000)	Aug 2009-Aug 2011
8 Graduate Scholarships/Fellowships (approx. CAD$ 105,500)	Sep 2000-Aug 2008
Undergraduate Exchange Scholarship for research in Spain	Apr-Jun 1999
2 Undergraduate Research Scholarships	Mar 1997-Feb 1999
2 Paper Awards	1999, 2009
First Prize of the First Level of the Argentine Mathematics Olympiad	1988

PUBLICATIONS

3 papers in refereed journals; 1 journal paper with 295 citations (as reported by Google Scholar)

16 papers in refereed international conference proceedings

1 abstract in an international conference proceedings

Total of ~490 citations

TEACHING EXPERIENCE

Course instructor/lecturer, *Control Systems*	Aug 1998-Aug 1999
Teaching assistant, *Fundamentals of Electricity and Electric Circuits* (Spring 2005), *Linear Systems and Communications* (Fall 2001/2002), *Electrical Fundamentals* (Spring 2002), *Signals and Systems Analysis* (Apr-Aug 2000), *Control Systems* (Apr-Aug 1998, Aug 1999-Aug 2000)	Apr 1998-May 2005

SUPERVISION

1 undergraduate thesis student	Sep 2009-Apr 2010
8 summer research students	Summers 2003-2008
1 exchange research student	Aug-Oct 1998

PROFESSIONAL SERVICES

Reviewer for IEEE Transactions on Human-Machine Systems	Feb 2016
Reviewer for IEEE Transactions on Multimedia	Dec 2013
Reviewer for the Sixth and Seventh Symposiums on Eye Tracking Research and Applications (ETRA 2010 and ETRA 2012)	Mar 2010, Mar 2012
Session chair at the Fifth Symposium on Eye Tracking Research and Applications (ETRA 2008)	Mar 2008

LANGUAGES

English (full professional proficiency)

Spanish (full professional proficiency)