

David Rozado

Lecturer

Otago Polytechnic

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Research Interests

Assistive Technologies, Human Computer Interaction, Accessibility, Gaze Interaction, Machine Learning, Brain Computer Interfaces

Work Experience

Lecturer

Otago Polytechnic

April 2015 - Present



- » Lecturer of Web Programming paper
- » Lecturer of Machine Learning paper
- » Supervisor of Bachelor Capstone projects
- » Research on Accessibility Software
- » Creation of a repository of open source assistive technology software

Postdoctoral Fellow

CSIRO

January 2012 - April 2015



- » Built an EEG-based motor imagery Brain Computer Interface intended for rehabilitation of upper extremity paralysis using a thought-driven exoskeleton
- » Built an EEG-based cognitive load detector
- » Researched the improvement of Brain Computer Interfaces using pupil diameter tracking
- » Used of real time pupil size monitoring for assessment of cognitive load
- » Built a network of low cost eye trackers to capture the gaze behavior of several remote visitors to a museum
- » Explored augmented HCI using Eye Tracking to speed up routine HCI input task such as target acquisition, text editing, text selection and drag and drop operations
- » Built low cost wireless Eye Tracking Glasses for innovative interaction with objects in the environment via gaze and hand gestures

- » Optimized an algorithm for DNA Origami Design using caDNAno by providing visual feedback about strands melting temperature to the DNA origami designer
- » Developed an app for monitoring heart rate using a video stream taken from a WebCam
- » Developed an app for interacting with a computer using facial gestures captured using a deformable face tracker
- » Developed a plug-in to improve the performance of speech recognition by using gaze assisted corrections of misrecognized words

Research and Teaching Graduate Assistant

Universidad Autonoma de Madrid

February 2007 - December 2011



- » Carried out research tasks for my Ph.D thesis on the topic of Hierarchical Temporal Memory (HTM), a bioinspired pattern recognition algorithm
- » Implemented the HTM theoretical framework into a software library for image recognition, sign language recognition and gaze gestures recognition
- » Involved in teaching cores in the courses: Introduction to Computer Science and Fundamentals of Informatics

Research Assistant

Max Planck Institute for Molecular Genetics

November 2003 - October 2005



MAX-PLANCK-GESELLSCHAFT

- » Software Development / Data Analysis
- » Developed algorithm for selection of over 10,000 gene transcript representative clones for the EURexpress project
- » Developed software for in-silico detection of Exon Splicing Enhancers in human genome
- » Developed software for visualization of Chromosome 21 gene expression patterns in mouse

Technical Skills

Python	C++	Microsoft Office
Matlab	C#	Eclipse
Perl	Java	Visual Studio
R	Latex	R Studio
JavaScript	HTML	EEGLab
Django	CSS	BCILab
C	mySQL	caDNAno

Education

Ph.D in Computer Science

Universidad Autónoma de Madrid

August 2011



During my Ph.D I studied a connectionist machine learning algorithm known as

Hierarchical Temporal Memory, or HTM. HTM is bioinspired on some of the working principles employed by the neocortex to create invariance, namely spatio-temporal coding and a hierarchical topology of learning units or nodes. Particularly, I explored the optimization of HTM algorithms to spatio-temporal patterns that unfold over time. My algorithm reached state-of-the-art performance on the automatic recognition of sign language and on a new paradigm of eye tracking interaction: gaze gestures recognition.

M.Sc. in Bioinformatics

Freie Universität Berlin

August 2005



During my Master Degree studies, I took classes in a wide array of areas: Computer Programming, Biological Networks, Data Analysis, Signal Pathways, Cognitive Neuroscience, Data Structures, Algorithms and Computational Mathematics. I carried out my master's thesis on the selection of genetic sequences for the transcriptome-wide mapping project known as EURexpress at the Max Planck Institute for Molecular Genetics under the supervision of Prof. Dr. Hans Lehrach.

B.Sc. in Information Systems

Boston University

May 2002



I completed my undergraduate degree in Information Systems. The degree consisted of the traditional Business set of courses: Financial Accounting, Managerial Accounting, Mathematical Finance, Management as a System, Marketing, Operations Management, Managerial Statistics, Business Law, Human Resources, Information Systems Management and Strategic Planning. I specialized in the sub-field of Management of Information Systems by taking classes in: Database Administration and Design, Object Oriented Programming, C++ Programming, Network Architecture and Systems Design. Due to my interest in Bioinformatics, I also got a Minor in molecular biology, taking classes in: Molecular Biology, Genetics, Biochemistry, Organic Chemistry and Bioinformatics.

Publications

Google Scholar Profile

Citations:	382
h-index:	7
i10-index:	6

FaceSwitch-Low-Cost Accessibility Software for Computer Control Combining Gaze Interaction and Face Gestures

D Rozado, J Niu, A Duenser. *Proceedings of the Annual Meeting of the Australian Special Interest Group for Computer Human Interaction*

Combining EEG with Pupillometry to Improve Cognitive Workload Detection

D Rozado, A Dunser. *Computer 48 (10)*, 18-25

Improving Video Based Heart Rate Monitoring

J Lin, D Rozado, A Duenser. *23rd Australian National Health Informatics Conference (HIC 2015)*

Gaze dependant prefetching of web content to increase speed and comfort of web browsing

D Rozado, A El Shoghri, R Jurdak. *International Journal of Human-Computer Studies* 78, 31-42

Visual and Manual Control for Human-Robot Tele-operation

A Duenser, M Lochner, U Engelke, D Rozado. *IEEE Computer Graphics and Applications*, 1-1

Improving the Performance of an EEG-Based Motor Imagery Brain Computer Interface Using Task Evoked Changes in Pupil Diameter

D Rozado, A Duenser, B Howell. *PloS one* 10 (3), e0121262

Controlling a Smartphone Using Gaze Gestures as the Input Mechanism

D Rozado, T Moreno, J San Agustin, FB Rodriguez, P Varona. *Human-Computer Interaction* 30 (1), 34-63

Interacting with objects in the environment using gaze tracking glasses and speech

D Rozado, L Stephen, N Kottege. *Proceedings of the 26th Australian Computer-Human Interaction Conference on Designing Futures*

Low cost human-robot gaze estimation system

K Ishac, D Rozado. *Proceedings of the 26th Australian Computer-Human Interaction Conference on Designing Futures*

Gaze enhanced speech recognition for truly hands-free and efficient text input during HCI

MV Portela, D Rozado. *Proceedings of the 26th Australian Computer-Human Interaction Conference on Designing Futures*

Mouse and keyboard cursor warping to accelerate and reduce the effort of routine HCI input tasks

D Rozado. *Human-Machine Systems, IEEE Transactions on* 43 (5), 487-493

Using gaze based passwords as an authentication mechanism for password input

D Rozado. *17th European Conference on Eye Movements. ECEM 2013, Lund, Sweden.*

Distributed Eye Tracking Network for Conveying Gaze of Remote Users in a Robotic Telepresence Scenario

D Rozado, B Ward, F Pauling. *17th European Conference on Eye Movements. ECEM 2013, Lund, Sweden.*

Interacting with Objects in the Environment by Gaze and Hand Gestures

J Hales, D Rozado, D Mardanbegi. *17th European Conference on Eye Movements. ECEM 2013, Lund, Sweden.*

Visualization of strand melting temperature in DNA Origami Design using caDNAno

D Rozado, P Valencia, G Coia, B Muir, O Hutt, D Winkler. *International Conference on Emerging Advanced Nanomaterials - ICEAN*

Low cost remote gaze gesture recognition in real time

D Rozado, FB Rodriguez, P Varona. *Applied Soft Computing* 12 (8), 2072-2084

Extending the bioinspired hierarchical temporal memory paradigm for sign language recognition

D Rozado, FB Rodriguez, P Varona. *Neurocomputing*

A high-resolution anatomical atlas of the transcriptome in the mouse embryo

G Diez-Roux, S Banfi, M Sultan, L Geffers, S Anand, D Rozado, A Magen, *PLoS Biol* 9 (1), e1000582

Gaze gesture recognition with hierarchical temporal memory networks

D Rozado, F Rodriguez, P Varona. *Advances in Computational Intelligence*, 1-8

Gliding and Saccadic Gaze Gesture Recognition in Real Time

D Rozado, J San Agustin, F Rodriguez, P Varona. *ACM Transactions on Intelligent Interactive Systems*

Teaching

Web programming 3

Otago Polytechnic

Semester 1 - 2015, 2016



In this paper, students study modern techniques in the design and delivery of information and functionality across the Web. Topics include the Django server side Framework, the MVC Design Pattern, JavaScript, AJAX, HTML5, CSS3, Bootstrap, Angular JS, RESTful APIs and responsive design for multiple devices. This paper extends the skills and knowledge from Introductory Web Programming and Development, to cover enterprise scale systems and complex architectures.

Data Science and Machine Intelligence

Otago Polytechnic

Semester 2 - 2015



This course provides a broad introduction to Machine Intelligence/Data Science with an emphasis on the intuition and the applications behind the concepts. The course aims for students to be able to analyse a data problem and based on a reasoned argument choose and deploy the appropriate machine learning tool to solve the problem and obtain useful/actionable information from the raw data. Possible applications are: automated medical diagnosis, recommender systems, anomaly detection agents, pattern recognition, time series predictions, dimensionality reduction, autonomous navigation, clustering, predictive systems and biometrics.

Final Year Capstone Project

Otago Polytechnic

Semester 1 and 2 - 2015, 2016



During the final year of the Bachelor program in Information Technology students are involved in a group based capstone project that spans 2 semesters. During Project the students need to work for an external client to create a specific software or hardware

system that addresses a real world problem for the client. My role in the capstone project has been to serve as supervisor of several student groups to keep them on track and provide technical advice and guidance in order to help them realize the final goals of their project.

Human Computer Interaction

University of Tasmania

Semester 2 - 2014



Course for 3rd and final year undergraduate students, and also postgraduates. This course introduces students to the theory and practice of developing user interfaces. Practical concerns are balanced by discussion of relevant theory from the literature of computer science (graphics, software engineering, multimedia), cognitive psychology, and industrial design. Students who take this class develop practical user interface design skills, an understanding of the human side of computing, an appreciation of the significance of historical case studies and a forward looking attitude about future directions in HCI.

Wireless Sensor Networks

The University of Queensland

Semester 2 - 2012, 2013



Course for 3rd and final year undergraduate students, and also postgraduates. A variety of topics in the field of Sensor Networks is covered: sensors, actuators, storage and debugging, IPv6 routing, TCP/UDP, localization, mobility tracking, time synchronization, sensing for health applications, multimedia sensor networks and energy efficiency. The course combines lectures and group project work: lab projects, a final project demo and a final project presentation.

Introduction to Computer Science

Universidad Autónoma de Madrid

Semester 1 - 2009



An undergraduate course in the school of engineering at Universidad Autónoma de Madrid. The course is a crash course on the MATLAB environment and the corresponding programming language paradigm. The course covers topics about: data structures, flow control, functions, recursivity, input/output and algorithms.

Fundamentals of Informatics

Universidad Autónoma de Madrid

Semester 1 - 2008



An undergraduate course offered by the school of computer science at Universidad Autónoma de Madrid. The course is an overview of fundamental concepts on computer science. The topics covered are: hardware and software, digital representation of information, operating systems and introduction to programming.

- » ICT Centre Teamwork Award 2013 - Mobile Telepresence for Museums
 - » Graduated Summa Cum Laude from Universidad Autonoma de Madrid, 2011
 - » Doctoral Fellowship for Training of University Professors
 - » Doctoral Fellowship for Training of Doctoral Researcher
 - » Member of Spanish National Team at the 1997 Paris Swimming World Cup
 - » Member of Spanish National Team at the XXIII European Swimming Championships
 - » Gold Medal at 97' Spanish Nationals in 200 Fly
 - » Silver Medal at 97' Spanish Nationals in 400 Free
 - » Most Valuable Player (MVP) of BU Swimming Team, 1999-2000,2000-2001,2001-2002 seasons
 - » Academic Excellence Award for Student Athletes 1999- 2000,2000-2001,2001-2002 seasons
 - » Dean's List 2000, 2001 and 2002
 - » Graduated Cum Laude from Boston University
 - » Full Merit Scholarship at Boston University
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Continuing Education

R Programming

CSIRO

November 2014

Statistics in SPSS

Australian Consortium for Social and Political Research

July 2014

Neuropsychology and Education

Universidad Complutense de Madrid

August 2009

Certificate of Pedagogical Aptitude

Universidad Alfonso X - El Sabio

March 2009

Innovation in the Classroom

Universidad Camilo Jose Cela

July 2009

Leveraging New Technologies in an Educational Context

Universidad Camilo Jose Cela

July 2009

Educational Research

Universidad Camilo Jose Cela

July 2009

Visiting Scholar

Nano-Robotics Lab

Tohoku University

March 2013



Visited the Nano Robotics Lab of research partners as part of an Australian-Japan Foundation grant to explore collaboration opportunities in the field of DNA Origami.

Wyss Institute for Biologically Inspired Engineering



HARVARD
UNIVERSITY

Harvard University

April 2012

Worked at the Wyss Institute For Bioinspired Nanotechnology, in the development of a plug-in for caDNAno in the context of DNA Origami Design.

Institute for Science Innovation and Society



Oxford University

February 2011 - March 2011

Visited the Institute For Science, Innovation and Society at the Said Business School.

Gaze Group

IT University of Copenhagen

Aug 2010 - Nov 2005



IT-Universitetet
i København

Worked with the Gaze Group in the development of a gaze tracking application for the recognition of gaze gestures.

Grants

EAD Competitive Research Grant

Otago Polytechnic

Amount: \$27,000

February 2016

Grant targeted at the creation of open source accessibility software for motor impaired users.

2015 Establishment Grant

Royal Hobart Research Foundation

Amount: \$24,300

November 2015

Grant targeted for the creation of an Assistive Technology exoskeleton for motor rehabilitation.

International Collaboration Grant

Australia Japan Foundation

Amount: \$20,000

May 2012

References

Andreas Duenser

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Grahame Rosolen

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