Ph.D. Christian **Arzate Cruz**

PH.D. COMPUTER SCIENCE

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Education

Ph.D. in Computer Science (Grade: 98/100)

Estado de México, México

TEC DE MONTERREY *2013 - 2018*

- Thesis: HRLB^2: A Game AI Architecture For Believable Bots That Unifies the Elements of Flow and Reinforcement Learning
- Thesis Advisor: Jorge Adolfo Ramirez Uresti
- Description: My work is aimed towards maximizing the player's enjoyment through artificial intelligence techniques in real-time. Specifically, my thesis' main objective was to create non-player characters that behave in a human-like manner. Our approach to achieve this goal is based on reinforcement learning techniques.

M.Sc. in Computer Science (Grade: 96/100)

Estado de México, México

TEC DE MONTERREY *2010 - 2011*

- Graduated with honors
- Thesis: Body Part Detection Using a Low Cost Depth Camera
- Thesis Advisor: Isaac Rudimín Goldberg
- Description: The main objective of my dissertation was to design and implement real- time algorithms to detect body parts using the Kinect depth camera. Our algorithms make use of parallel computing – they were coded in the GPU (CUDA). The principal application of the proposed algorithms was the generation of human-like crowd behaviors.

B.Sc. Mechatronics Engineering (Grade: 90/100)

Estado de México, México

TEC DE MONTERREY *2004 - 2009*

- Graduated with honors
- Specialization: Automotive engineering
- Description: For my specialization in automotive engineering, I took courses of mechanical vibrations and the finite element method.

Research Experience

Project Researcher

Tokyo, Japan

THE UNIVERSITY OF TOKYO *2019 - present*

- Takeo Igarashi Laboratory
- Description: My research currently focuses on creating aligned agent behaviors. One open challenge in this research area is creating effective communication channels between the agent and the user. From the user agent, this channel has to enable it to explain its decision procedure to the user. From the user standpoint, communication has to provide her with the tools to give precise feedback to the agent. I, and my collaborators at the Igarashi Lab, tackle this challenge by designing human-computer interaction methods that minimize the needed human feedback, and reinforcement learning based agents that explain their thinking process.

Professional Experience

Research Assistant

California, USA

HEWLETT PACKARD LABS *2012 - 2013*

- Laboratory: Mobile and Immersive Experiences
- Description: I developed artificial vision based technologies aimed to improve the man-machine interaction of Hewlett-Packard systems for the visualization of data on 3D displays in real-time.
- Computer vision: I designed and implemented a real-time camera calibration system for arrays of projectors. This calibration system facilitates the constructions of more precise panoramas.
- Computer graphics: I ported a multimedia engine to OpenGL. This engine was mainly used for creating 3D environments for stereoscopic displays. Additionally, I implemented a 3D engine aimed to visualize and manipulate big data sets of social networks.
- Man–machine interaction: I participated in the design and implementation of a gesture based interface using the Leap Motion depth camera.

Honours & Awards

COMECYT	**Studies Financial Support**, living expenses support throughout the duration of Ph.D. studies.	*2017 - 2018*
Tec de Monterrey	**Tuition Scholarship**, full tuition support as a student of Ph.D. program in Computer Science.	*2013 - 2018*
CONACyT	**National Studies Financial Support**, living expenses support throughout the duration of Ph.D. studies.	*2013 - 2016*
Tec de Monterrey	**Honors**, graduated with honors from M.Sc. in Computer Science	*2011*
Tec de Monterrey	**Honors**, graduated with honors from B.Sc. in Mechatronics Engineering	*2009*

Teaching Experience

Part-Time Faculty Member *Estado de México, México*

Universidad Mexicana de Innovación en Negocios *2016*

- Teacher of undergraduate students on *operating systems* and *computational architecture courses.*

Believable Bots Lecture *Estado de México, México*

Tec de Monterrey *2017*

- Invited by Ph.D. Jorge Adolfo Ramírez Uresti to give an introductory lesson on the creation of human-like behaviors for non-player characters to students of the last semester in Computer Science Engineering.

Selected Publications

2020	**A Survey on Interactive Reinforcement Learning: Design Principles and Open Challenges**, Christian Arzate Cruz, and Takeo Igarashi. Designing Interactive Systems Conference (DIS).	*Conference*
2020	**Interactive Design Exploration of Game Stages Using Adjustable Synthetic Testers**, Hirotaka Suetake, Tsukasa Fukusato, Christian Arzate Cruz, Andy Nealen, and Takeo Igarashi. Conference on the Foundations of Digital Games (FDG).	*Conference*
2018	**HRLB^2: A Reinforcement Learning Based Framework for Believable Bots**, Christian Arzate Cruz and Jorge Adolfo Ramirez Uresti. Applied Sciences.	*Journal*
2017	**Player-centered game AI from a flow perspective: Towards a better understanding of past trends and future directions**, Christian Arzate Cruz and Jorge Adolfo Ramirez Uresti. Entertainment Computing.	*Journal*
2013	**A Game AI Architecture for Believable Bots**, Christian Arzate Cruz and Jorge Adolfo Ramirez Uresti. Mexican International Conference on Artificial Intelligence.	*Doctoral Consortium*

Reviewer

2018	**Springer 3D Research**	*Journal*
2017	**IEEE Transactions on Computational Intelligence and AI in Games**	*Journal*
2017	**Entertainment Computing**	*Journal*

Technical Skills

Programming Skills

- My background includes parallel computing and, data-driven programming techniques. My main programming languages are: **C**, **C++**, **CUDA**, **OpenCL**, **Matlab**, and **Java**. Furthermore, since my work focus on computer graphics and game AI, I have experience in the next programming libraries: **OpenGL** and **OpenCV**.

Languages

- English (TOEFL score: 615/677)