Carlos Alfredo Tirado Cortes

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Sydney, New South Wales, Australia

MY RESEARCH

My research expertise lies in Human-Computer Interaction in Virtual Reality and Augmented Reality. My research interests are how humans react to complex immersive environments and interfaces, how interactions enable communication with immersive spaces, and different alternative input methodologies in Virtual and Augmented reality. I am currently investigating the design of different interfaces and interactions for multiplatform XR visualization systems. Other research interests include locomotion in VR, VR sickness, and game technologies.

EDUCATION

Ph.D. Human-Computer Interaction   2021
University of Technology, Sydney

Thesis Title: Providing Safer Virtual Reality Experiences with the Help of Brain-Computer Interfaces
Advisor: Distinguished Professor CT-Lin
Co-Advisor: Dr. Tim Chen

Msc Computer Game Engineering   2015
Newcastle University

Thesis Title: Just-in-time collaborative path-finding for AI agents

B.S. Engineering in Information and Communication Technologies   2012
Instituto Technologico y de Estudios Superiores de Monterrey, Campus Laguna

RESEARCH EXPERIENCE

Lecturer in Interaction Design   October 2024 - Present
Discipline of Design, Sydney School of Architecture, Design and Planning
The University of Sydney

I currently follow three main research streams. First, I work on using Mixed Reality as a tool for disaster resilience during extreme weather events. Second, I try to understand cybersickness and its effects on the human body while walking in virtual environments. Third, I study how body kinematics can be interaction inputs with multiple elements of the metaverse, such as virtual avatars or the teleoperation of robots.

ARC Laureate Postdoctoral Fellow in Intelligent Visualization   February 2021 - September 2024
iCinema Centre for Interactive Cinema Research
The University of New South Wales

Through my time at iCinema, I mainly worked under the Laureate Project *iFire*. The project focused on building an Intelligent Visualization System capable of realistically depicting the behaviour of wildfires. One of the project's main achievements was developing data processing and visualization pipelines for wildfire data. Led the design of interactive methods that help enable the system to be used by firefighter training academies.

Research Support   August 2017 - December 2020
Computer Intelligence and Brain-Computer Interfaces Centre
University of Technology, Sydney

I Worked as research support on topics complementary to my main PhD research. I participated in three research projects. One was spatial navigation in VR, where I helped develop experiments to study the cognitive processes of navigation and workload inside VR systems. The second project was navigation techniques for AR systems, where I worked on creating a HoloLens app with a novel AR navigation technique. I worked on a neurofeedback pain relief project, where I worked on a neurofeedback system intended to modulate spinal cord pain with an EEG-controlled video game. Other responsibilities included the development of Unity VR/AR apps to be used for research experiments.

PhD Candidate   February 2017 - August 2020
Computer Intelligence and Brain-Computer Interfaces Centre
University of Technology, Sydney

My thesis focused on the user's physical safety while interacting with a VR scene. I investigated the two main safety issues of VR systems: postural instability and VR sickness. My focus was understanding the body kinematics of postural imbalance in VR users and its relationships with common EEG signals. The thesis's main findings were that EEG signals can be used to detect VR sickness and, in conjunction with other sensors such as body trackers, postural instability.

PUBLICATIONS BC=Book Chapter, C=Conference, J=Journal, P=Poster, T=Thesis, W=Workshop

[C.1] **Carlos A. Tirado Cortes**, et al. (2025). **Designing an Immersive Wildfire Visualization System for Firefighters.** In *Extended Abstracts of the CHI Conference on Human Factors in Computing Systems (CHI EA 25)*. April 26- May 1, 2025, Yokohama, Japan. https://doi.org/10.1145/3706599.3719903

[C.2] Mario Flores Gonzalez, **Carlos A. Tirado Cortes**, and Dennis del Favero. (2025). **Tablet as an Enabler for Immersive Visceral Experiences.** In *Extended Abstracts of the CHI Conference on Human Factors in Computing Systems (CHI EA 25)*. April 26- May 1, 2025, Yokohama, Japan. http://dx.doi.org/10.13140/RG.2.2.30528.03843

[C.3] Kevin Cheung, Dennis Del Favero, Jason Sharples, **Carlos A. Tirado Cortes**. (2024). **Numerical Study of the Montana Bridger Foothills Wildfire in 2020 through Idealized and Real-case WRF-SFIRE Simulations**. In *International Fire Behaviour and Fuels Conference 2024*. April 2024, Canberra, Australia. DOI:10.13140/ RG.2.2.15499.91684. **[Conference Presentation Only]**

[C.4] **Carlos A. Tirado Cortes**, et al. (2023). **An EEG-based Experiment on VR Sickness and Postural Instability While Walking in Virtual Environments**. In *2023 IEEE Conference Virtual Reality and 3D User Interfaces (VR)*, pp. 94-104. IEEE. March 2023, Shanghai, China. DOI: 10.1109/vr55154.2023.00025

[C.5] Avinash Kumar Singh, Jia Liu, **Carlos A. Tirado Cortes**, Chin-Teng Lin (2021). **Virtual Global Landmark: An Augmented Reality Technique to Improve Spatial Navigation Learning**. In *Extended Abstracts of the 2021 CHI Conference on Human Factors in Computing Systems*, Association for Computing Machinery. DOI: 10.1145/3411763.3451634

[C.6] Tien-Thong Nguyen Do, Avinash K. Singh, **Carlos A. Tirado Cortes**, Chin-Teng Lin. (2020). **Estimating the cognitive load in physical spatial navigation**. In *2020 IEEE Symposium Series on Computational Intelligence (SSCI)*, pp. 568-575. IEEE. DOI: 10.1109/SSCI47803.2020.9308389

[C.7] **Carlos A. Tirado Cortes**, et al. (2019). **Analysis of VR Sickness and Gait Parameters During Non-Isometric Virtual Walking with Large Translational Gain**. In *Proceedings of the 17th ACM SIGGRAPH International Conference on Virtual-Reality Continuum and Its Applications in Industry*, Association for Computing Machinery. November 2019, Brisbane, Australia. DOI: 10.1145/3359997.3365694

[J.1] **Carlos A. Tirado Cortes**, et al. (2023). **Analysis of Wildfire Visualization Systems for Research and Training: Are They Up for the Challenge of the Current State of Wildfires?**. *IEEE Transactions on Visualization and Computer Graphics*, Vol. 30, Issue 7, pp. 4285-4303. DOI: 10.1109/TVCG.2023.3258440. **[Invited to Present at IEEE VIS 2023]**.

[J.2] Negin Hesam-Shariati, Toby Newton-John, Avinash K. Singh, **Carlos A. Tirado Cortes**, Thomas Do et al. (2020). **Evaluation of the effectiveness of a novel brain-computer interface neuromodulative intervention to relieve neuropathic pain following spinal cord injury: protocol for a single-case experimental design with multiple baselines**. *JMIR Research Protocols*, Vol. 9, Issue 9, DOI: 10.2196/20979

[J.3] **Carlos A. Tirado Cortes**, et al. (2019). **Evaluating Balance Recovery Techniques for Users Wearing Head-Mounted Display in VR**. *IEEE Transaction on Visualization and Computer Graphics*, Vol. 27, Issue 1, pp. 204-215. DOI: 10.1109/TVCG.2019.2927477

[BC.1] Khalid Moinuddin, **Carlos A. Tirado Cortes, Ahmad Hassan**, et al. (2024). **Simulation of Extreme Fire Event Scenarios Using Fully Physical Models and Visualisation Systems**. *In: Del Favero, D., Thurow, S., Ostwald, M.J., Frohne, U. (eds) Climate Disaster Preparedness. Arts, Research, Innovation and Society. Springer, Cham*. DOI: 10.1007/978-3-031-56114-6_5.

[BC.2] Baylee Brits, Yang Song, **Carlos A. Tirado Cortes** (2024). **). Immersive Visualisation Systems as Alignment Strategies for Extreme Event Scenarios**. *In: Del Favero, D., Thurow, S., Ostwald, M.J., Frohne, U. (eds) Climate Disaster Preparedness. Arts, Research, Innovation and Society. Springer, Cham*. DOI: 10.1007/978-3-031-56114-6_6.

[P.1] **Carlos A. Tirado Cortes**, et al. (2024). **iFire: Combining AI and Immersive Visualisation to Enhance Fire Training Sensemaking**. In *AFAC 2024*. September 2024, Sydney, Australia. DOI: 10.13140/RG.2.2.30153.76641

[P.2] **Carlos A. Tirado Cortes**, et al. (2019). **Analysis of VR Sickness and Gait Parameters During Non-Isometric Virtual Walking with Large Translational Gain**. In *VRST 19: Proceedings of the 25th ACM Symposium on Virtual Reality Software and Technology*. November 2019. Sydney, Australia. DOI: 10.1145/3359996.3364741

[P.3] Thomas Do, Chin-Teng Lin, **Carlos A. Tirado Cortes**, Avinash K. Singh, et al. (2019). **Human brain dynamics during navigation with natural walking under different workload conditions in VR by using the mobile brain/body imaging approach.** In *Society for Neuroscience 2019*.

[W.1] Liquan Liu, **Carlos A. Tirado Cortes**, Howe Yuan Zhu. (2025). **Digital Playground: Is the Metaverse safe for my child?**. In *CHI2025: The Third Workshop on Building an Inclusive and Accessible Metaverse for All*. April 26, 2025, Yokohama, Japan.

[T] **Carlos Alfredo Tirado Cortes** (2020). **Providing safer Virtual Reality experiences with the help of Brain-Computer Interfaces.** PhD Thesis.

RESEARCH IMPACT

- **iFire and the ABC (2025):** The Australian Broadcasting Corporation implemented the iFire system as part of a news piece to inform the public about the dangers of wildfires. [link]
- **iFire and Fire and Rescue New South Wales (2024):** The iFire system was implemented in the Fire and Rescue New South Wales training academy as part of its firefighter training suite. [link 1 and link 2]
- **Penumbra 1.0 (2022):** Dennis Del Favero, Susanne Thurow, Carlos A. Tirado Cortes, Alex Ong, Navin Brohier, and Nagida Helsby-Clark presented Penumbra 1.0 at the Düsseldorf Cologne Open in 2022. [video demonstration]

TEACHING EXPERIENCE

Lecturer in Interaction Design   October 2024 - Present
Discipline of Design, Sydney School of Architecture, Design and Planning
The University of Sydney
[**Subject Coordination**]: I coordinated subject IDEA9103: Creative Coding for semester 1, 2025.
[**Teaching**]: I taught the subjects of Creative Coding and Introduction to Design in Virtual Reality.
[**Capstone Research Students**]: I mentored one master's student for their capstone project in Human-Computer Interaction. I mentored one external capstone student in data analytics at the University of Adelaide and one external capstone student in the University of Technology, Sydney, in Virtual Avatars.

Casual Academic   August 2017 - December 2020
School of Computer Science, Faculty of Engineering and IT
University of Technology Sydney
[**Teaching**]: A series of courses through the School of Computer Science such as .Net Application Development, Software Engineering Studio I, II, III; Introduction to Computer Graphics, and Interactive Media.
[**Capstone Supervision**]: Supervised one capstone student in developing Android Mobile Applications.

PROFESSIONAL EXPERIENCE

- **iCinema Research Deputy Director**   *2022 - 2024*
  iCinema Centre for Interactive Cinema Research/The University of New South Wales   Sydney, Australia
  - Performed Administrative roles like center reports and meeting chairing.
  - Representing center in Faculty's Engagement and Impact committee.
  - Research Support for grant writing.
  - Communication with national and international stakeholders.
  - Research project management and student mentoring.

- **Unreal AR/VR Developer**   *2020*
  7DX   Sydney, Australia
  - Development of AR, VR and Mobile Applications using Unreal Engine.

- **Android Developer**   *2016 - 2017*
  Cratebind LLC   Remote
  - Development of multiple Android applications for multiple stakeholders.

- **Android Developer and Founder**   *2015*
  Five or Less   Newcastle Upon Tyne, UK
  - Find multiple funding streams to fund our project.
  - Development of a mobile platform for iOs and Android.

- **Software Engineer**   *2013 - 2014*
  Cytruss Enterprise Management   Gomez Palacio, Mexico
  - Part of the software research team in developing new products for the company.
  - Development of multiple Android applications for internal projects.

- **Android Mobile Developer**   *2013*
  El Directorio MX   Torreon, Mexico
  - Development of multiple Android and .NET projects for the *El Directorio* platform.

COURSES AND CERTIFICATIONS

- **Sydney XR Research Methods Summer School** [Sydney Human-Centered Computing Group]   *January 2025*
- **Introductory Statistics for Researchers Using R** [Stats Central UNSW]   *July 2022*

SERVICE

- **Demo Chair**, OzCHI 2025 — *2025*
- **Local Arrangements Chair**, IEEE International Symposium on Mixed and Augmented Reality (ISMAR) — *2023*
- **Meta Review Chair**, International Conference on Quality of Multimedia Experience — *2022*
- **Co-Editor**, MDPI Electronics Special Issue on "Advances in Augmenting Human-Machine Interface" — *2021*
- **Conference Reviewer:**
    ACM CHI (2022, 2025)
    ACM CHI Late-Breaking Work (2020 - 2022, 2025)
    ACM Virtual Reality Software and Technology (2019, 2022)
    IEEE ISMAR (2021 [**highly useful review award**], 2024)
    IEEE VR (2020 - 2025)
    SIGGRAPH Poster Track (2024)
- **Journal Reviewer:** IEEE Transactions in Visualization and Computer Graphics (2021), MDPI Electronics (2020-2021)