

Interests

Human-computer interaction, 3D user interfaces, virtual and tangible, collocated and remote collaboration, holograms, and mixed reality.

Short bio

I am a Postdoctoral Fellow at the [DGP Lab](#), Department of Computer Science of the University of Toronto working with [Professor Tovi Grossman](#). Previously, I was a researcher at the Visualization and Intelligent Multimodal Interfaces Group (VIMMI) under the supervision of [Professor Joaquim Jorge](#). I received my PhD, MSc and BSc degrees in Computer Science and Engineering. In my research, I have been designing and evaluating novel interaction techniques for the engineering, architecture and medical fields, focusing on computer supported remote collaborative work in mixed reality. I also have experience in 3D and spatial user interfaces, virtual and tangible remote collaboration, mixed reality, fabrication, and actuated tangible interfaces applied to human-computer interaction. And I have been fortunate to see my research published in top international conferences and journals, such as ACM CHI, ACM UIST, ACM ISS, ACM IUI, ACM VRST, IEEE VR, INTERACT, IHCS, and IEEE TVCG. I am currently a member of the organizing committee of the international conferences ACM ISS 2022 and IEEE VR 2023.

Education

Ph.D. in Computer Science and Engineering 2020

Instituto Superior Técnico, University of Lisbon

Thesis: *Perception Manipulation for Seamless Face-to-face Remote Collaboration*
Summa Cum Laude (highest honour for Doctoral Degree)

Advisor: Prof. Joaquim Jorge

Committee: Prof. Anthony Steed, Prof. Pedro Campos, Prof. Carlos Martinho,
Prof. Miguel Sales Dias, and Prof. Pavão Martins

M.Sc. in Information Systems and Computer Engineering 2014

Instituto Superior Técnico, University of Lisbon

Thesis: *Remote Proxemics for Collaborative Virtual Environments*

Advisors: Prof. Joaquim Jorge, and Prof. Alfredo Ferreira

Committee: Prof. Carlos Duarte, and Prof. Pedro Sousa

B.Sc. in Information Systems and Computer Engineering 2012

Instituto Superior Técnico, University of Lisbon

Experience

DGP LAB, Dep of Computer Science, University of Toronto

2020 - Present

Postdoctoral Fellow

Researching, designing and evaluating novel interaction techniques, while supporting and advising undergraduate and graduate students.

Champalimaud Center for the Unknown

2018 - 2020

Researcher

Researching, designing and evaluating novel mixed reality interaction techniques for minimally invasive laparoscopic surgery.

INESC-ID, Visualization and Intelligent Multimodal Interfaces

2012 - 2020

Researcher

Researching, designing and evaluating novel interaction techniques in 3D user interfaces for collocated and remote collaboration using head-mounted displays, walls, tabletops, mobiles, large scale displays, and wearables. I also maintained VIMMI's media lab.

Instituto Superior Técnico, University of Lisbon

2017/18

Teaching Assistant

Human-Computer Interaction

Publications

21 conference proceedings, 6 journal articles, 2 book chapters.

530+ citations, h-index 14 ([Google Scholar](#)).

Peer-reviewed Conference Proceedings

- C21 **Touching The Droid: Understanding and Improving Touch Precision With Mobile Devices in Virtual Reality.** Fengyuan Zhu, Zhuoyue Lyu, Mauricio Sousa, and Tovi Grossman. IEEE International Symposium on Mixed and Augmented Reality (ISMAR), 2022
- C20 **immersivePOV: Filming How-To Videos with a Head-Mounted 360° Action Camera.** Kevin Huang, Jiannan Li, Mauricio Sousa, and Tovi Grossman. ACM Conference on Human Factors in Computing Systems (CHI), 2022.
Honorable Mention Award
- C19 **ASTEROIDS: Exploring Swarms of Mini-Telepresence Robots for Physical Skill Demonstration.** Jiannan Li, Mauricio Sousa, Chu Li, Jessie Liu, Yan Chen, Ravin Balakrishnan, and Tovi Grossman. ACM Conference on Human Factors in Computing Systems (CHI), 2022.
- C18 **Route Tapestries: Navigating 360° Virtual Tour Videos Using Slit-Scan Visualizations.** Jiannan Li, Jiahe Lyu, Maurício Sousa, Ravin Balakrishnan, Anthony Tang, and Tovi Grossman. ACM Symposium on User Interface Software and Technology (UIST), 2021
- C17 **Promoting Reality Awareness in Virtual Reality through Proxemics.** Daniel Medeiros, Rafael dos Anjos, Nadia Pantidi, Kun Huang, Maurício Sousa, Craig Anslow and Joaquim Jorge. IEEE Conference on Virtual Reality and 3D User Interfaces (IEEE VR), 2021.
- C16 **“Grip-that-there”: An Investigation of Explicit and Implicit Task Allocation Techniques for Human-Robot Collaboration.** Karthik Mahadevan, Maurício Sousa, Anthony Tang, and Tovi Grossman. ACM Conference on Human Factors in Computing Systems (CHI), 2021.
Honorable Mention Award

- C15 **Negative Space: Investigating Workspace Awareness in 3D Face-to-face Remote Collaboration.** Maurício Sousa, Daniel Medeiros, and Joaquim Jorge. ACM SIGGRAPH International Conference on Virtual-Reality Continuum and its Applications in Industry (VRCAI), 2019
- C14 **Safe Walking in VR.** Maurício Sousa, Daniel Medeiros, Francisco Venda, and Joaquim Jorge. ACM SIGGRAPH International Conference on Virtual-Reality Continuum and its Applications in Industry (VRCAI), 2019
- C13 **Adventures in Hologram Space: Exploring the Design Space of Eye-to-eye Volumetric Projection-based Telepresence.** Rafael Kuffner dos Anjos, Maurício Sousa, Daniel Medeiros, Daniel Mendes, Mark Billingham, Craig Anslow and Joaquim Jorge. ACM Symposium on Virtual Reality Software and Technology (VRST), 2019
- C12 **WARPING DEIXIS: Distorting Gestures to Enhance Collaboration.** Maurício Sousa, Rafael Kuffner Dos Anjos, Daniel Mendes, Mark Billingham, and Joaquim Jorge. ACM Conference on Human Factors in Computing Systems (CHI), 2019
Featured in the 'Best of CHI 2019' event by IndiaHCI
- C11 **Using Custom Transformation Axes for Mid-Air Manipulation of 3D Virtual Objects.** Daniel Mendes, Maurício Sousa, Rodrigo Lorena, Alfredo Ferreira, and Joaquim Jorge. ACM Symposium on Virtual Reality Software and Technology (VRST), 2017
- C10 **Creepy Tracker Toolkit for Context-aware Interfaces.** Maurício Sousa, Daniel Mendes, Rafael Kuffner dos Anjos, Daniel Medeiros, Alberto Raposo, Alfredo Ferreira, João Pereira, and Joaquim Jorge. ACM Interactive Surfaces and Spaces (ISS), 2017
- C9 **VRRRRoom: Virtual Reality for Radiologists in the Reading Room.** Maurício Sousa, Daniel Mendes, Soraia Paulo, Nuno Matela, Joaquim Jorge, and Daniel S. Lopes. ACM Conference on Human Factors in Computing Systems (CHI), 2017
- C8 **PRECIOUS! Out-of-reach Selection using Iterative Refinement in VR.** Daniel Mendes, Daniel Medeiros, Eduardo Cordeiro, Maurício Sousa, Alfredo Ferreira, and Joaquim Jorge. IEEE Symposium on 3D User Interfaces (3DUI), 2017
- C7 **Mid-air Modeling with Boolean Operations in VR.** Daniel Mendes, Daniel Medeiros, Maurício Sousa, Ricardo Ferreira, Alberto Raposo, Alfredo Ferreira, and Joaquim Jorge. IEEE Symposium on 3D User Interfaces (3DUI), 2017
- C6 **Effects of Speed and Transitions on Target-based Travel Techniques.** Daniel Medeiros, Eduardo Cordeiro, Daniel Mendes, Maurício Sousa, Alberto Raposo, Alfredo Ferreira and Joaquim Jorge. ACM Symposium on Virtual Reality Software and Technology (VRST), 2016
- C5 **Perceiving Depth: Optical versus Video See-through.** Daniel Medeiros, Maurício Sousa, Daniel Mendes, Alberto Raposo, and Joaquim Jorge. ACM Symposium on Virtual Reality Software and Technology (VRST), 2016
- C4 **SleeveAR: Augmented Reality for Rehabilitation using Realtime Feedback.** Maurício Sousa, João Vieira, Daniel Medeiros, Artur Arsenio, and Joaquim Jorge. ACM Intelligent User Interfaces (IUI), 2016
- C3 **From Tecton to Teknos: Going back to the Classical Roots of Architecture.** Daniel Mateus, Maurício Sousa, Rui de Klerk, Sandra Gama, Joaquim Jorge, and José Duarte. Education and Research in Computer Aided Architectural Design in Europe (eCAADe), 2015
- C7 **Eery Space: Facilitating Virtual Meetings Through Remote Proxemics.** Maurício Sousa, Daniel Mendes, Alfredo Ferreira, João Madeiras Pereira, and Joaquim Jorge. Human-Computer Interaction—INTERACT, 2015
- C1 **Beyond Post-It: Structured Multimedia Annotations for Collaborative VEs.** João Guerreiro, Daniel Pires, Maurício Sousa, Daniel Mendes, Ismael Santos, Alberto Raposo, and Joaquim Jorge. Eurographics Symposium on Virtual Environments (EGVE), 2014

Journal Articles

- J6 **Laparoscopy with Augmented Reality Adaptations.** Ezequiel Zorzal, José Miguel Gomes, Maurício Sousa, Pedro Belchior, Pedro G da Silva, Nuno Figueiredo, Daniel S. Lopes, and Joaquim Jorge. Elsevier Journal of Biomedical Informatics, 2020
- J5 **Anatomy Studio: a Tool for Virtual Dissection Through Augmented 3D Reconstruction Sessions.** Ezequiel Zorzal, Maurício Sousa, Daniel Mendes, Rafael K dos Anjos, Soraia F. Paulo, Pedro Rodrigues, José Mendes, Vincent Delmas, Jean-Francois Uhl, José Mogorrón, Daniel S. Lopes, and Joaquim Jorge. Computers & Graphics, 2019
- J4 **Magic Carpet: Interaction Fidelity for Flying in VR.** Daniel Medeiros, Maurício Sousa, Alberto Raposo, and Joaquim Jorge. IEEE Transactions on Visualization and Computer Graphics (TVCG), 2019
Recipient of the Encarnação Award 2020 from Eurographics Portuguese chapter
- J3 **Design and evaluation of novel out-of-reach selection techniques for VR using iterative refinement.** Daniel Mendes, Daniel Medeiros, Maurício Sousa, Eduardo Cordeiro, Alfredo Ferreira, and Joaquim Jorge. Computers & Graphics, 2017
Honourable Mention in the 33rd Spring Conference on Computer Graphics
- J2 **Hip-directed walking-in-place using a single depth camera.** Luís Bruno, Maurício Sousa, Alfredo Ferreira, João Madeiras Pereira, and Joaquim Jorge. International Journal of Human-Computer Studies (IJHCS), Elsevier, 2017
- J1 **Expeditious Illustration of Layer-Cake Models On and Above a Tactile Surface.** Daniel S. Lopes, Daniel Mendes, Maurício Sousa, and Joaquim Jorge. Computers & Geosciences (in press), 2016

Book Chapters

- B2 **A Tool for Collaborative Anatomical Dissection.** Ezequiel Zorzal, Maurício Sousa, Daniel Mendes, Soraia Paulo, Pedro Rodrigues, Joaquim Jorge, and Daniel Simões Lopes. Book chapter in Digital Anatomy, Springer, 2021
- B1 **Remote Proxemics.** Maurício Sousa, Daniel Mendes, Daniel Medeiros, Alfredo Ferreira, João Madeiras Pereira, and Joaquim Jorge. Book chapter in Collaboration Meets Interactive Spaces, Springer, 2016

Other Peer Reviewed Publications

- 012 **Anatomy Studio II: A Cross-Reality Application for Teaching Anatomy.** Joaquim Jorge, Pedro Belchior, Abel Gomes, Maurício Sousa, João Pereira, and Jean-François Uhl. XR for Healthcare and Wellbeing Workshop Workshop (IEEE VR), 2022
- 011 **Design requirements to improve laparoscopy via XR.** Ezequiel R Zorzal, Maurício Sousa, Pedro Belchior, João Madeiras Pereira, Nuno Figueiredo, and Joaquim Jorge. XR for Healthcare and Wellbeing Workshop Workshop (IEEE VR), 2022
- 010 **Constellation: a Multi-User Interface for Remote Drone Tours.** Jiannan Li, Maurício Sousa, Ravin Balakrishnan, and Tovi Grossman. International Conference on Human-Agent Interaction (HAI), 2021
- 09 **Demo hour.** Paden Shorey, Audrey Girouard, Sang Ho Yoon, Yunbo Zhang, Ke Huo, Karthik Ramani, Maurício Sousa, Daniel Mendes, Soraia Paulo, Nuno Matela, Joaquim Jorge, Daniel S. Lopes, Dirk Wenig, Johannes Schöning, Alex Olwal, Mathias Oben, and Rainer Malaka. Demo hour. interactions 24, 6 (October 2017), 8-11.

- 08 **Evaluation of Travel Techniques for Virtual Reality.** Eduardo Cordeiro, Daniel Medeiros, Daniel Mendes, Maurício Sousa, Alberto Raposo, Alfredo Ferreira, and Joaquim Jorge. Portuguese Meeting of Computer Graphics (EPCG), 2016
- 07 **Beyond Eery Space: Applying Gradual Engagement to Remote Proxemics.** Maurício Sousa, Daniel Medeiros, Alberto Raposo, and Joaquim Jorge. Collaboration meets Interactive Surfaces Workshop, ACM Interactive Tabletops and Surfaces(ITS), 2015
- 06 **Augmented Reality for Rehabilitation Using Multimodal Feedback.** João Vieira, Maurício Sousa, Artur Arsénio, and Joaquim Jorge. REHAB2015 Workshop, 2015
- 05 **Enabling Remote Proxemics through Multiple Surfaces.** Daniel Mendes, Maurício Sousa, João Madeiras Pereira, Alfredo Ferreira, and Joaquim Jorge. Collaboration meets Interactive Surfaces Workshop, ACM Interactive Tabletops and Surfaces(ITS), 2014
- 04 **Eery Proxemics: Proximidade à Distância usando Múltiplas Superfícies.** Maurício Sousa, Daniel Mendes, João Madeiras Pereira, Alfredo Ferreira, and Joaquim Jorge. Portuguese Meeting of Computer Graphics (EPCG), 2014
- 03 **ThumbCam: Returning to single touch interactions to explore 3D virtual environments.** Daniel Mendes, Maurício Sousa, Alfredo Ferreira, and Joaquim Jorge. ACM Interactive Tabletops and Surfaces(ITS), 2014
- 02 **Binding a Handheld Device with its Owner. Maurício Sousa and Joaquim Jorge.** Collaboration meets Interactive Surfaces Workshop, ACM Interactive Tabletops and Surfaces (ITS), 2013
- 01 **Collaborative 3D Visualization on Large Screen Displays.** Daniel Mendes, Maurício Sousa, Bruno Araújo, Alfredo Ferreira, Hildegardo Noronha, Pedro Campos, Luciano Soares, Alberto Raposo, and Joaquim Jorge. Powerwall Workshop, SIGCHI Conference on Human Factors in Computing Systems (CHI), 2013

Theses

- T2 **Perception Manipulation for Seamless Face-to-face Remote Collaboration.**
Maurício Sousa. Ph.D. Thesis. Instituto Superior Técnico, University of Lisbon. 2020
- T1 **Remote Proxemics for Collaborative Virtual Environments.**
Maurício Sousa. M.Sc. Thesis. Instituto Superior Técnico, University of Lisbon. 2014

Funding

- 5 **Snap Creative Challenge**
Project: *Audio-Augmented Reminiscence by Capturing and Replaying Memories*
Team Member
2023
- 4 **Champalimaud Center for the Unknown Grant & INESC-ID**
Project: *Laparoscopic Surgery Through Augmented Reality*
A viability study for the inclusion of Augmented Reality in the laparoscopic surgical theater.
Researcher
2018
- 3 **Portuguese Science and Technology Foundation Grant**
Project: *Interactive Tablets for Collaborative Scenarios Related to 3D Medical Image Exploration*
Interactive experiences for medical collaborative workspaces 3D images.

Researcher
2017

2 Portuguese Science and Technology Foundation Grant

Project: *Digital Mockup: Touching the 3rd Dimension*

Interaction techniques for architectural 3D modeling design and review in mixed reality

Researcher
2016

1 Portuguese Science and Technology Foundation Grant

Project: *CEDAR - Collaborative Engineering Design And Review*

Design and evaluation of novel collaborative spacial interaction techniques for the Oil&Gas Industry

Researcher
2015

Awards and Recognition

7 Special Recognition for Outstanding Reviews

UIST 2022 Papers

6 Best Paper Honorable Mention Award ACM CHI 2022

[C20] *immersivePOV: Filming How-To Videos with a Head-Mounted 360° Action Camera.*

5 Recognition of Service Award IEEE VR 2022.

In appreciation for contributions to IEEE VR Conference as Web Chair.

4 Best Paper Honorable Mention Award ACM CHI 2021.

[C16] *"Grip-that-there": An Investigation of Explicit and Implicit Task Allocation Techniques for Human-Robot Collaboration.*

3 Paper selected to feature in the 'Best of CHI 2019' event by IndiaHCI.

[C12] *WARPING DEIXIS: Distorting Gestures to Enhance Collaboration.*

2 Paper recipient of the Encarnação Award 2020 from Eurographics Portuguese chapter.

[J4] *Magic Carpet: Interaction Fidelity for Flying in VR.*

1 Honorable Mention Award in the 33rd Spring Conference on Computer Graphics 2017.

[J3] *Design and evaluation of novel out-of-reach selection techniques for VR using iterative refinement.*

Academic Service

Senior Program Committee

ACM International Conference on Multimodal Interaction (ICMI)
2021, 2022

Technical/Scientific Program Committee

International Conference on Graphics and Interaction (ICGI)
2021, 2022

IEEE International Symposium on Mixed and Augmented Reality (ISMAR)
2021

ACM International Conference on Multimodal Interaction (ICMI)
2020

Conference Organizing Committee

IEEE Conference on Virtual Reality and 3D User Interfaces (VR)
Video Co-chair
2023

ACM International Conference on Interactive Surfaces and Spaces (ISS)
Web Chair and Online Experience Co-chair
2020, 2022

IEEE Conference on Virtual Reality and 3D User Interfaces (VR)
Web Chair
2021, 2022

Eurographics
Fast-forward Chair
2016

Workshops Organizing Committee

W1 **Enhancing cross-reality applications and user experiences.** Frank Maurer, Craig Anslow, Joaquim Jorge, and Mauricio Sousa. International Conference on Advanced Visual Interfaces (AVI), 2022

Conference Session Chair

ACM Symposium on User Interface Software and Technology (UIST)
Session: *Device Augmentation & Communication*
2021

Peer Reviewer

IEEE Conference on Virtual Reality and 3D User Interfaces (VR)
2019, 2023

ACM Conference on Human Factors in Computing Systems (CHI)
2018, 2020, 2021, 2022, 2023

IEEE International Symposium on Mixed and Augmented Reality (ISMAR)
2017, 2018, 2019, 2020, 2021, 2022

ACM International Conference on Interactive Surfaces and Spaces (ISS)
2015, 2016, 2017, 2018, 2019, 2020, 2022

ACM Symposium on User Interface Software and Technology (UIST)
2020, 2021, 2022

International Conference on Graphics and Interaction (ICGI)
2021, 2022

ACM Conference on Designing Interactive Systems (DIS)
2016, 2021

ACM Symposium on Spatial User Interaction (SUI)
2017, 2020

ACM Symposium on Virtual Reality Software and Technology (VRST)
2017, 2018, 2020

ACM Conference on Computer-Supported Cooperative Work and Social Computing (CSCW)
2020

Elsevier Computers & Graphics
2018, 2019, 2020

ACM International Conference on Tangible, Embedded and Embodied Interaction (TEI)
2018, 2020

ACM ACM International Conference on Multimodal Interaction (ICMI)
2018, 2019

IEEE Consumer Electronics Magazine (CEM)
2016

Thesis Committee Jury Member

Master's Thesis Committee for Filipe Guedes Barbosa **2022**
Faculdade de Engenharia Universidade do Porto
Thesis: *Shape-a-getti: A haptic device for getting multiple shapes using a single actuator.*

Students

PhD Students

- 1 **Catarina G. Fidalgo**, Instituto Superior Técnico, Carnegie Mellon University **2021 -**
Co-Advisor with Joaquim Jorge and David Lindlbauer
Thesis: TBD

Master Students

- 7 **João Simões**, Instituto Superior Técnico, University of Lisbon. **2021 -**
Co-Advisor with Joaquim Jorge.
Thesis: TBD
- 6 **Mingxiao (Eve) Li**, University of Toronto. **2021 -**
Co-Advisor with Tovi Grossman.
Thesis: *EnchantedBrush: Animating in Mixed Reality for Storytelling and Communication*

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|---|---|-------------|
| 5 | Carlos McGregor Muro , University of Toronto.
Co-Advisor with Tovi Grossman.
Thesis: <i>Knowing when students struggle before verbalizing it using non-intrusive psycho-physiological indicators.</i> | 2020 - 2022 |
| 4 | Manuel Lopes , Instituto Superior Técnico, University of Lisbon.
Co-Advisor with Joaquim Jorge.
Thesis: <i>CHASM - Computer-Human Assisted Segmentation of Medical Structures</i> | 2020 - 2021 |
| 3 | Catarina G. Fidalgo , Instituto Superior Técnico, University of Lisbon.
Co-Advisor with Joaquim Jorge.
Thesis: <i>MAGIC: Manipulating Avatars and Gestures to Improve Remote Collaboration</i> | 2019 - 2020 |
| 2 | Francisco Venda , Instituto Superior Técnico, University of Lisbon.
Unofficial Co-Advisor with Joaquim Jorge.
Thesis: <i>Safe Walking in VR</i>
[C14] | 2016 - 2017 |
| 1 | João Vieira , Instituto Superior Técnico, University of Lisbon.
Unofficial Co-Advisor with Joaquim Jorge and Artur Arsénio.
Thesis: <i>SleeveAR: Augmented Reality for Rehabilitation Using Realtime Feedback</i>
[C4] [06] | 2014 - 2015 |

Undergrad Researchers

- | | | |
|---|--|-------------|
| 5 | Helena Jovic , University of Toronto.
Co-Advisor with Tovi Grossman. | 2022 - |
| 4 | Sixuan Wu , University of Toronto.
Co-Advisor with Tovi Grossman. | 2022 - |
| 3 | Angela Yang , University of Toronto.
Co-Advisor with Tovi Grossman. | 2022 |
| 2 | Tianquan (Andy) Di , University of Toronto.
Co-Advisor with Tovi Grossman. | 2021 - 2022 |
| 1 | Kevin Huang , University of Toronto.
Co-Advisor with Tovi Grossman.
[C20] | 2020 - 2021 |

Research Assistants

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|---|---|-------------|
| 1 | Chu Li , University of Toronto.
Co-Advisor with Tovi Grossman.
[C19] | 2021 - 2022 |
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Mentoring (Ph.D. Students)

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|---|---|--------|
| 4 | Jiannan Li , University of Toronto.
[C20] [C19] [C18] [010] | 2020 - |
| 3 | Laura (Di) Chen , University of Toronto. | 2020 - |

2 **Fengyuan Zhu**, University of Toronto.
[C21]

2020 -

1 **Karthik Mahadevan**, University of Toronto.
[C16]

2020 - 2021

References

References available upon request.