Mauricio Sousa

Postdoctoral Fellow
Dynamic Graphics Project
Department of Computer Science
University of Toronto
http://mauriciosousa.github.io | Google Scholar
mauricio.sousa@utoronto.ca

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, focussing 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, IJHCS, and IEEE TVCG. I am currently a member of the organizing committee of the international conference IEEE VR 2022 and ACM ISS 2022.

Education

2020   **Ph.D. in Computer Science and Engineering**
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

2014   **M.Sc. in Information Systems and Computer Engineering**
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

2012   **B.Sc. in Information Systems and Computer Engineering**
Instituto Superior Técnico, University of Lisbon

Experience

2020 - Present   **DGP LAB, Dep of COMPUTER SCIENCE, UNIVERSITY OF TORONTO**
Postdoctoral Fellow

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

2018 - 2020   **CHAMPALIMAUD CENTER FOR THE UNKNOWN**
Researcher
Researching, designing and evaluating novel mixed reality interaction techniques for minimally invasive laparoscopic surgery.

2012 - 2020   **INESC-ID, VISUALIZATION AND INTELLIGENT MULTIMODAL INTERFACES GROUP**
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.

2017/18   **INSTITUTO SUPERIOR TÉCNICO, UNIVERSITY OF LISBON**
Teaching Assistant
Human-Computer Interaction

Students

PhD Students

2021 -   **Catarina Gonçalves Fidalgo**, Instituto Superior Técnico, University of Lisbon, Carnegie Mellon University, Co-Advisor to Joaquim Jorge and David Lindlbauer
Thesis: TBD

Master Students

2021 -   **João Simões**, Instituto Superior Técnico, University of Lisbon. Co-Advisor to Joaquim Jorge.
Thesis: TBD

2021 -   **Mingxiao (Eve) Li**, University of Toronto. Co-Advisor to Tovi Grossman.
Thesis: TBD

2020 -   **Carlos McGregor Muro**, University of Toronto. Co-Advisor to Tovi Grossman.
Thesis: TBD

2020 - 2021   **Manuel Lopes**, Instituto Superior Técnico, University of Lisbon. Co-Advisor to Joaquim Jorge.
Thesis: CHASM - Computer-Human Assisted Segmentation of Medical Structures

2019 - 2020   **Catarina Gonçalves Fidalgo**, Instituto Superior Técnico, University of Lisbon. Co-Advisor to Joaquim Jorge.
Thesis: MAGIC: Manipulating Avatars and Gestures to Improve Remote Collaboration

2016 - 2017   **Francisco Venda**, Instituto Superior Técnico, University of Lisbon. Unofficial Co-Advisor to Joaquim Jorge.
Thesis: Safe Walking in VR

2014 - 2015   **João Vieira**, Instituto Superior Técnico, University of Lisbon. Unofficial Co-Advisor to Joaquim Jorge and Artur Arsénio.
Thesis: SleeveAR: Augmented Reality for Rehabilitation Using Realtime Feedback

Undergrad Researchers

2022   **Sixuan Wu**, University of Toronto. Co-Advisor to Tovi Grossman.

2022   **Angela Yang**, University of Toronto. Co-Advisor to Tovi Grossman.

| 2021 | **Tianquan (Andy) Di**, University of Toronto. Co-Advisor to Tovi Grossman. |
| 2020 | **Kevin Huang**, University of Toronto. Co-Advisor to Tovi Grossman. |

Research Assistants

| 2021 - 2022 | **Chu Li**, University of Toronto. Co-Advisor to Tovi Grossman. |

Mentoring (Ph.D. Students)

2020 -	**Jiannan Li**, University of Toronto.
2020 -	**Laura (Di) Chen**, University of Toronto.
2020 -	**Fengyuan Zhu**, University of Toronto.
2020 -	**Karthik Mahadevan**, University of Toronto.

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

Organizing Committee:
Workshop: Enhancing Cross-Reality Applications and User Experiences
In International Conference on Advanced Visual Interfaces (**AVI**)
2022
ACM International Conference on Interactive Surfaces and Spaces (**ISS**)
2020, 2022
IEEE Conference on Virtual Reality and 3D User Interfaces (**VR**)
2021, 2022
Eurographics
2016

Conference Session Chair:
ACM Symposium on User Interface Software and Technology (**UIST**)
2021

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

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

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

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

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

International Conference on Graphics and Interaction (**ICGI**)
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

Full list of Publications

20 conference proceedings, 6 journal articles
470+ citations, h-index 14 ([Google Scholar](#))

Peer-reviewed Conference Proceedings

C20   **immersivePOV: Filming How-To Videos with a Head-Mounted 360° Action Camera.**
Kevin Huang, Jiannan Li, Maurício 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, Maurício 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, 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 Billinghurst, 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 Billinghurst, 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 Modelling 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

C2 **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

O12 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

O11 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

O10 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

O9 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.

O8 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

O7 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

O6   **Augmented Reality for Rehabilitation Using Multimodal Feedback.** João Vieira, Maurício Sousa, Artur Arsénio, and Joaquim Jorge. REHAB2015 Workshop, 2015

O5   **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

O4   **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

O3   **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

O2   **Binding a Handheld Device with its Owner.** Maurício Sousa and Joaquim Jorge. Collaboration meets Interactive Surfaces Workshop, ACM Interactive Tabletops and Surfaces(ITS), 2013

O1   **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

Workshops

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

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

Awards and Recognitions

Best Paper Honorable Mention Award ACM CHI 2022
[C20] immersivePOV: Filming How-To Videos with a Head-Mounted 360° Action Camera.

Recognition of Service Award IEEE VR 2022
In appreciation for contributions to IEEE VR Conference as Web Chair

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.

Paper selected to feature in the 'Best of CHI 2019' event by IndiaHCI
[C12] WARPING DEIXIS: Distorting Gestures to Enhance Collaboration.

Paper recipient of the Encarnação Award 2020 from Eurographics Portuguese chapter
[J4] Magic Carpet: Interaction Fidelity for Flying in VR.

Honourable 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.

References

Available upon request.