



# Maurício Sousa

## Curriculum Vitae

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### 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 - **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 **Kevin Ge**, 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 - **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

### **Technical/Scientific Program Committee**

International Conference on Graphics and Interaction (ICGI)  
2021

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:**

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

International Conference on Graphics and Interaction (ICGI)  
2021

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

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

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 International Conference on Interactive Surfaces and Spaces (ISS)  
2016, 2017, 2018, 2019, 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

## REFERENCES

Available upon request.

## LIST OF PUBLICATIONS

20 conference proceedings, 6 journal articles  
420+ citations, h-index 13 ([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.  
(*Conditionally Accepted*)
- 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 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 **VRRRRRoom: 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.

- 8 **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
- 7 **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
- 6 **Augmented Reality for Rehabilitation Using Multimodal Feedback.** João Vieira, Maurício Sousa, Artur Arsénio, and Joaquim Jorge. REHAB2015 Workshop, 2015
- 5 **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
- 4 **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
- 3 **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
- 2 **Binding a Handheld Device with its Owner.** Maurício Sousa and Joaquim Jorge. Collaboration meets Interactive Surfaces Workshop, ACM Interactive Tabletops and Surfaces(ITS), 2013
- 1 **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