

Leonardo Pavanatto

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Third year Computer Science Ph.D. student at Virginia Tech, member of the 3D Interaction Group and of the Center for Human-Computer Interaction. My expertise area is Virtual and Augmented Reality within the scope of 3D User Interfaces. Some specific research interests include how to use augmented reality for improving productivity on real-world tasks (with special focus on virtual displays), and how to increase the public's engagement and interest through interactive technologies.

Education

Ph.D. in Computer Science

Aug 2019 - Current

Virginia Tech, GPA: 3.94/4.0

- **Thesis:** Designing Augmented Reality Virtual Displays for Productivity Work (Advisor: Doug Bowman)
- **Qualification:** Human-Computer Interaction (6/6 points awarded)

M.Sc. in Computer Science

Mar 2019

Pontifical Catholic University of Rio Grande do Sul (PUCRS), GPA: 9.32/10.0

- **Thesis:** 3D Modeling of Large Structures in Augmented Reality (Advisors: Marcio Pinho, Doug Bowman)

B.Eng. in Computer Engineering

Dec 2016

Pontifical Catholic University of Rio Grande do Sul (PUCRS), GPA: 8.82/10.0

- **Thesis:** Evaluating the Efficiency of an Ego-exocentric Technique for Cooperative Manipulation in Virtual Environments
- **Study abroad:** Illinois Institute of Technology (IIT), GPA: 3.87/4.0

Research Experience

Microsoft Research

Summer 2021

Research Intern

- Conducted user studies to understand the effects of replacing physical monitors with VR virtual monitors.
- Presented findings at the HCI Intern Talk Series and at an End of Internship Talk.
- Informed the design of software and hardware prototypes based on user study results.

Virginia Tech

Aug 2019 - Current

Student and Graduate Research Assistant

- Designed a prototype for displaying virtual monitors on a Microsoft HoloLens 2, with the objective of conducting office work.
- Designed novel approaches for virtual displays that take advantage of AR characteristics to enhance usability and productivity.
- Conducted user studies to understand the impacts of extending or replacing physical monitors with virtual monitors in productivity situations.
- Led a team submission to the IEEE VR 3DUI Contest 2020 about immersive storytelling and increasing empathy towards people with disabilities through experience and embodiment.

PUCRS

Mar 2017 - Feb 2019

Student and Graduate Research Assistant

- Designed an AR application for situated modeling in architecture, using Unity 3D (C#) and Microsoft HoloLens.
- Evaluated approaches to 3D modeling when the environment geometry is unknown; results were published at ACM SUI 2019.
- Evaluated methods of interaction for an AR game with behavioral animation of virtual characters using iOS devices.
- Designed an application to remotely present slides from inside a virtual environment, which was used at PUCRS Health Tech.

Duke University

May 2015 - Jul 2015

Research Scholar

- Designed a technique for using asymmetric viewpoints in cooperative object manipulation in virtual reality, using Unity 3D (C#), Oculus Rift, and UDP/IP network communication.
- Led the development team, and presented our solution at the IEEE 3DUI Contest 2016.

PUCRS

Apr 2012 - Dec 2016

Undergraduate Research Assistant

- Designed games for the Microsoft Kinect using XNA (C#) that were used by elderly people with mild cognitive impairment in a neurorehabilitation study.
- Designed and deployed an interface for 6 DOF tracking of a conductor's baton during a live orchestral performance.
- Developed an application for creating digital sculptures using handheld AR (Android/iOS).

Publications

Journal Papers:

1. Fabris, E., Sangalli, V., **Pavanatto, L.**, Pinho, M. Immersive telepresence on the operation of unmanned vehicles. International Journal of Advanced Robotic Systems. January 2021. [DOI: 10.1177/1729881420978544](https://doi.org/10.1177/1729881420978544)

Conference Papers:

1. **Pavanatto, L.**, C. North, D. Bowman, C. Badea, and R. Stoakley. Do we still need physical monitors? An evaluation of the usability of AR virtual monitors for productivity work. In IEEE Virtual Reality and 3D User Interfaces (VR), 2021, 8 pages. [DOI: 10.1109/VR50410.2021.00103](https://doi.org/10.1109/VR50410.2021.00103)
2. **Pavanatto, L.**, Bowman, D., and Pinho, M. Evaluating the Impact of Point Marking Precision on Situated Modeling Performance. In Proceedings of ACM Symposium on Spatial User Interaction (SUI), 2019, 5 pages. [DOI: 10.1145/3357251.3357586](https://doi.org/10.1145/3357251.3357586)
3. Stahl, B., **Pavanatto, L.**, Sangalli, V., Klein, P., Copstein, R. and Pinho, M. DirectFlow: A Robust Method for Ocular Torsion Measurement. In IEEE 43rd Annual Computer Software and Applications Conference (COMPSAC), 2019, 6 pages. [DOI: 10.1109/COMPSAC.2019.00052](https://doi.org/10.1109/COMPSAC.2019.00052)
4. **Pavanatto, L.**, Kopper, R. and Pinho, M. EGO-EXO: A Cooperative Manipulation Technique with Automatic Viewpoint Control. In 20th Symposium on Virtual and Augmented Reality (SVR), 2018, 6 pages. [DOI: 10.1109/SVR.2018.00023](https://doi.org/10.1109/SVR.2018.00023)
5. **Pavanatto, L.**, Musse, S., Pinho, M. and Boussu, J. Evaluation of Selection Techniques on a Mobile Augmented Reality Game. In 17th Brazilian Symposium on Computer Games and Digital Entertainment (SBGames), 2018, 10 pages. [DOI: 10.1109/SBGAMES.2018.00024](https://doi.org/10.1109/SBGAMES.2018.00024)
6. Copstein, R., Abichequer, V., Andrade, M., Machado, L., Rodrigues, E., **Pavanatto, L.** and Pinho, M. Image Processing Strategies for Automatic Detection of Common Gastroenterological Diseases. In IEEE 42nd Annual Computer Software and Applications Conference (COMPSAC), 2018, 6 pages. [DOI: 10.1109/COMPSAC.2018.00090](https://doi.org/10.1109/COMPSAC.2018.00090)

Other Refereed Publications (posters, workshop papers, demo papers):

1. **Pavanatto, L.** Designing Augmented Reality Virtual Displays for Productivity Work. Manuscript accepted for the doctoral consortium of the IEEE International Symposium on Mixed and Augmented Reality (ISMAR), 2021, 2 pages.
2. **Pavanatto, L.**, Lu, F., Davari, S., Harris, E., Folino, A., Imamov, S., Chekuri, S., Blustein, L., Lages, W. and Bowman, D. Get the job! An immersive simulation of sensory overload. In IEEE Conference on Virtual Reality and 3D User Interfaces Abstracts and Workshops (VRW), 2020, 2 pages. [DOI: 10.1109/VRW50115.2020.00106](https://doi.org/10.1109/VRW50115.2020.00106)

3. Sangalli, V., Oliveira, T., **Pavanatto, L.** and Pinho, M.S. SculptAR: An augmented reality interaction system. In IEEE Symposium on 3D User Interfaces (3DUI), 2017, 2 pages. *DOI: 10.1109/3DUI.2017.7893371*
4. **Pavanatto, L.**, Pinho, M. and Kopper, R. Design and preliminary evaluation of an EGO-exocentric technique for cooperative manipulation. In IEEE Symposium on 3D User Interfaces (3DUI), 2017, 2 pages. *DOI: 10.1109/3DUI.2017.7893342*
5. **Pavanatto, L.**, Oliveira, T., Sangalli, V., Pinho, M. and Kopper, R. Collaborative hybrid virtual environment. In IEEE Symposium on 3D User Interfaces (3DUI), 2016, 2 pages. *DOI: 10.1109/3DUI.2016.7460081*

Non-refereed Publications:

1. Bogoni, T, **Pavanatto, L.**, Sangalli, V., Pinho, M. Dental Simulator for Endodontic Access Cavity Preparation. Demo at IEEE Virtual Reality (VR), 2016, 2 pages. Available at [website](#).
2. Oliveira, G., **Pavanatto, L.**, Sangalli, V., Pinho, M. A Software Architecture for Distributed AR Applications. Demo at IEEE Virtual Reality (VR), 2016, 2 pages. Available at [website](#).
3. Lykawka, C., Oliveira, T., **Pavanatto, L.**, Sangalli, V., Siqueira, E., Campos, M, Pinho, M. Belt-Based Haptic Device for Representing Scene Depth Information. Demo at Virtual Reality (VR), 2016, 2 pages. Available at [website](#).

Skills

Expertise Areas *Research, Augmented Reality, Virtual Reality, 3D User Interfaces, Human-Computer Interaction, User Studies*

Tools & Technologies *C#, Unity 3D, C, C++, OpenGL, OpenCV, Python, VB.net, Git, Windows APIs*

Honors and Awards

- 2017** *Academic Excellence fellowship recipient (2017-2018), from CAPES/PROEX*
- 2016** *Featured Student by the Brazilian Computer Society (SBC), with the highest GPA of class*
- 2014** *Brazil Scientific Mobility Program scholarship recipient (2014-2015), from CAPES*

Activities and Service

- Student Member, IEEE Computer Society.
- Student Member, ACM.
- Student Member, Virginia Tech's Center for HCI.
- Reviewed submissions for IEEE VR, IEEE ISMAR, ACM CHI, etc.