

Curriculum Vitae Wallace Santos Lages

✉ w.lages@northeastern.edu | 🏠 www.wallacelages.com | realitydesign.sites.northeastern.edu

Academic Appointments

Assistant Professor

Boston, United States

COLLEGE OF ARTS, MEDIA AND DESIGN, NORTHEASTERN UNIVERSITY

2023 - Present

- Department of Art & Design
- Joint Appointment with the Khoury College of Computer Sciences

Assistant Professor

Blacksburg, United States

SCHOOL OF VISUAL ARTS, VIRGINIA TECH

2018 - 2022

- Faculty of the Creative Technologies Program
- Fellow, Institute for Creativity, Arts, and Technology
- Member, Center for Human-Computer Interaction
- Courtesy Appointment, Computer Science Department

Associate Director - Lab. for Research and Experimentation

Belo Horizonte, Brazil

RODRIGO MELO FRANCO DE ANDRADE FOUNDATION

2011 - 2014

- Mentored undergraduate and graduate students
- Assisted with lab administration and operations

Interim Chair - Dept. Photography, Performing Arts, and Cinema

Belo Horizonte, Brazil

SCHOOL OF FINE ARTS, UFMG

2010 - 2012

- Chairing department executive committee
- Overseeing processes of promotion, leave, and sub-committees
- Overseeing the use of departmental facilities

Assistant Professor

Belo Horizonte, Brazil

SCHOOL OF FINE ARTS, UFMG

2010 - 2018

- Tenured-equivalent position obtained in 2014
- On leave from fall 2014 to 2018

Education

Ph.D. in Computer Science

Blacksburg, United States

VIRGINIA TECH

Aug. 2014 - Aug. 2018

- Dissertation: Walk-Centric User Interfaces for Mobile Augmented Reality
- Thesis Advisor: Dr. Doug Bowman, Virginia Tech
- Committee: Dr. Nicholas Polys, Dr. Joseph Gabbard, Dr. Chris North, and Dr. Tobias Höllerer
- Research assistantship funded by the US Office of Naval Research

M.S. in Computer Science

Belo Horizonte, Brazil

UNIVERSIDADE FEDERAL DE MINAS GERAIS

Mar. 2006 - Dec. 2008

- Dissertation: A Parallel Architecture for Rendering Multiple Points of View
- Dissertation Advisor: Dr. Dorgival Guedes, Universidade Federal de Minas Gerais
- Dissertation Committee: Dr. Joao Luiz Elias Campos, Dr. Marcelo Walter
- CAPES Fellowship (Brazilian Federal Agency for Higher Education)

B.S. in Computer Science

UNIVERSIDADE FEDERAL DE MINAS GERAIS

Belo Horizonte, Brazil

Mar. 2002 - Dec. 2005

- Senior Project: Using IP Cameras in Computer Vision
- Advisor: Dr. Mario Montenegro Campos
- CNPq Fellowship (Brazilian National Council for Scientific and Technological Development)

Electronics Technician

UNIVERSIDADE FEDERAL DE MINAS GERAIS

Belo Horizonte, Brazil

Mar. 1994 - Dec. 1996

Research Experience

Principal Investigator

REALITY DESIGN STUDIO

United States

2018 - present

- Research on virtual reality, augmented reality, and digital games

Graduate Research Assistant

DEPARTMENT OF COMPUTER SCIENCE, VIRGINIA TECH

Blacksburg, United States

2014 - 2018

- 3DI group, Center for Human-Computer Interaction
- Advisor: Dr. Doug Boman
- Research on interaction techniques, augmented and virtual reality

Co-Principal Investigator - 1maginari0

DEPART. OF PHOTOGRAPHY, PERFORMING ARTS, AND CINEMA, UFMG

Belo Horizonte, Brazil

2010 - 2014

- PI: Dr. Francisco Marinho
- Research on interactive digital art and digital games

Graduate Research Assistant

SCHOOL OF ARCHITECTURE, UFMG

Belo Horizonte, Brazil

Oct. 2006 - Jan. 2009

- PI: Dr. Maria Lucia Mallard
- Research and development of a low-cost virtual reality CAVE for architecture instruction

Industry Experience

Founder, COO, and board member

ILUSIS INTERACTIVE GRAPHICS

Belo Horizonte, Brazil

2006 - 2014

- Strategic planning
- Proposal development
- Led research and development activities

Vice President of Institutional Relations

BRAZILIAN ASSOCIATION OF DIGITAL GAMES

Belo Horizonte, Brazil

2009 - 2010

- Managed relationships with companies and government
- Monitored policies affecting industry development
- Coordinated institutional publications

Research and Creative Activities

Awards, Prizes, and Recognitions

1. D. Abhraneil, L. YeaJi, A. Siddiqui, **W. S. Lages**, M. Jeon. Audio Augmented Reality Using Sonification to Enhance Visual Art Experiences: Lessons Learned. Data Sonification Archive Award, March 2025.

2. **W. S. Lages**, J. Perkinson, P. Nguyen. Live Action VR. *Board Choice Award*. Creativity + Innovation Day, Virginia Tech, May 2020.
3. **W. S. Lages**, D. A. Bowman. An Adaptive Interface for Spatial Augmented Reality Workspaces. *Best Demo Award*. 7th ACM Symposium on Spatial User Interaction, October 2019.
4. **W. S. Lages**, M. Dee, P. Nguyen. Virginia Tech Hokienauts. NASA Spacesuit User Interface Technologies for Students, December 2018.
5. **W. S. Lages**, Second Place. uDev Challenge. Usens Inc. 2017.
6. **W. S. Lages**, Winner JogosBR Contents 2006. Brazilian Ministry of Culture / ABrGames. 2006.
7. **W. S. Lages**, Finalist. Idea to Product Lating America. Fundacao Getulio Vargas, The University of Texas at Austin. Best 4 Business Plans. 2008.
8. **W. S. Lages**, Semi-Finalist. GV-Intel Challenge 2008. Fundacao Getulio Vargas / Intel Capital. Best 16 Business Plan. 2008.

Papers in Refereed Conference Proceedings

Star* indicates a student for whom I was the primary advisor. Plus+ indicates the presenter.

1. Li, Brady*, Gaydos, Zachary*, and **W. Lages**. Field dependence as a predictor of cybersickness dropout. In *2025 IEEE International Symposium on Mixed and Augmented Reality (ISMAR)*, pages 1354–1364, 2025. doi: 10.1109/ISMAR67309.2025.00140
2. Connor, Cherelle*, E. C. Schoenborn, S. Hu, T. M. Porcino, C. Moore, D. Reilly, and **Lages, Wallace S⁺**. Examining pair dynamics in shared, co-located augmented reality narratives. In *Proceedings of the 2024 ACM Symposium on Spatial User Interaction, SUI '24*, New York, NY, USA, 2024. Association for Computing Machinery. ISBN 9798400710889. doi: 10.1145/3677386.3682091. <https://doi.org/10.1145/3677386.3682091>
3. C. Moore* and **W. S. Lages⁺**. Planning locomotion techniques for virtual reality games. In *Proceedings of the 29th ACM Symposium on Virtual Reality Software and Technology, VRST '23*, New York, NY, USA, 2023. Association for Computing Machinery. ISBN 9798400703287. doi: 10.1145/3611659.3615711. <https://doi.org/10.1145/3611659.3615711>
4. Y. Li⁺, S. W. Lee, D. A. Bowman, D. Hicks, **W. s. Lages**, and A. Sharma. Arcritique: Supporting remote design critique of physical artifacts through collaborative augmented reality. In *Proceedings of the 2022 ACM Symposium on Spatial User Interaction, SUI '22*, New York, NY, USA, 2022. Association for Computing Machinery. ISBN 9781450399487. doi: 10.1145/3565970.3567700. <https://doi.org/10.1145/3565970.3567700>
5. S. Imamov*, D. Monzel*, and **W. Lages⁺**. Where to display? how interface position affects comfort and task switching time on glanceable interfaces. In *2020 IEEE Conference on Virtual Reality and 3D User Interfaces (VR)*, pages 851–858, Mar 2020. doi: 10.1109/VR46266.2020.00012. <https://doi.org/10.1109/VR46266.2020.00012>
6. **W. Lages**, Y. Li⁺, L. Lisle, T. Höllerer, and D. Bowman. Enhanced geometric techniques for point marking in model-free augmented reality. In *2019 IEEE International Symposium on Mixed and Augmented Reality (ISMAR)*, pages 301–309. IEEE, 2019
7. Y. Li⁺, F. Lu, **W. S. Lages**, and D. Bowman. Gaze direction visualization techniques for collaborative wide-area model-free augmented reality. In *2019 ACM Symposium on Spatial User Interaction (SUI)*, New York, NY, USA, 2019. Association for Computing Machinery. ISBN 9781450369756. doi: 10.1145/3357251.3357583. <https://doi.org/10.1145/3357251.3357583>
8. A. Behzad Behbahani⁺, **W. S. Lages**, and A. Kelliher. A multisensory design probe: An approach for reducing technostress. In *Proceedings of the Thirteenth International Conference on Tangible, Embedded, and Embodied Interaction, TEI '19*, pages 459–466, New York, NY, USA, 2019. ACM. ISBN 978-1-4503-6196-5. doi: 10.1145/3294109.3300992. <http://doi.acm.org/10.1145/3294109.3300992>
9. **W. S. Lages⁺** and D. A. Bowman. Walking with adaptive augmented reality workspaces: Design and usage patterns. In *Proceedings of the 24th International Conference on Intelligent User*

- Interfaces*, IUI '19, pages 356–366, New York, NY, USA, 2019. ACM. ISBN 978-1-4503-6272-6. doi: 10.1145/3301275.3302278. <http://doi.acm.org/10.1145/3301275.3302278>
10. R. Yu⁺, **W. S. Lages**, M. Nabiyouni, B. Ray, N. Kondur, V. Chandrashekar, and D. A. Bowman. Bookshelf and bird: Enabling real walking in large vr spaces through cell-based redirection. In *2017 IEEE Symposium on 3D User Interfaces (3DUI)*, IEEE Symposium on 3D User Interfaces, pages 116–119. Los Angeles, CA, IEEE, Jan 2017. <http://ieeexplore.ieee.org/document/7893327/>
 11. **W. Santos Lages**, A. Ivanenko Salgado⁺, A. Vilas-Boas, C. Megale Leite, A. Haibara, T. Mota, J. Henriques Silva, J. Carvalho Tavares, G. Avelar, M. Gino, F. Marinho, F. Fernandino, and P. Gobira. Construction of an interactive space of life sciences: finding a way through the difficult dialogue between scientists and artists, May 2014
 12. **W. Lages**⁺, C. Cordeiro, and D. Guedes. A parallel multi-view rendering architecture. In *SIBGRAPI 2008: XXI Brazilian Symposium on Computer Graphics and Image Processing*, SIBGRAPI - Brazilian Symposium on Computer Graphics and Image Processing, pages 270–277. Campo Grande, Brazil, IEEE Comput Soc, Jan 2008. ISBN 978-0-7695-3358-2. doi: 10.1109/SIBGRAPI.2008.41. <https://ieeexplore.ieee.org/document/4654169/>
 13. A. R. da Silva⁺, **W. S. Lages**, and L. Chaimowicz. Improving boids algorithm in gpu using estimated self occlusion. In *Proceedings of SBGames' 08: VII Brazilian Symposium on Games and Digital Entertainment*, pages 41–46. Sao Leopoldo, Brazil, SBC, 2008
 14. L. Arantes, A. Dubiela, P. Magalhaes, and **W. Lages**⁺. O projeto visual do jogo peixis. In *Proceedings of SBGames' 07: VI Brazilian Symposium on Games and Digital Entertainment*. SBC, 2007

Papers in Refereed Journals

Star* indicates a student for whom I was the primary advisor. Plus⁺ indicates the presenter.

1. Sun, Nanlin* and **W. S. Lages**. Virtual reality impacts on novice programmers' self-efficacy. *IEEE Transactions on Visualization and Computer Graphics*, 31(5):2395–2405, 2025. doi: 10.1109/TVCG.2025.3549567
2. A. Dam, Y. Lee, A. Siddiqui, **W. S. Lages**, and M. Jeon. Audio augmented reality using sonification to enhance visual art experiences: Lessons learned. *International Journal of Human-Computer Studies*, 191:103329, 2024. ISSN 1071-5819. doi: <https://doi.org/10.1016/j.ijhcs.2024.103329>. <https://www.sciencedirect.com/science/article/pii/S1071581924001125>
3. A. Dam⁺, Y. Lee, A. Siddiqui, **W. S. Lages**, and M. Jeon. Enhancing art gallery visitors' experiences through audio augmented reality technology. *Proceedings of the Human Factors and Ergonomics Society Annual Meeting*, 67(1):971–977, 2023. doi: 10.1177/21695067231192706. <https://doi.org/10.1177/21695067231192706>
4. A. Steed, T. M. Takala, D. Archer, **W. Lages**, and R. W. Lindeman. Directions for 3d user interface research from consumer vr games. *IEEE Transactions on Visualization and Computer Graphics*, October 2021. doi: 10.1109/TVCG.2021.3106431. <https://doi.org/10.1109/tvcg.2021.3106431>
5. **W. S. Lages** and D. A. Bowman. Move the object or move myself? walking vs. manipulation for the examination of 3d scientific data. *Frontiers in Information and Communication Technology (Frontiers in ICT)*, 5, Jul 2018. doi: 10.3389/fict.2018.00015
6. A. R. Silva, **W. S. Lages**, and L. Chaimowicz. Boids that see: Using self-occlusion for simulating large groups on gpus. *ACM Computers in Entertainment (CIE)*, 7(4):1–20, 2009. ISSN 1544-3574. doi: 10.1145/1658866.1658870. <https://doi.org/10.1145/1658866.1658870>
7. **W. Lages**, C. Cordeiro, and D. Guedes. Performance analysis of a parallel multi-view rendering architecture using light fields. *The Visual Computer*, 25:947–958, Oct 2009. ISSN 0178-2789. doi: 10.1007/s00371-009-0371-z. <https://link.springer.com/article/10.1007/s00371-009-0371-z>

Book Chapters

1. P. G. Hayward, L. Bunning, and **W. Lages**. Co-creating intercultural scenes with gen ai using a case study framework. In V. Wang, editor, *AI Integration Into Andragogical Education*, pages 155–180, Cham, 2025. IGI Global Scientific Publishing. doi: 979-8-3373-0502-8.ch007
2. **W. S. Lages**. Nine challenges for immersive entertainment. In R. P. d. Santos and M. d. S. Hounsell, editors, *Grand Research Challenges in Games and Entertainment Computing in Brazil - GranDGamesBR 2020–2030*, pages 233–254, Cham, 2023. Springer Nature Switzerland. ISBN 978-3-031-27639-2

Non peer-reviewed publications

- T. L. Thompson, E. Lyon, and **W. Lages**. Breaking barriers in immersive stories: Empathy, representation, and access. *Interactions*, 31(6):6–7, Oct. 2024. ISSN 1072-5520. doi: 10.1145/3698391. <https://doi.org/10.1145/3698391>

Creative Work

1. **W. Lages**. Anima ex machina. Altered Art, 2024. Interactive Artwork. Invitational Group Exhibition.
2. **W. Lages**, E. Lyon, and T. Thompson. The inside story. Spotify, Apple, Google Podcasts, . October, 2023.
3. **W. S. Lages**. Epipremnum mechaemum. SOVA Faculty Triennial Exhibition, 07 April 2022. Invitational group exhibition.
4. **W. S. Lages**, H. Okumura, C. Constantikes, and G. Tatum. Between earth and air. Simply Elemental, 01 August - 30 September 2019. Juried group exhibition.
5. **W. S. Lages**. Datasphinx. SOVA Faculty Triennial Exhibition, 04 April 2019. Invitational group exhibition.
6. **W. S. Lages**. Multiple realities. XXI Generative Art Conference, 20 Dec 2018. Juried Stage performance.
7. **W. S. Lages**, P. Gobira, and F. Marinho. Better hands. ACM Creativity and Cognition Art Exhibition., 27 Jun - 30 Jun 2017. Robotic artwork. Juried group exhibition.
8. K. Gandhi, M. Bergamo, J. Bethonico, P. Gobira, **W. S. Lages**, and F. Marinho. Coração. Espaço Interativo de Ciências da Vida - Inaugural Exhibition, 2013. Interactive artwork. Invitational group exhibition.
9. I. Travenzoli, F. Ferreira, M. Bergamo, P. Gobira, **W. S. Lages**, and F. Marinho. Pulo. Espaço Interativo de Ciências da Vida - Inaugural Exhibition, 2013. Interactive artwork. Invitational group exhibition.
10. I. Travenzoli, F. Ferreira, M. Bergamo, P. Gobira, **W. S. Lages**, and F. Marinho. Flexibility. Espaço Interativo de Ciências da Vida - Inaugural Exhibition, 2013. Interactive artwork. Invitational group exhibition.
11. I. Travenzoli, M. Bergamo, P. Gobira, **W. S. Lages**, and F. Marinho. Balance. Espaço Interativo de Ciências da Vida - Inaugural Exhibition, 2013. Interactive artwork. Invitational group exhibition.
12. M. Coutinho, K. Gandhi, M. Bergamo, P. Gobira, **W. S. Lages**, and F. Marinho. Balance. Espaço Interativo de Ciências da Vida - Inaugural Exhibition, 2013. Interactive artwork. Invitational group exhibition.
13. R. Mariz, I. Travenzoli, R. Campos, A. Karina, P. G. de Azevedo, E. Arttur, P. Gobira, **W. S. Lages**, and F. Marinho. Balance. Espaço Interativo de Ciências da Vida - Inaugural Exhibition, 2013. Interactive artwork. Invitational group exhibition.
14. **W. S. Lages**. Trem de cataguases. 43 UFMG Winter Art Festival., 2011. Interactive Projection. Invitational group exhibition.
15. F. Marinho, A. Ribeiro da Silva, and **W. S. Lages**. Mesa interativa da vale. Vale Itinerant Exhibition, 2011. Interactive table. Invitational group exhibition.
16. F. Marinho and L. W. S. Fire. Bienal Zero – Bienal Universitária de Arte, 2011. Interactive installation. Invitational group exhibition.

17. F. Marinho, **W. S. Lages**, and A. R. d. Silva. Rain dance. Inaugural Exhibition, Espaço Israel Pinheiro, 2010. Digital projection. Invitational group exhibition.
18. F. Marinho, **W. S. Lages**, and A. R. d. Silva. Piracema. Inaugural Exhibition, Espaço Israel Pinheiro, 2010. Digital projection. Invitational group exhibition.
19. S. Clear and **W. S. Lages**. Visual poems. 43 UFMG Winter Art Festival, 2011. Interactive Installation. Invitational group exhibition.
20. F. Marinho, M. Bergamo, J. Bethonico, and **W. S. Lages**. Pictobiobots. Espaço UFMG do Conhecimento, 2007. Interactive Art. Invitational group exhibition.
21. F. Marinho, F. Moraes, J. Bethonico, and **W. S. Lages**. Palavrador 2.0 openbook. SIGGRAPH Art Gallery, 2007. Interactive Art. Invitational group exhibition.

Creative Work - Major Games at Ilusis Interactive Graphics

- 2015 - KrinkleKrusher [Sony PS4, PS3, and PSVita]
- 2014 - SocceR10 [Android,iOS]
- 2013 - Dengue Over [PC]
- 2012 - Jett Tailfin [PC, WiiU, Android Tegra]
- 2012 - StreetKix [Sony PSP]
- 2011 - Urbanias [Android, iOS, Facebook]
- 2006 - Peixis [PC]

Refereed Extended Abstracts and Posters

Star* indicates a student for whom I was the primary advisor. Plus+ indicates the presenter.

1. Zahir, Aisha*, Li, Brady*, and **W. Lages**. Predicting cybersickness susceptibility from gaze behavior. In *2025 IEEE International Symposium on Mixed and Augmented Reality Adjunct (ISMAR-Adjunct)*, pages 871–872, 2025. doi: 10.1109/ISMAR-Adjunct68609.2025.00232
2. N. Sun*+, A. Feng, R. Patton, Y. Gingold, and **W. Lages**. Programmable virtual reality environments. In *2021 IEEE Conference on Virtual Reality and 3D User Interfaces Abstracts and Workshops (VRW)*, pages 619–620. IEEE, 2021
3. Y. Li*+, D. Hicks, **W. S. Lages**, S. W. Lee, A. Sharma, and D. A. Bowman. Arcritique: Supporting remote design critique of physical artifacts through collaborative augmented reality. In *2021 IEEE Conference on Virtual Reality and 3D User Interfaces Abstracts and Workshops (VRW)*, pages 585–586. IEEE, 2021
4. A. Sapra*+ and **W. S. Lages**. Leveraging AR and object interactions for emotional support interfaces. In *2021 IEEE Conference on Virtual Reality and 3D User Interfaces Abstracts and Workshops (VRW)*, pages 667–668. IEEE, 2021
5. **W. S. Lages**. The immersive living room. In *CSCW The Future of Social AR Workshop*. ACM Computer Supported Cooperative Work (Workshop Paper), October 2020
6. L. Pavanatto*+, F. Lu*, S. Davari*, E. Harris*, A. Folino*, S. Imamov*, S. Chekuri*, L. Blustein*, **W. S. Lages**, and D. A. Bowman. Get the job! an immersive simulation of sensory overload. In *2020 IEEE Conference on Virtual Reality and 3D User Interfaces Abstracts and Workshops (VRW)*, pages 509–510. IEEE, 2020
7. **W. Lages**+ and D. Bowman. Adjustable adaptation for spatial augmented reality workspaces. In *ACM Symposium on Spatial User Interaction (SUI)*, New York, NY, USA, 2019. Association for Computing Machinery. ISBN 9781450369756. doi: 10.1145/3357251.3358755. <https://doi.org/10.1145/3357251.3358755>
8. **W. Lages**+ and D. Bowman. An adaptive interface for spatial augmented reality workspaces. In *ACM Symposium on Spatial User Interaction (SUI)*, New York, NY, USA, 2019. Association for Computing Machinery. ISBN 9781450369756. doi: 10.1145/3357251.3360005. <https://doi.org/10.1145/3357251.3360005>
9. **W. S. Lages**. Exploring artistic multi-agent systems. In C. Soddu and E. Colabella, editors, *Pro-*

- ceedings of the XXI Generative Art Conference*, pages 368–375. Verona, Italy, Domus Argenia, Dec 2018. ISBN 9788896610343
10. Y. Li⁺, R. Yu, L. Zhang, **W. S. Lages**, and D. A. Bowman⁺. Climb, direct, stack: Smart interfaces for league contest. In *2018 IEEE Conference on Virtual Reality and 3D User Interfaces (VR)*, pages 852–853, Mar 2018. doi: 10.1109/VR.2018.8446131
 11. **W. S. Lages**⁺, Y. Li, and D. A. Bowman. Evaluation of environment-independent techniques for 3d position marking in augmented reality. In *2018 IEEE Conference on Virtual Reality and 3D User Interfaces (VR)*, pages 615–616, Mar 2018. doi: 10.1109/VR.2018.8446055
 12. **W. S. Lages**. Walk-centric user interfaces. In *2018 IEEE Conference on Virtual Reality and 3D User Interfaces (VR)*, pages 825–826, Mar 2018. doi: 10.1109/VR.2018.8446426
 13. **W. Santos Lages**⁺, P. Gobira, and F. Marinho. Structural coupling on creative interfaces. In *Proceedings of the 2017 ACM SIGCHI Conference on Creativity and Cognition*, pages 252–256. Singapore, ACM, Jun 2017. doi: 10.1145/3059454.3078860
 14. **W. S. Lages**⁺, G. A. Arango, D. H. Laidlaw, J. J. Socha, and D. A. Bowman. Designing capsule, an input device to support the manipulation of biological datasets. In B. Thomas, R. Lindeman, and M. Marchal, editors, *2016 IEEE Symposium on 3D User Interfaces (3DUI)*, pages 255–256, Greenville, SC, Jan 2016. IEEE. <https://ieeexplore.ieee.org/abstract/document/7460067/>
 15. **W. S. Lages**⁺, B. Laha, W. Miller, J. Novotny, J. J. Socha, D. H. Laidlaw, and D. A. Bowman. Effects of field of regard and stereoscopy and the validity of mr simulation for visual analysis of scientific data. In T. Hollerer, V. Interrante, A. Lecuyer, and E. Suma, editors, *2016 IEEE Conference on Virtual Reality (VR)*, Proceedings of the IEEE Virtual Reality Annual International Symposium, pages 215–216. Greenville, SC, IEEE, Jan 2016. <https://ieeexplore.ieee.org/document/7504730/>
 16. **W. S. Lages**⁺, M. Nabiyouni, and L. Arantes. Krinkle cube - a collaborative vr game using natural interaction. In *CHI PLAY 2016: Proceedings of the Annual Symposium on Computer-Human Interaction in Play Companion*, pages 189–196, Austin, TX, Jan 2016. Assoc Computing Machinery. doi: 10.1145/2968120.2987746. <https://dl.acm.org/doi/10.1145/2968120.2987746>
 17. **W. Lages**. Ray, camera, action! a technique for collaborative 3d manipulation. In B. Thomas, R. Lindeman, and M. Marchal, editors, *2016 IEEE Symposium on 3D User Interfaces (3DUI)*, pages 281–282, Greenville, SC, Jan 2016. IEEE. <https://ieeexplore.ieee.org/abstract/document/7460080/>
 18. K. Hines⁺, **W. Lages**, N. Somasundaram, and T. Martin. Protecting workers with smart e-vest. In *Adjunct Proceedings of the 2015 ACM International Joint Conference on Pervasive and Ubiquitous Computing and Proceedings of the 2015 ACM International Symposium on Wearable Computers*, UbiComp/ISWC’15 Adjunct, pages 101–104, New York, NY, USA, 2015. ACM. ISBN 978-1-4503-3575-1. doi: 10.1145/2800835.2800881. <http://doi.acm.org/10.1145/2800835.2800881>. location: Osaka, Japan
 19. **W. Lages**⁺, M. Nabiyouni, J. Tibau, and D. A. Bowman⁺. Interval player: Designing a virtual musical instrument using in-air gestures. In *2015 IEEE Symposium on 3D User Interfaces (3DUI)*, pages 203–204, Mar 2015. doi: 10.1109/3DUI.2015.7131771

Sponsored Research and Other Grant Awards

External Funded

- D. Srinivasan (PI), A. Asbeck (Co-PI), S. Ge, W. Kim, N. Lau (Co-PI), A. Leonessa (Co-PI), M. Nussbaum (Co-PI), and **W. S. Lages**. FW-HTF Theme 2: enabling the functional use of powered exoskeletons for industrial applications and understanding the socioeconomic consequences of exoskeleton technology application. National Science Foundation, 09/15/2018 to 08/31/2023. USD 2,981,870. Responsible for \$14,284.
- E. Morshedzadeh (PI), A. Muelenaer (Co-PI), **W. S. Lages (Co-PI)**, B. Arena (Co-PI), and S. Parker (Co-PI). Designing an interactive training system for pediatric telemedicine cart oper-

- ations incorporating augmented reality. National Institutes of Health, 01/02/2021 to 01/06/2022. USD 45,165. Responsible for 5% (\$2,500).
- **W. S. Lages (PI)**. Exploring emotion and spatial presence in ar storytelling. Snap Creative Challenge Award, 01-10-2020. USD 10,000. Responsible for 100%.
 - **W. S. Lages (co PI)**, D. Bowman (co PI), and B. Macintyre (co PI). Content management for always-on augmented reality interfaces. Google's AR/VR Research Awards, 22-01-2019 to 12-11-2019. USD 142,802. Responsible for 29% (\$41,133).

Internal Funded

- **W. S. Lages (PI)** and L. Chukoskie. Haptic guidance. CAMD Strategic Research Priorities Seed Grant, 07/01/2025 to 06/30/2026. USD 10,000.
- **W. S. Lages (PI)** and A. Seitz. Incongruency and presence in xr. CAMD Catalyst Seed, 2025. USD 2,500
- **W. S. Lages (PI)**. Enhancing art gallery experience through augmented reality technology. CAMD Undergraduate Research Opportunity, 3/01/2023 to 07/31/2023. USD 1,000.
- **W. S. Lages (PI)** and C. North. An immersive analytics framework for drone-collected environmental data. Center for Human-Computer Interaction Planning Grant., 3/12/2021 to 12/31/2021. USD 7,076 Responsible for 80% (\$5,660).
- **W. S. Lages (PI)**, R. Patton, and Y. Gingold. Collaboration on virtual reality programming environments. 4-VA Research Grant., 3/12/2020 to 12/31/2021. USD 34,998. Responsible for 71% (\$24,998).
- **W. S. Lages (PI)**, P. Nguyen, and A. Leonessa. Using robotic platforms to provide large scale haptics in virtual reality. Virginia Tech ICAT SEAD Grant, 07/2019 to 08/2020. USD 25,000. Responsible for 100% (\$25,000).
- **W. S. Lages (PI)** and T. Oggle. Field dependency and implications to virtual environments. Virginia Tech ICAT Mini SEAD Grant, 10/2019 to 05/2020. USD 3,000. Responsible for 100% (\$3,000).
- J. Perkinson (PI), **W. S. Lages**, and P. Nguyen. Next-level vr: Integrating live-action 3d humans into synthetic environments in real time. Virginia Tech ICAT Mini SEAD Grant and CHCI, 01/2019 to 05/2019. USD 4,000. Responsible for 33% (\$1,133).
- **W. S. Lages** and M. Nabiyouni. Krinkle cube. Virginia Tech ICAT Student SEAD Grant, 01/2017 to 05/2017. USD 500.

Other Funded Grant Awards

- **W. S. Lages (Co-PI)**, M. Dee (Co-PI), and P. Nguyen (Co-PI). Virginia tech NASA SUITS challenge. Department of Computer Science, Institute of Creative Arts and Technologies, Office for Undergraduate Research, 8/1/2018 to 05/31/2019. USD 12,500. Responsible for 50% (\$6,250).
- **W. S. Lages (Co-PI)**. New faculty mentoring grant. Virginia Tech, Office of Provost, 3/11/2019 to 05/01/2021. USD 1,500.
- **W. S. Lages (Co-PI)**. Reality boundary studio. Creativity + Innovation Destination Area, 3/01/2021 to 12/01/2021. USD 1,500.
- **W. S. Lages (Co-PI)**. Virginia tech hokienauts. Department of Computer Science, Office for Undergraduate Research, 11/01/2020. USD 2,800.
- **W. S. Lages**. Natural control of animated photorealistic characters. FINEP - Brazilian Funding Authority for Studies and Projects, 01-01-2014 to 12-11-2017. USD 470,000. Ilusis Interactive

Graphics.

- **W. S. Lages.** Using time of flight cameras for robust tracking. FAPEMIG - Fundação de Amparo à Pesquisa do Estado de Minas Gerais, 01-01-2010 to 12-11-2012. USD 28,444. Ilusis Interactive Graphics.