Carmine Elvezio

carmine@cs.columbia.edu
www.carmineelvezio.com

EDUCATION

Columbia University, New York, NY
Doctor of Philosophy, Computer Science, Anticipated June 2021
Advisor: Professor Steven Feiner
Thesis: *XR Development with the Relay & Responder Pattern*

Columbia University, New York, NY
Master of Philosophy, Computer Science, May 2021

Columbia University, New York, NY
Master of Science, Computer Science, May 2012

Polytechnic Institute of New York University, Brooklyn, NY
Bachelor of Science, Computer Science, Summa Cum Laude, June 2010
NYU-Polytechnic Institute Presidential Scholarship, Lamelson Scholarship

EXPERIENCE

Columbia University, New York, NY September 2019–Present
PhD Student—Computer Graphics and User Interfaces Lab (Prof. Steven Feiner)
- Studied and developed XR (AR/VR/MR) and haptic applications, systems, and infrastructure across several domains including medicine, maintenance, aerospace, music, and rehabilitation, working with technologies including HoloLens [2], Oculus, Vive, SteamVR, and Unity
- Developed and maintained open source frameworks
- Published in *ACM UIST*, *CHI*, and *SUI*, and *IEEE ISMAR, VR,* and *IROS*
- Managed and advised 15–20 independent student project courses per semester under Prof. Feiner
- Teaching assistant for *3D User Interfaces and Augmented Reality* and *Topics in AR/VR*

Columbia University, New York, NY September 2010–August 2019
Research Associate—Computer Graphics and User Interfaces Lab (Prof. Steven Feiner)
- Studied and developed XR interaction and visualization techniques, associated applications, and supporting frameworks
- Managed and advised 5–15 student project courses per semester under Prof. Feiner
- Teaching assistant for *3D User Interfaces and Augmented Reality*, with Prof. Feiner

Columbia University, New York, NY December 2011–June 2012
Research Assistant—Columbia Robotics Group (Prof. Peter Allen)
- Created database interface for manipulation of robotic hands and automated grasp selection using brain control interfaces (OpenGL/Qt)

ARchemist, New York, NY November 2011–July 2012
Software Engineer—Server Development
- Created 3D model database with support for streaming content to mobile platforms
- Developed server and web interface to manage 3D model database
- Worked on streaming system for compact 3D model transmission over network

Polytechnic Institute of New York University, New York, NY May 2009–July 2010
Consultant/Research Assistant—Games for Learning Institute (Prof. Joel M. Wein)
- Created animation API and graphics tools (DirectX/XNA) for educational games

SKILLS

Graphics Platforms: Unity, Unreal, OpenGL, Direct3D
Languages: C, C++, C#, GLSL, HLSL, Java, Python, PHP, CUDA
Hardware/API: Oculus, Vive, SteamVR, OpenXR, HoloLens [2], Vuforia, ARCore, ARToolkit
OSs: Windows (.NET/COM), Mac OS X, Linux, iOS, Android
3D Graphics: Multi-core rendering, simulation, GPU and game engine development
UX and UI design: JavaScript, XAML, HTML, Figma, CSS, Bootstrap
Project Management: Asana, Trello, Microsoft Project, Jira, Scrum (with Agile)

AWARDS

Columbia Department of Computer Science—PhD Service Award 2020-2021

IEEE VR 2020—Best Demo Award
XREye: Simulating Visual Impairments in Eye-Tracked XR

Columbia Data Science Day 2019—Best Demo Award
Collaborative exploration of urban data in virtual and augmented reality

NYC Media Lab Summit 2019—1st Place in Future Interfaces and Spatial Computing Prize
Bounce! Collaborative VR for Low-Latency Interaction

NYC Media Lab Summit 2018—1st Place in XR Prize
Collaborative Exploration of Urban Data in VR and AR

NYC Media Lab Summit 2017—Grand Prize
Travel in Large-Scale Head-Worn VR: Pre-oriented Teleportation with WIMs and Previews

NYC Media Lab Summit 2017—3rd Place Prize
Remote Collaboration in AR and VR using Virtual Replicas

Polytechnic Institute of NYU—Presidential Scholarship

Polytechnic Institute of NYU—Lamelson Scholarship

PAPER PUBLICATIONS

Rausch, T., Hummer, W., Stippel, C., Vasiljevic, S., Elvezio, C., Dustdar, S., & Krösl, K. (2021). Towards a Platform for Smart City-Scale Cognitive Assistance Applications. In *2021 IEEE Conference on Virtual Reality and 3D User Interfaces Abstracts and Workshops* (*VR*).

Krösl, K., Elvezio, C., Luidolt, L. R., Hürbe, M., Karst, S., Feiner, S., & Wimmer, M. (2020). CatARact: Simulating cataracts in augmented reality. *2020 IEEE International Symposium on Mixed and Augmented Reality* (*ISMAR*), 682–693. https://doi.org/10.1109/ISMAR50242.2020.00098

Sadri, S., Kohen, S. A., Elvezio, C., Sun, S. H., Basu, N., Grinshpoon, A., Loeb, G. J., Feiner, S. K. (2019). Manipulating 3D Anatomic Models in Augmented Reality: Comparing a Hands-Free Approach and a Manual Approach. *IEEE International Symposium on Mixed and Augmented Reality* (*ISMAR*). Beijing, China: IEEE. https://doi.org/10.1109/ISMAR-Adjunct51615.2020.00035

Krösl, K., Elvezio, C., Wimmer, M., Hürbe, M., Feiner, S., & Karst, S. (2019). ICthroughVR: Illuminating Cataracts through Virtual Reality. *2019 IEEE Conference on Virtual Reality and 3D User Interfaces* (*VR*), 655–663. https://doi.org/10.1109/VR.2019.8798239

Elvezio, C., Sukan, M., & Feiner, S. (2018). Mercury: A messaging framework for modular UI components. *Proc. 2018 ACM Conference on Human Factors in Computing Systems* (*CHI*), 1–12, 2018-April. https://doi.org/10.1145/3173574.3174162

Furuya, H., Wang, L., Elvezio, C., & Feiner, S. K. (2018). A Comparative Ground Study of Prototype Augmented Reality Task Guidance for International Space Station Stowage Operations. *Proc. 69th International Astronautical Congress*, 5785–5795. https://www.researchgate.net/publication/337783822_A_Comparative_Ground_Study_of_Prototype_Augmented_Reality_Task_Guidance_for_International_Space_Station_Stowage_Operations

Sukan, M., Elvezio, C., Feiner, S., & Tversky, B. (2016). Providing assistance for orienting 3D objects using monocular eyewear. *Proc. 2016 Symposium on Spatial User Interaction* (*SUI*), 89–98. https://doi.org/10.1145/2983310.2985764

Elvezio, C., Sukan, M., & Feiner, S. (2016). A framework to facilitate reusable, modular widget design for real-Time interactive systems. *2016 IEEE 9th Workshop on Software Engineering and Architectures for Realtime Interactive Systems* (*SEARIS 2016*), 1–7. https://doi.org/10.1109/SEARIS.2016.7551586

Oda, O., Elvezio, C., Sukan, M., Feiner, S., & Tversky, B. (2015). Virtual replicas for remote assistance in virtual and augmented reality. *Proc. 28th Annual ACM Symposium on User Interface Software and Technology* (*UIST*), 405–415. https://doi.org/10.1145/2807442.2807497

Sukan, M., Elvezio, C., Oda, O., Feiner, S., & Tversky, B. (2014). ParaFrustum: Visualization Techniques for Guiding a User to a Constrained Set of Viewing Positions and Orientations. *Proc. 27th Annual ACM Symposium on User Interface Software and Technology* (*UIST*), 331–340. https://doi.org/10.1145/2642918.2647417

Weisz, J., Elvezio, C., & Allen, P. K. (2013). A user interface for assistive grasping. *IEEE International Conference on Intelligent Robots and Systems* (*IROS*), 3216–3221. https://doi.org/10.1109/IROS.2013.6696813

CONFERENCE AND JOURNAL ABSTRACTS

Krösl, K., Elvezio, C., Hürbe, M., Karst, S., Feiner, S., & Wimmer, M. (2020). XREye: Simulating visual impairments in eye-tracked XR. *2020 IEEE Conference on Virtual Reality and 3D User Interfaces Abstracts and Workshops* (*VRW*), 831–832. https://doi.org/10.1109/VRW50115.2020.00266

Kohen, S., Elvezio, C., & Feiner, S. (2020). MiXR: A Hybrid AR Sheet Music Interface for Live Performance. *2020 IEEE International Symposium on Mixed and Augmented Reality Adjunct* (*ISMAR-Adjunct*), 76–77. https://doi.org/10.1109/ISMAR-Adjunct51615.2020.00035

Ling, F. F., Elvezio, C., Bullock, J., Henderson, S., & Feiner, S. (2019). A Hybrid RTK GNSS and SLAM Outdoor Augmented Reality System. *2019 IEEE Conference on Virtual Reality and 3D User Interfaces* (*VR*), 1044–1045. https://doi.org/10.1109/VR.2019.8798315

Elvezio, C., Ling, F., Liu, J.-S., Tversky, B., & Feiner, S. (2018). Collaborative Exploration of Urban Data in Virtual and Augmented Reality. *ACM SIGGRAPH 2018 Virtual, Augmented, and Mixed Reality*, 10:1–10:1. https://doi.org/10.1145/3226552.3226570

Elvezio, C., Amelot, P., Boyle, R., Wes, C. I., & Feiner, S. (2018). Hybrid UIs for Music Exploration in AR and VR. *Adjunct Proceedings of the IEEE International Symposium for Mixed and Augmented Reality 2018*. 411–412. https://doi.org/10.1109/ISMAR-Adjunct.2018.00121

Elvezio, C., Ling, F., Liu, J.-S., & Feiner, S. (2018). Collaborative Virtual Reality for Low-Latency Interaction. *The 31st Annual ACM Symposium on User Interface Software and Technology Adjunct Proceedings*, 179–181. https://doi.org/10.1145/3266037.3271643

Furuya, H., Wang, L., Elvezio, C., & Feiner, S. (2018). Augmented Reality Task Guidance for International Space Station Stowage Operations. *ACM SIGGRAPH 2018 Virtual, Augmented, and Mixed Reality*, 4:1–4:1. https://doi.org/10.1145/3226552.3226579

Sadri, S., Loeb, G., Grinshpoon, A., Elvezio, C., Velagapudi, P., Ng, V., Khalique, O., Moses, J., Sommer, R., Patel, A., George, I., Hahn, R., Leon, M., Kirtane, A., Nazif, T., Kodali, S., Feiner, S., and Vahl, T. (2018). Abstract 12019: Augmented Reality Guidance for Cerebral Embolic Protection (CEP) With the Sentinel Device During Transcatheter Aortic Valve Replacement (TAVR): First-In-Human Study. *Circulation*, 138(Suppl_1), A12019–A12019. https://doi.org/10.1161/circ.138.suppl_1.12019

Grinshpoon, A., Sadri, S., Loeb, G. J., Elvezio, C., & Feiner, S. (2018). Hands-Free Interaction for Augmented Reality in Vascular Interventions. *Proc IEEE Virtual Reality*. IEEE. 751–752. https://doi.org/10.1109/VR.2018.8446259

Loeb, G., Sadri, S., Grinshpoon, A., Carroll, J., Cooper, C., Elvezio, C., Mutasa, S., Mandigo, G., Lavine, S., Weintraub, J., Einstein, A., Feiner, S., and Meyers, P. (2018). 3:54 PM Abstract No. 29 Augmented reality guidance for cerebral angiography. *Journal of Vascular and Interventional Radiology*, 29(4), S17. https://doi.org/10.1016/j.jvir.2018.01.036

Elvezio, C., Sukan, M., Oda, O., Feiner, S., & Tversky, B. (2017). Remote collaboration in AR and VR using virtual replicas. *ACM SIGGRAPH 2017 VR Village, SIGGRAPH 2017*. https://doi.org/10.1145/3089269.3089281

Elvezio, C., Sukan, M., Tversky, B., & Feiner, S. (2017). Travel in Large-Scale Head-Worn VR: Pre-oriented Teleportation with WIMs and Previews. *2017 IEEE Virtual Reality* (*VR*). 475–476. https://doi.org/10.1109/VR.2017.7892386

Elvezio, C., Sukan, M., Feiner, S., Tversky, B. (2015, September). [POSTER] Interactive Visualizations for Monoscopic Eyewear to Assist in Manually Orienting Objects in 3D. *2020*

IEEE International Symposium on Mixed and Augmented Reality Adjunct (*ISMAR-Adjunct*) 180–181. https://doi.org/10.1109/ISMAR.2015.54

ACADEMIC AND INDUSTRY POSTER PRESENTATIONS

Ling, F. F., Elvezio, C., Bullock, J., Henderson, S., & Feiner, S. A Hybrid RTK GNSS and SLAM Outdoor Augmented Reality System. *2019 IEEE Conference on Virtual Reality and 3D User Interfaces* (*VR*), March 23–27, 2019.

Elvezio, C., Sukan, M., & Feiner, S. A Framework to Facilitate Reusable, Modular Widget Design. *Tristate Workshop on Imaging and Graphics*, New York University, April 25, 2016.

Elvezio, C., Sukan, M., Feiner, S., & Tversky, B. Interactive Visualizations for Monoscopic Eyewear to Assist in Manually Orienting Objects in 3D. *Tristate Workshop on Imaging and Graphics, New York University*, April 25, 2016.

Elvezio, C., Sukan, M., Feiner, S., & Tversky, B. Interactive Visualizations for Monoscopic Eyewear to Assist in Manually Orienting Objects in 3D. *Data Science Day*, Data Science Institute, Columbia University, April 6, 2016.

Oda, O., Elvezio, C., Sukan, M., Feiner, S., & Tversky, B. Remote Task Assistance in Virtual and Augmented Reality. *Data Science Day*, Data Science Institute, Columbia University, April 6, 2016.

Elvezio, C., Sukan, M., Feiner, S., & Tversky, B. Interactive Visualizations for Monoscopic Eyewear to Assist in Manually Orienting Objects in 3D. *2015 IEEE International Symposium on Mixed and Augmented Reality* (*ISMAR*), S&T Poster Sessions, September 30–October 2, 2015.

Oda, O., Elvezio, C., Sukan, M., Feiner, S., & Tversky, B. Remote Task Assistance in Virtual and Augmented Reality. *Tristate Workshop on Imaging and Graphics*, Columbia University, April 19, 2015.

Sukan, M., Elvezio, C., Oda, O., Feiner, S., & Tversky, B. ParaFrustum: Visualization Techniques for Guiding a User to a Constrained Set of Viewing Positions and Orientations. *Tristate Workshop on Imaging and Graphics*, Columbia University, April 19, 2015.

Elvezio, C, Dedual, N., & Feiner, S. Visualizing and Interacting with Urban Data in Augmented Reality. *Institute for Data Sciences and Engineering Symposium*, Columbia University, April 5, 2013.

INVITED AND REFEREED DEMOS

Kohen, S., Elvezio, C., & Feiner, S. MiXR: A Hybrid AR Sheet Music Interface for Live Performance. *2020 IEEE International Symposium on Mixed and Augmented Reality* (*ISMAR*), Research Demos, Online, November 3–November 9, 2020.

Elvezio, C., Liu, J.-S., Sekaran, J., Kinoshita, Y., Oomori, K., Shimizu, K., Meguro, S., Hiraishi, T., and Feiner, S., Fastball: An augmented reality ballgame between New York and Tokyo (Columbia University & Hakuhodo). *NYC Media Lab Summit*, Online, New York, NY, October 7–9, 2020.

Krösl, K., Elvezio, C., Hürbe, M., Karst, S., Feiner, S., & Wimmer, M. XREye: Simulating Visual Impairments in Eye-Tracked XR. *2020 IEEE Virtual Reality (VR)*, Research Demos, Online, March 22–March 26, 2020. (**Best Demo Award**)

Sadri, S., Kohen, S., Elvezio, C., Sun, S., Basu, N., Grinshpoon, A., Loeb, G., and Feiner, S., Manipulating 3D anatomic models in augmented reality: Comparing a hands-free approach and a manual approach. *IEEE ISMAR 2019*, Beijing, China, October 14–18, 2019.

Elvezio, C., Ling, F. F., Liu, J.-S., & Feiner, S. Bounce! Collaborative VR for Low-Latency Interaction. *NYC Media Lab Summit*, The New School, New York, NY, September 26, 2019. (**1st Place in Future Interfaces and Spatial Computing Prize**)

Elvezio, C., Ling, F., Liu, J.-S., Tversky, B., & Feiner, S. Collaborative exploration of urban data in virtual and augmented reality. *Data Science Day*, Data Science Institute, Columbia University, New York, NY, April 5, 2019. (**Best Demo Award**)

Elvezio, C., Ling, F., Liu, J.-S., & Feiner, S. 5G Healthcare: Remote Rehabilitation. *Snapdragon Tech Summit* 2018, Maui, HI, December 4–6, 2018.

Elvezio, C., Amelot, P., Boyle, R., Wes, C. I., & Feiner, S. Hybrid UIs for Music Exploration in AR and VR. *2018 IEEE International Symposium on Mixed and Augmented Reality* (*ISMAR*), Research Demos, October 16–20, 2018.

Elvezio, C., Ling, F., Liu, J.-S., & Feiner, S. Collaborative Virtual Reality for Low-Latency Interaction. *2018 ACM Symposium on User Interface Software and Technology* (*UIST 2018*), Berlin, Germany, October 14–17, 2018.

Grinshpoon, A., Sadri, S., Loeb, G. J., Elvezio, C., & Feiner, S. Hands-free augmented reality for vascular interventions. *NYC Media Lab: Exploring Future Reality '18*, NYU, New York, NY, November 29, 2018.

Elvezio, C., Ling, F., Liu, J.-S., & Feiner, S. Collaborative Exploration of Urban Data in VR and AR. *NYC Media Lab Summit*, The New School, New York, NY, September 20–21, 2018. (**1st Place in XR Prize**)

Elvezio, C., Ling, F., Liu, Siu, S., J.-S., & Feiner, S. 5G Healthcare: Remote Rehabilitation. *Mobile World Congress Americas* (*MWCA*) *2018*, Los Angeles, September 12–14, 2018.

Elvezio, C., Ling, F., Liu, J.-S., Tversky, B., & Feiner, S. Collaborative exploration of urban data in virtual and augmented reality. *ACM SIGGRAPH 2018 Virtual, Augmented, and Mixed Reality* (*SIGGRAPH '18*), Vancouver, BC, August 12–16, 2018.

Furuya, H., Wang, L., Elvezio, C., & Feiner, S. Augmented reality task guidance for international space station stowage operations. *ACM SIGGRAPH 2018 Virtual, Augmented, and Mixed Reality* (*SIGGRAPH '18*), Vancouver, BC, August 12–16, 2018.

Grinshpoon, A., Sadri, S., Loeb, G. J., Elvezio, C., & Feiner, S. Hands-free augmented reality for vascular interventions. *ACM SIGGRAPH 2018 Emerging Technologies* (*SIGGRAPH '18*), Vancouver, BC, August 12–16, 2018.

Elvezio, C., Ling, F., Liu, J.-S., & Feiner, S. ReCoVR: Realtime collaborative virtual reality. *Verizon Open Innovation Lab Media Day*, Alley Chelsea, New York, NY, May 7, 2018.

Elvezio, C., Ling, F., Liu, J.-S., Mao, C., Zenelli, A., Tversky, B., & Feiner, S. Shared VR and AR. *Columbia Alumni Association STEM Day*, Columbia University, New York, NY, June 10, 2018.

Elvezio, C., Ling, F., Liu, J.-S., Tversky, B., & Feiner, S. Collaborative exploration of urban data in virtual and augmented reality. *Data Science Day*, Data Science Institute, Columbia University, New York, NY, March 28, 2018.

Grinshpoon, A., Sadri, S., Loeb, G. J., Elvezio, C., & Feiner, S. Hands-Free Interaction for Augmented Reality in Vascular Interventions. *2018 IEEE Virtual Reality* (*VR*), Research Demos, Reutlingen, Germany, March 18–March 22, 2018.

Elvezio, C., Sukan, M., Tversky, B., & Feiner, S. Travel in Large-Scale Head-Worn VR: Pre-oriented Teleportation with WIMs and Previews. *NYC Media Lab Summit*, The New School, New York, NY, September 28, 2017. (**Grand Prize**)

Elvezio, C., Sukan, M., Oda, O., Feiner, S., & Tversky, B. Remote Collaboration in AR and VR using Virtual Replicas. *NYC Media Lab Summit*, The New School, New York, NY, September 28, 2017. (**3rd Place Prize**)

Grinshpoon, A., Sadri, S., Loeb, G. J., Elvezio, C., & Feiner, S. Hands-free Interaction for Augmented Reality in Vascular Interventions. *NYC Media Lab Summit*, The New School, New York, NY, September 28, 2017.

Elvezio, C., Sukan, M., Oda, O., Feiner, S., & Tversky, B. Remote Collaboration in AR and VR using Virtual Replicas. *ACM SIGGRAPH 2017 VR Village* (*SIGGRAPH '17*), Los Angeles, CA, July 30–August 3, 2017.

Elvezio, C., Sukan, M., Tversky, B., & Feiner, S. Travel in Large-Scale Head-Worn VR: Pre-oriented Teleportation with WIMs and Previews. *Data Science Day*, Data Science Institute, Columbia University, New York, NY, April 5, 2017.

Elvezio, C., Sukan, M., Tversky, B., & Feiner, S. Travel in Large-Scale Head-Worn VR: Pre-oriented Teleportation with WIMs and Previews. *2017 IEEE Virtual Reality* (*VR*), Research Demos, Los Angeles, CA, March 20–March 22, 2017.

Sukan, M., Elvezio, C., Feiner, S., & Tversky, B. Interactive Visualizations for Monoscopic Eyewear to Assist in Manually Orienting Objects in 3D. *NYC Media Lab: Exploring Future Reality*, Viacom, New York, NY, November 10, 2016.

Sukan, M., Elvezio, C., Feiner, S., & Tversky, B. Interactive Visualizations for Monoscopic Eyewear to Assist in Manually Orienting Objects in 3D. *NYC Media Lab Summit*, Columbia University, New York, NY, September 22, 2016.

Sukan, M., Elvezio, C., Oda, O., Feiner, S., & Tversky, B. Augmented Reality for Task Assistance and ParaFrustum: Visualization Techniques for Guiding a User to a Constrained Set of Viewing Positions and Orientations. *Data Science Institute: Data on a Mission*, Columbia University, New York, NY, March 31, 2015.

Sukan, M., Elvezio, C., Oda, O., Feiner, S., & Tversky, B. Augmented Reality for Task Assistance and ParaFrustum: Visualization Techniques for Guiding a User to a Constrained Set of Viewing Positions and Orientations. *NYC Media Lab: Exploring Future Reality*, Columbia University, New York, NY, November 5, 2015.

TEACHING

COMS 6998—Topics in AR and VR
Columbia University, Professor Steven Feiner
TA, Co-taught subset of lectures
Fall 2020

COMS 4172—3D User Interfaces and Augmented Reality
Columbia University, Professor Steven Feiner
TA, Co-taught subset of lectures
Spring 2012-Spring 2021

Introduction to Data Structures and Algorithms
Polytechnic Institute of NYU, Professor Lisa Hellerstein
TA
Spring 2008

TALKS & PANELS

Elvezio, C., XR Development with the Relay & Responder Pattern. (PhD Thesis Proposal) Online, Columbia University, 2021.

Elvezio, C., et al., Graduate STEM Student Panel, Scientists and Engineers for a Better Society (SEBS) Online, Columbia University, 2021.

Elvezio, C., A Survey of Development Tools for XR Programmers. (PhD Candidacy Exam) Online, Columbia University, 2020.

Elvezio, C., The PhD Project: Demystifying the Dissertation Presentation: Carmine Elvezio. Online, Columbia University, 2020.

Elvezio, C., Feiner, S., Pitch Your Lab: Columbia CGUI Lab, *2018 IEEE International Symposium on Mixed and Augmented Reality* (*ISMAR*) Conference, Munich, Germany, 2018.

Elvezio, C., Ling, F., Liu, J-S,. Tversky, B., Feiner, S., Collaborative Exploration of Urban Data in Virtual and Augmented Reality. *ACM SIGGRAPH 2018 Virtual, Augmented, and Mixed Reality* (*SIGGRAPH '18*), Vancouver, BC, August 12.

Elvezio, C., Sukan, M., Feiner, S., Mercury: A Messaging Framework with Relay Nodes and Responders for Modular UI Components. *2018 ACM Conference on Human Factors in Computing Systems (CHI)*, Montreal, Québec, Canada, April 26, 2018.

ACADEMIC AND COMMUNITY SERVICE

IEEE VR Reviewer: 2019

ACM VRST Reviewer: 2019

ACM UIST Reviewer: 2018, 2019, 2020

ACM CHI Reviewer: 2017, 2019, 2020

Columbia Dept. of CS New Undergrad Events and Programming Support: 2021

Columbia Dept. of CS PhD Virtual Mentor: 2021

Columbia Dept. of CS PhD Prospective Student Visit Day: 2021

Columbia Dept. of CS Grad Social Events Support—Student Services: 2020–2021

Columbia SEAS WISC Holistic Academic Mentoring: 2020–2021

Columbia University Task Force on Inclusion and Belonging: 2020–2021

Columbia University KOCH COVID Ambassador Program: 2020–2021

Columbia Dept. of CS PhD Instagram Takeover: 2020

Columbia University, Bergen County Academies Senior Experience Mentor: 2018–2021

Columbia Engineering STEM Day: 2018

Polytechnic Institute of NYU Dept. of CS—General Tutor: 2008–2010

PATENTS & APPLICATIONS

Feiner, S., Loeb, G., Grinshpoon, A., Sadri, S. and Elvezio, C., Columbia University of New York, 2020. Systems and methods for augmented reality guidance. U.S. Patent Application 16/796,645.

Elvezio, C., Sukan, M., Oda, O., Feiner, S. and Tversky, B., Columbia University of New York, 2016. Systems and methods for providing assistance for manipulating objects using virtual proxies and virtual replicas. U.S. Patent Application 15/146,764.

TECHNICAL REPORTS

Sekaran, J., Liu, J-S., Elvezio, C., Feiner, S., *Fastball v2*. Technical Report, Columbia University and Hakuhodo, NYC Media Lab Seed Project. 2020.

Yen, S., J., Liu, J-S., Elvezio, C., Feiner, S., *Fastball*. Technical Report, Columbia University and Hakuhodo, NYC Media Lab Seed Project. 2020.

Feiner, S., Elvezio, C., Ling, F., *CAVIAR (Cyber Affordance Visualization In Augmented Reality)*. Technical Report, CMU SEI Subcontract. 2018.

Feiner, S., Elvezio, C., Sukan, M., *Augmented Reality for Maintenance and Training in NUWC Industrial Operations.* Technical Report, NISE Subcontract. 2015.

OPEN SOURCE PROJECTS

Mercury Messaging
A framework facilitating XR development through cross-component communication in Unity
https://github.com/ColumbiaCGUI/MercuryMessaging
Fall 2017-present

GoblinXNA
A platform for research on 3D user interfaces, including mobile AR and VR
http://monet.cs.columbia.edu/projects/goblin/
Fall 2011-Spring 2014

SELECTED RESEARCH PROJECTS

SpaceLine: AR Precueing
Liu, J.-S., Elvezio, C., Tversky, B., & Feiner, S.
AR system showing how graphical precueing can be used to indicate trajectories and improve performance in a series of path-following tasks. *Submission in progress. 2021.*

DentAR: Dentistry Training in AR
Elvezio, C., Samuel, S., Comas, E., Zubiaurre Bitzer, L. A., Moss-Salentijn, L., Feiner, S.

A system for guiding dentistry students in learning to complete complex dental procedures, such as Novocain injection, in AR and VR with support for haptic devices. *Submission in progress. 2021.*

AR Notifications
Elvezio, C., Wang, Z., Liu, J.-S., Feiner, S.
An AR/VR system that presents notifications of real-world objects and points of interest when the user gets near. *Submission in progress. 2021.*

CatARact: Simulating Cataracts in Augmented Reality
Krösl, K., Elvezio, C., Luidolt, L. R., Hürbe, M., Karst, S., Feiner, S., & Wimmer, M.
The first medically-informed, pilot-studied simulation of cataracts and other impairments in eye-tracked augmented reality (AR). *Published in IEEE ISMAR 2020.*

MiXR: A Hybrid AR Sheet Music Interface for Live Performance
Kohen, S., Elvezio, C., & Feiner, S.
A system that combines AR, smartphones, and tablets to allow performers to manage and annotate virtual sheet music. *Published in IEEE ISMAR 2020.*

ICthroughVR: Illuminating Cataracts through Virtual Reality
Krösl, K., Elvezio, C., Wimmer, M., Hürbe, M., Feiner, S., & Karst, S.
A parametrizable VR system allowing for the simulation of cataracts to help Ophthalmologists and patients better understand symptoms of the various visual diseases under labelled as cataracts. *Published in IEEE VR 2019.*

CAVIAR: A Hybrid RTK GNSS and SLAM Outdoor Augmented Reality System
Ling, F. F., Elvezio, C., Bullock, J., Henderson, S., & Feiner, S.
A wide-area outdoor wearable AR system that uses RTK GNSS tracking to register maps in AR with a SLAM tracking system. *Published in IEEE VR 2019.*

Manipulating 3D Anatomic Models in Augmented Reality: Comparing a Hands-Free Approach and a Manual Approach
Sadri, S., Kohen, S. A., Elvezio, C., Sun, S. H., Grinshpoon, A., Loeb, G. J., … Feiner, S. K.
A hands-free AR guidance system for vascular interventions, using Microsoft HoloLens, controlled by head motion and speech. *Published in IEEE ISMAR 2019, IEEE VR 2018, ACM SIGGRAPH 2018.*

Mercury: A Messaging Framework for Modular UI Components
Elvezio, C., Sukan, M., & Feiner, S.
A framework and encompassing toolkit to facilitate nonspatial communication in the Unity game engine. *Published in ACM CHI 2018.*

Collaborative Exploration of Urban Data in Virtual and Augmented Reality
Elvezio, C., Broudo, L, Chan, M., Ling, F., Liu, J.-S., Tversky, B., & Feiner, S.
A collaborative AR/VR multi-user system for visualizing and interacting with social and municipal urban data. *Published in ACM SIGGRAPH 2018, Submission in progress.*

Bounce! Collaborative Virtual Reality For Low-Latency Interaction
Elvezio, C., Ling, F., Liu, J.-S., & Feiner, S.
A remote rehabilitative VR game in which two collaborating users simultaneously manipulate virtual objects by controlling a set of physically modeled ropes. *Published in ACM UIST 2018.*

Hybrid UIs for Music Exploration in AR and VR
Elvezio, C., Amelot, P., Boyle, R., Wes, C. I., & Feiner, S.
An AR system combining HoloLens, LeapMotion, and touch screens to create a new way to search, organize and enjoy music (powered by the Spotify catalog). *Published in ACM UIST 2018.*

Augmented Reality Task Guidance for International Space Station Stowage Operations
Furuya, H., Wang, L., Elvezio, C., & Feiner, S. K.
A system for helping NASA astronauts to complete Stowage packing and loading tasks on the International Space Station, in AR. *Published in the International Astronautical Congress (IAC) 2018, ACM SIGGRAPH 2018.*

Travel in Large-Scale Head-Worn VR: Pre-oriented Teleportation with WIMs and Previews
Elvezio, C., Sukan, M., Tversky, B., & Feiner, S.
A VR system allowing users to pre-orient before teleporting in a Virtual Scene, using a World-In-Miniature and preview. *Published in ACM SUI 2016, IEEE ISMAR 2015.*

A Framework to Facilitate Reusable, Modular Widget Design for Real-Time Interactive Systems
Elvezio, C., Sukan, M., & Feiner, S.
A light-weight toolkit for Unity facilitating the creating of modular 3D widgets for XR applications and user studies. *Published in IEEE SEARIS 2016.*

Providing Assistance for Orienting 3D Objects Using Monocular Eyewear
Sukan, M., Elvezio, C., Feiner, S., & Tversky, B.
A system for exploring different visualization approaches across different paradigms for guiding unconstrained manual 3DoF rotation. *Published in ACM SUI 2016, IEEE ISMAR 2015.*

Remote Collaboration in AR and VR using Virtual Replicas
Elvezio, C., Sukan, M., Oda, O., Feiner, S., & Tversky, B.
A hybrid XR system where a remote subject expert views a scene in either AR or VR, to create referential instructions for a technician using AR. *Published in ACM SIGGRAPH 2017, UIST 2015.*

ParaFrustum: Visualization Techniques for Guiding a User to a Constrained Set of Viewing Positions and Orientations
Sukan, M., Elvezio, C., Oda, O., Feiner, S., & Tversky, B.
A system for exploring different modalities for representing a range of strategic view poses for optimal viewing. *Published in ACM UIST 2014.*

A User Interface for Assistive Grasping
Weisz, J., Elvezio, & Allen, P.
A 2D UI combining the speed and convenience of preplanned grasps with versatility of an online planner. *Published in IEEE IROS 2013.*

MENTORSHIP (Columbia and NYU Independent Research Project Students)

Sad Adib, Pierre Amelot, Yujin Ariza, Oliver Baltay, Priyanjana Bangani, Maria Barbulescu, Naomi Basu, Siddharth Bhatnagar, Johnathan Bi, Robert Boyle, Lea Broudo, Jacob Bullock, Diana Caraveo, Benjamin Carlin, Matthew Chan, Jenny Chan, Jiahe Chen, Fujunku Chen, Jessica Chen, Julie Chien, Hayun Chong, Edith Comas, Sebastian Cueva-Caro, Dimitar Dinev, Gustave Ducrest, Ethan Edwards, Rachel Etheredge, Steven Fantin, Chihao Feng, Ariel Fleming, Aaron Friedman, Hiroshi Furuya, Manushree Gangwar, Lu Gao, Matthieu Gavaudan, Suwen Ge, Alon Grinshpoon, Dru Grossberg, Yu Gu, Jiakang Guo, Ge Guo, Huy Ha, William Hallett, Anis Harbi, Yilan He, Daniel Hu, Ji Ho Hyun, Maya Iwabuchi, Aruj Jain, Ruijue Ji, Shalva Kohen, Katharina Krösl, Krithika Kuppusamy, Patrick Kwon, Claudia Lauschke, Kathleen Lee, Justin Lee, Hollis Lehv, He Li, Jenny Li, Manxueying Li, Tia Lim, Yida Lin, Yihan Lin, Frank Ling, Jiaqi Liu, Gabrielle Loeb, Kaiji Lu, Yulin Lu, Yeuting Lu, Alan Luo, Anthony Luo, Sahil Mahendrakar, Vaibhav Malpani, Cynthia Mao, Alan McNaney, Yuxuan Mei, Kevin Mejia, Ido Michael, Seth Mishan, Ribo Mo, Saaman Moghadam, Mohanad Mohamed, Wode Ni, Eszter Offertaler, Melissa Ozcan, Minhaz Palasara, Donglai Pan, Su Ji Park, Michal Porubcin, Sarah Radway, Yixiong Ren, Cory Robertson, Madeleine Roodberg, Alexander Rupp-Coppi, Shirin Sadri, Sara Samuel, Sofia Sanchez-Zarate, Harshit Saxena, Emma Schechter, Janane Sekaran, Changmin Seo, Sumiran Shah, Bin Shen, Kishan Sheth, Samuel Silverman, Samantha Siu, Yarden Stern, Vivek Subramaniam, Shawn Sun, Weijie Tang, Rahul Tewari, Morgan Thompson, Luis Tolosa, Alyza Tüchler, Darshana Umakanth, Manasvi Vohra, Linli Wan, Zichuan Wang, Tianfan Wang, Linnan Wang, Tianfan Wang, Shawn Wei, Catherine Wes, Nora Wixom, Brian Wu, Bruce Wu, Yuxuan Xie, Bin Xu, Amy Xu, Lu Yang, Danwen Yang, Spencer Yen, Nazli Yurdakul, Ana Zeneli, Joy Zeng, Xuanyuan Zhang, Davide Zhang, Di Zhu, Elijah Zulu, Noah Zweben