

Carmine Elvezio

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EDUCATION

Columbia University, New York, NY

Doctor of Philosophy, Computer Science, Anticipated Graduation June 2021.

Advisor: Professor Steven K. Feiner

Thesis: XR Development with the Relay & Responder Pattern

Columbia University, New York, NY

Master of Philosophy, Computer Science, Graduation May 2021.

Columbia University, New York, NY

Master of Science, Computer Science, Graduated May 2012.

Polytechnic Institute of New York University, Brooklyn, NY

Bachelor of Science, Computer Science, Summa Cum Laude, Graduated 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

- Studied and developed AR/VR/MR/3D/Haptic applications, systems, and infrastructure across several domains including medicine, remote maintenance, space, music, and rehabilitation, working with many technologies including Microsoft HoloLens, Oculus, and Unity
- Developed and maintained several open source frameworks
- Published in *ACM UIST*, *CHI*, and *SUI*, and *IEEE ISMAR*, *VR*, and *IROS*, et al.
- Managed 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*, with Prof. Feiner

Columbia University, New York, NY

September 2010–August 2019

Research Associate - Computer Graphics and User Interfaces Lab

- Created and studied XR interactions and visualization techniques, associated applications and supporting frameworks
- Managed 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, Brooklyn, 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

Experience with Unity, Unreal, XNA, OpenGL, and Direct3D

Programming Skills in C, C++, C#, GLSL, HLSL, Java, Python, PHP, JavaScript, CUDA

Experience with Oculus, Vive, SteamVR, OpenXR, HoloLens, Vuforia, ARCore, and ARToolkit

Experience in Development on Windows (.NET/COM), Mac OS X, Linux, iOS, and Android

Experience with multi-core rendering, simulation, GPU and engine development

Experience in UX and UI design (2D and 3D)

Project Management: Asana, Trello, JIRA, and Scrum (with Agile)

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 (VRW).
- 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.
- Sadri, S., Kohen, S. A., Elvezio, C., Sun, S. H., 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.
- 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. ACM Conference on Human Factors in Computing Systems (CHI) - Proceedings, 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. SUI 2016 - Proceedings of the 2016 Symposium on Spatial User Interaction, 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>
- Elvezio, C., Sukan, M., Oda, O., Feiner, S., & Tversky, B. (2016). Systems and methods for providing assistance for manipulating objects using virtual proxies and virtual replicas. Google Patents.
- Oda, O., Elvezio, C., Sukan, M., Feiner, S., & Tversky, B. (2015). Virtual replicas for remote assistance in virtual and augmented reality. UIST 2015 - Proceedings of the 28th Annual ACM Symposium on User Interface Software and Technology, 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. Proceedings of the 27th Annual ACM Symposium on User Interface Software and Technology, 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, 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.
- 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.

- 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.
- 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. G., ... Vahl, T. P. (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. *Proceedings - IEEE Virtual Reality*. IEEE.
- Loeb, G., Sadri, S., Grinshpoon, A., Carroll, J., Cooper, C., Elvezio, C., ... 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).
- Elvezio, C., Sukan, M., Feiner, S., Tversky, B. (2015, September). [POSTER] Interactive Visualizations for Monoscopic Eyewear to Assist in Manually Orienting Objects in 3D. 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 23-27th 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 25th 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 25th 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 6th 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 6th 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 30th-October 2nd 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 19th 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 19th 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 5th 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 3rd-November 9th 2020.
- Krösl, K., Elvezio, C., Hürbe, M., Karst, S., Feiner, S., & Wimmer, M. XREye: Simulating Visual Impairments in Eye-Tracker XR. 2020 IEEE Virtual Reality (VR), Research Demos, Online, March 22nd-March 26th 2020.
- 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 5th 2019.
- Elvezio, C., Ling, F., Liu, J.-S., & Feiner, S. 5G Healthcare: Remote Rehabilitation. Snapdragon Tech Summit 2018, Maui, HI, December 5th 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 16th-20th 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 14th-17th 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 Kimmel Center, New York, NY, November 29th 2018.
- Elvezio, C., Ling, F., Liu, J.-S., & Feiner, S. Collaborative Virtual Reality for Low-Latency Interaction. NYC Media Lab Summit, The New School, New York, NY, September 20th-21st 2018.
- Elvezio, C., Ling, F., Liu, S., J.-S., & Feiner, S. 5G Healthcare: Remote Rehabilitation. Mobile World Congress Americas (MWCA) 2018, Los Angeles, September 12th-14th 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 12th-16th 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 12th-16th 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 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 28th 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 18th-March 22nd 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 28th 2017.
- 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 28th 2017.
- 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 28th 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 30th-August 3rd 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 5th 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 20th-March 22nd 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, White Box Theatre at Viacom, New York, NY, November 10th 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 22nd 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 31st 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 5th 2015.

TEACHING

COMS 6998 - Topics in AR and VR

Columbia University, Professor Steven Feiner
TA, Co-taught lectures
Fall 2020

COMS 4172 - 3D User Interfaces and Augmented Reality

Columbia University, Professor Steven Feiner

TA, Co-taught subset of lectures
Spring 2011-Spring 2021

Introduction to Data Structures and Algorithms

Polytechnic Institute of NYU, Professor Lisa Hellerstein

TA

Spring 2008

AWARDS

IEEE VR 2020 - Best Demo Award

XREye: Simulating Visual Impairments in Eye-Trackled 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 - Future Interfaces and Spatial Computing Prize

Collaborative Virtual Reality for Low-Latency Interaction.

NYC Media Lab Summit 2018 - 1st Place in XR Prize

Collaborative Virtual Reality for Low-Latency Interaction.

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

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., ISMAR Pitch Your Lab: Columbia CGUI Lab, IEEE ISMAR 2018
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 12th.

Elvezio, C., Sukan, M., Feiner, S., Mercury: A Messaging Framework with Relay Nodes and Responders for Modular UI Components. ACM CHI 2018, Montreal, Québec, Canada, April 26th, 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 CS - New Undergrad Events and Programming Support: 2021

Columbia CS - PhD Virtual Mentor: 2021

Columbia CS - PhD Prospective Student Visit Day: 2021
Columbia 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 CS - PhD Instagram Takeover: 2020
Columbia University, Bergen County Academies Senior Experience Mentor: 2018-2021
Columbia Engineering STEM Day: 2018
Polytechnic Institute of NYU CS Department - General Tutor: 2008-2010

PATENTS

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 new way to handle cross-component communication in the Unity game engine.
<https://github.com/ColumbiaCGUI/MercuryMessaging>
 Fall 2017-present

GoblinXNA

Goblin XNA is a platform for research on 3D user interfaces, including mobile augmented reality and virtual reality, with an emphasis on games.
<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.,
 A system for guiding dentistry students in learning to complete complex dental procedures, such as Novocain injection, in AR and VR with several 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

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