Daniel He

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Education

University of California, Berkeley — Berkeley, CA

Bachelor's in Computer Science — *Aug 2019 – May 2023*

Master of Engineering in EECS, Visual Computing and Computer Graphics Concentration — *Aug 2024 – May 2025*

Publications

Edward Kim, Alton Sturgis, Zachary Pardos, Kyle Cui, James Hu, Yunzhong Xiao, Boxi Fu, **Daniel He**, Issac Gonzalez, Alberto Sangiovanni-Vincentelli, Sanjit Seshia, Bjoern Hartmann, "Task Distribution Aware Psychomotor Skill Training with Probabilistic Programs and Bayesian Knowledge Tracing in Virtual Reality," *EECS Department, University of California, Berkeley*, Technical Report No. UCB/EECS-2024-16. https://www2.eecs.berkeley.edu/Pubs/TechRpts/2024/EECS-2024-16.html

Experience

UC Berkeley - Research Assistant — Jan. 2021 – Present

Co-advised by Prof. Sanjit Seshia and Prof. Bjoern Hartmann | DOP Center for Electronic Systems Design — *June 2022 – Present*

- **(Curr. Research)** Developed system that uses natural language processing (NLP) and programming-by-demonstration (PBD) to perform program synthesis with LLMs - using novel program disambiguation techniques - to assist experts (in sports and medical rehab domains) in authoring dynamic scenarios to create content in VR and for users in VR to learn from it.
- **(See Publications)** Dynamically generated training scenarios based on the certain skills the user is expected to learn in a VR Ultimate Frisbee game, and determine if they have mastered the skills using using various metrics with Bayesian Knowledge Tracing; improved user performance using this intelligent training algorithm over a set training curriculum by 30%.
- Implemented pipeline to communicate between a probabilistic programming language (Scenic) to Unity & C# using ZMQ.
- Maintainer of the Scenic programming language; developing simulator support for Unity, Microsoft AirSim, and Unreal.

Advised by Prof. Bjoern Hartmann | Berkeley Institute of Design — *June 2021 – Jan 2022*

- Developed prototype of a Unity toolkit for an in-environment tutorial system allowing users to record and playback for VR painting and VR design applications called TutoriVR, increasing the feasibility of learning skills in VR and boosting skill acquisition by 30%.
- Developed 3D stroke reconstruction feature that plays back strokes the user made in 3D space.

Advised by Prof. Luisa Caldas | XR Lab — *Jan 2021 – June 2023*

- Software developer on Virtual Bauer Wurster, a collaborative virtual experience made in Unity, where hundreds of students post their architectural design work and interact with others inside their own 3D architecture models.
- Developed an in-app custom editor that uses AWS, for users to efficiently create, edit, and upload their architectural models for showcases in the app, at 3x faster than the original workflow.

Skywalk — July 2022 – Sep 2022

Software Intern

- Developed software code in Kotlin for an AR gesture control wristband for Microsoft Hololens; wrote code in C# and created Unity environments to interact with using the AR wristband for data collection and demo videos.
- Saved data using Protobuf, resulting in 10% smaller file size and 6x faster performance than the original workflow of using a JSON saving format; and converted data into HDF5 data format to use in our machine learning algorithm.

Meta — June 2022 – Aug 2022

Meta Youth Summer Academy (MYSA) - Virtual Reality Lead Instructor

- Lecturer and lead instructor of the Virtual Reality course at MYSA, teaching a diverse group of rising high school juniors through a project-based coding course covering the fundamentals of virtual reality using Unity and C#.
- In collaboration with Mission Bit, a non-profit organization providing computer science education, created an inclusive and community-based classroom culture at MYSA.

Extended Reality @ Berkeley — Jan 2020 – Present

Education Exec (Aug. '20), President (Aug. '21+)

- Revitalized a previously inactive club post-COVID, transforming it into one of the largest student AR/VR organizations in the nation, with over 600 alumni and 40 student developers/engineers/designers engaged in a dozen technical and research projects.
- Developed curriculum and taught hundreds of students about VR/AR development, history, and design principles through lectures and assignments in the Extended Reality Development course at UC Berkeley as the Lead Course Instructor.
- Founding member of the Intercollegiate Association of VR/AR clubs (ICXR), the largest network of XR college enthusiasts.

Projects

Weaponized Roman Candles: Real-time firework simulation rendered from scratch using Unity compute shaders, including the smoke and firework particle simulation; can also be run in virtual reality.

3D Reconstruction: Implemented pose estimation of a known image with OpenCV using feature matching, then adapted this estimation algorithm to compute a 3D point cloud representation of a scene with perspective projection.

Shoot-the-Block : AR iOS game using Unity's AR Foundation with ARKit, similar to the arcade game Whack-a-Mole!

Camping VR : Relaxing VR camping simulator developed in Unity with dozens of interactive tasks to complete around the campsite.

Technical Skills

Languages: C#, Scenic, Python, Java, Kotlin, C, C++, HTML/CSS, SQL, Swift, Scheme, JavaScript, RISC-V

Technologies/Frameworks: Augmented/Virtual Reality, Oculus, Hololens, ARCore, ARKit, Photon, LaTeX, NumPy, Linux (Ubuntu/Debian), AWS, OpenCV, OpenGL, scikit-learn, JUnit, Pandas, Matplotlib, Protobuf, HDF5, (currently learning Apple Vision Pro)

Developer/Design Tools: Git/GitHub, Unity/UnityXR, Unreal Engine, VS Code, Visual Studio, Rider, IntelliJ, PyCharm, Docker, NuGet, Xcode, Adobe Suite, Figma, Bezi, Maya, Blender, Termux, UserLAnd, Azure Cognitive Services