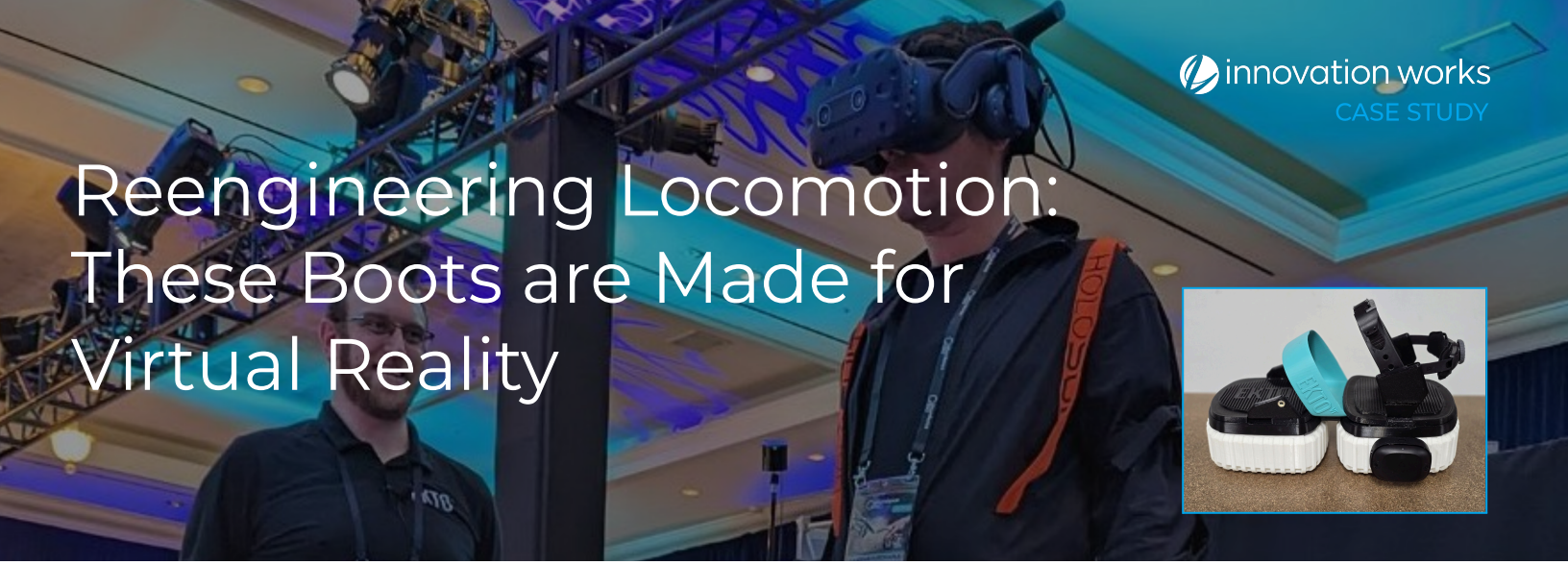


innovation works
CASE STUDY

Reengineering Locomotion: These Boots are Made for Virtual Reality

EKTO VR is revolutionizing virtual reality by making digital movement feel unmistakably real. Founded by robotics engineer and former aerospace flight controls expert **Brad Factor**, the Pittsburgh-based startup has developed wearable robotics that let users walk freely in virtual environments—without motion sickness, tethers, or cumbersome treadmills.

The launch of the first Oculus headset in 2013 sparked Factor's fascination with virtual reality. Determined to make digital environments feel natural to the body, he first explored a haptic exoskeleton before pivoting to locomotion in VR. To gain the expertise and resources he needed, Factor enrolled in Carnegie Mellon University's (CMU) Masters program in Robotics Systems Development, turning his concept into a capstone project that advanced his overall vision and laid the foundation for EKTO VR.

The result is the EKTO VR Boot system—motorized footwear with an AI-powered design that adapts to each step, allowing infinite walking in a compact space while maintaining perfect orientation. Unlike VR treadmills or "slidemills," which often feel like skating on ice or pushing against a harness, EKTO's omnidirectional drive technology delivers smooth, confident motion. Embedded motors and precision sensors gently glide users back to center while syncing with their visual and vestibular cues, eliminating disorientation and creating an unmatched sense of presence.

Developed through seven years of R&D and eleven generations of prototypes, EKTO's system blends advanced robotics and ergonomic design to create a platform that is both powerful and intuitive. The boots transform VR from a stationary experience into a fully physical one, advancing the science of presence and redefining how humans interact with digital worlds.

Challenge

With the Voyager SE, EKTO VR delivered a breakthrough enterprise solution that enabled natural walking in virtual reality while keeping users safely in place. Translating that success into a consumer-ready product, however, presented a challenge. Early prototypes were costly to produce, constrained by inconsistent component yields and a design that limited future performance gains in speed and responsiveness.

Founder Brad Factor faced a critical question: could the boots be redesigned to meet consumer price expectations without sacrificing fidelity? Determining whether to evolve the existing platform or rebuild from the ground up became a defining strategic decision. To navigate constraints around off-the-shelf components, power efficiency, weight reduction, and control performance, EKTO VR needed deep technical collaboration to make a scalable consumer product possible.

Project Details

Company:
EKTO VR

Year Founded:
2018

Founder:
Brad Factor

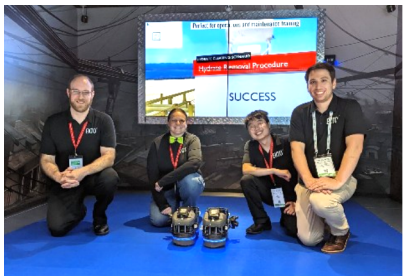
Programs Participated In (Year):
AlphaLab Gear Program (Guest 2018) (2019)
Robotics Factory Scale Program (2024)

Demo and Investor Days were milestones, but sharing our VR boots, connecting with peers, and enjoying informal after-hours discussions is where the magic happens. "

--Brad Factor
Founder and CEO, EKTO VR

Solution

Over the course of a year, EKTO VR worked with the Robotics Factory Scale program to mature its high-performance commercial platform into a redesigned model with broad consumer appeal. The team received hands-on support in mechanical design, design for manufacturability, and electrical circuit fabrication, alongside training on advanced shop equipment to rapidly build and test new prototypes. Working closely with mentors and Robotics Factory electromechanical engineer **Andrew Katon**, Factor and the EKTO team explored multiple production paths—from 3D printing with engineering-grade materials to evaluating injection molding and off-the-shelf components—striking the right balance between performance, durability, and cost. Electrical prototyping engineer **Brian Dougherty** also played a critical role in the electronics build and debugging, helping solder and assemble circuit boards, hand-placing some components when needed. This collaboration helped EKTO VR sharpen its next-generation concepts, solidify its engineering roadmap, and build critical momentum. That progress was on display at RADD 2025, where an early preview of the Genesis prototype was enthusiastically received.



EKTO VR's story is deeply enmeshed in Pittsburgh's world-class robotics ecosystem. Founder Brad Factor tapped CMU mentors Chris Atkeson, John Dolan, and Dimi Apostolopoulos for technical counsel, while programs like Project Olympus and close advisers from the Tepper School helped validate the business feasibility of his vision. EKTO VR began collaborating informally with AlphaLab Gear in 2017, gaining dedicated workspace and access to the program's core curriculum. EKTO officially joined the AlphaLab Gear multi-track cohort in 2019, further advancing strategic development and market readiness. In 2020, EKTO VR joined CMU's VentureBridge cohort, gaining access to both investors and business development support. These relationships, coupled with the guidance and hands-on mentorship from Innovation Works and the Robotics Factory, has helped the team refine their prototypes and position the company for broader growth in the VR market.

EKTO VR has built a small but relentless team of engineers, designers, and visionaries who are pioneering how humans navigate virtual worlds. Continuously iterating toward Genesis, the team has developed a sophisticated platform that delivers intuitive movement in the metaverse. Blending cutting-edge robotics with entrepreneurial ingenuity, EKTO VR delivers a platform that people are eager to experience, invest in, and soon own. From its homebase on Pittsburgh's North Shore, EKTO VR is bringing fluid, limitless movement to virtual experiences, transforming how users engage with digital worlds across entertainment, research, and consumer VR.

Innovation Works and the Robotics Factory

Innovation Works is one of the most active early-stage investors in the country and the most active in Pennsylvania. Since its inception of the seed fund in 1999, Innovation Works has invested in over 780 companies that have gone on to raise $3.4 billion in follow-on funding. Innovation Works is part of the Ben Franklin Technology Partners network, which has catalyzed economic growth over the last 30 years by providing access to capital and networks that help foster innovation and technology-based economic development in Pennsylvania. The Robotics Factory is an array of robotics programs led by Innovation Works and the Pittsburgh Robotics Network. Learn more at **innovationworks.org** and **roboticsfactory.org**.