The Second Great Wave of Human-Oriented Computing

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Abstract: *XR, consisting of Virtual Reality (VR) and Augmented Reality (AR) together, will be the next general computing platform, dominating our relationship with the digital world for the next 50 years, much as personal computing has dominated the last 50. XR will be the way people work, play, and connect. VR headsets will create deeply immersive new experiences and will enable the richest Metaverse experiences. Always-available AR glasses will be with us when we're on the go, letting us act with extremely low latency and friction, allowing us to use virtual entities of all sorts to annotate our world, share with others, and communicate, and extending our perceptions, memory, and cognition with an Artificial Intelligence (AI) assistant that truly understands our context and our personal needs. Both will be centered around people rather than technology, allowing us to connect more strongly than ever before, and providing a contextually personalized interface that is far more intuitive and natural than anything that exists today. However, VR and particularly AR are at a very early stage, and need a great deal of innovation and development, across multiple technologies, before they can offer the level of performance that would cause billions of people to make XR a part of their everyday lives. Those technologies include optics, projectors, display systems, graphics, audio, hand tracking, eye tracking, face tracking, body tracking, world mapping and reconstruction, contextual understanding, sensors, interaction, and AI. At the same time, VR headsets operate within tight power, weight, and thermal budgets, and AR glasses will need to operate within budgets that are far tighter—in fact, unprecedented in many ways in the consumer space, thanks to constraints that include light weight, very low power, and all-day comfort and all-day operation in a socially acceptable form factor. As a result, breakthroughs will be needed in every one of the areas listed above to meet the demanding features, extraordinary performance requirements, and very tight design constraints of XR. Finally, the full potential of XR can only be realized through true co-design of hardware and software; technology development will need to be driven from end to end, based on delivering important use cases with a full-system approach.*

Biography*:* Michael Abrash is the Chief Scientist of Reality Labs, a research laboratory that brings together a world-class R&D team of scientists, developers and engineers to build the future of connection within virtual and augmented reality. He was graphics lead for the first two versions of Windows NT, teamed with John Carmack on Quake, worked on the first two versions of Microsoft's Xbox, and helped develop virtual reality at Valve. He is also the author of several books, including Michael Abrash's Programming Black Book.