VIEWMAGIC EXECUTIVE SUMMARY

OVERVIEW

What if capturing a photo or video was not limited by the placement of a camera? Imagine the camera could be freely moved by the needs of the viewer rather than those of the content creator only.

ViewMagic has developed a breakthrough that enables applications to move any number of software-defined virtual cameras in 3D space with six degrees of freedom within a video or photo, **during or after** its recording.

The ViewMagic technology delivers unprecedented reconstructed image quality in real-time, all using the GPUs and commodity cameras available in mobile devices. This solution has profound implications for many current and emerging mass market applications such as immersive video calling and video conferencing, consumption of pre-recorded immersive content, virtual telepresence and broadcasted live immersive video, as well as Virtual and Augmented Reality experiences.

Using its core technology, ViewMagic has developed several end-user application demonstrations:

ViewMagic Experience™

Whether one is using video chat or video conferencing software or taking a selfie, it is impossible to establish mutual eye contact with others. This results in a loss of all the powerful social cues that are used during daily, in-person interactions. It is a fundamental problem caused by the fact that while we naturally want to look at the face of the person on the display, the camera is in the wrong location off to the side. As a result, both people appear to each other as being disengaged, looking in the wrong direction and social cues are frequently misinterpreted.

Immersive Video Call Experience (VME)

ViewMagic's software controlled virtual camera allows people to experience natural, mutual eye contact between each other and with themselves on any display. In addition, users will enjoy an immersive three-dimensional impression of another person or of any scene captured in real-time **as if freely looking through an open window**. ViewMagic demonstrates perfect mutual eye contact on full-duplex international video calls, all running using commodity cameras and mobile GPUs found in current generation smartphones. Furthermore, ViewMagic supports holographic displays for the truly immersive three-dimensional impression of another person or of any scene in real-time.

ViewMagic 4D™

With the development of the next breakthrough product category of Immersive Visual Content and Augmented Reality devices, a crucial question remains: how will such content be captured and viewed using these devices? To enable immersive visual content to be convincing and comfortable, it is essential

that the viewing perspective moves with the viewer in real-time, revealing parallax between actors, objects and their environment alongside important body language cues.

Immersive Movie Experience (IME)

ViewMagic has developed a complete software solution that captures, processes, encodes and reconstructs real-time light field content for these new display devices. This allows the viewer to experience physically correct 3D stereo and move freely with six degrees of freedom within full motion video with unprecedented range of motion and visual quality. No green screens are required and all content is captured in a single take. Multiple capture devices can be placed independently, thus allowing both the field-of-view and the movement parallax to be expanded depending on the nature of the content.

Immersive Broadcast Experience (IBE) / Immersive Communication Experience (ICE)

Due to the scalability of ViewMagic's software solution, with sufficient processing power at hand, real-time capture and transmission of content is also possible besides real-time consumption. ViewMagic IBE and ViewMagic ICE are essentially 3D light field real-time broadcasting / communication systems with portable and low-cost capture, processing and playback. Like normal cameras, these can be pointed at any object indoor, outdoors, etc. and transmit what they see. The systems are scalable in that they can be integrated into professional cameras as well as into consumer devices.

PRODUCT SUMMARY

ViewMagic's core product incorporates custom sparse light field encoding and reconstruction algorithms, optimized computation kernels, automated calibration processes and device configurations. Application demonstrations including custom prototype hardware devices have been built that are primarily aimed at delivering an unparalleled high-resolution immersive video chat and fully immersive (6DoF) 4K broadcast streaming video user experiences, all within practical computational constraints. Combined with low-latency and highly accurate tracking of the viewer's head, this instantly results in a correct perception of the other person or of recorded reality from that changed perspective, thereby eliminating the inherent problem of ocular and vestibular mismatch in 3DoF user experiences.

ViewMagic's underlying technology has direct applications also in emerging product categories including Augmented Reality (AR), Virtual Reality (VR), 6DoF telepresence (medical tele-examination and tele-surgery, observation, inspection, manipulation, collaboration) and biometric authentication.

Furthermore, the deepest levels of the technology have applications in collision avoidance and spatial awareness in situations where low-cost and small form factor are of significant importance, e.g., for autonomous vehicles, drones, and robots.

MISSION

ViewMagic's mission is to bring ViewMagic Experience and ViewMagic 4D to all users of video communication and immersive playback enabled devices in close cooperation with innovative device manufacturers, content creators and service providers.

FOUNDING TEAM

James A. McCombe is a highly accomplished engineer and entrepreneur in the field of parallel computing, hardware architecture and computer graphics. Before co-founding ViewMagic, James founded Caustic Graphics in 2006, and, as CTO, he developed algorithms and custom hardware logic to accelerate ray traced graphics. UK based Imagination Technologies acquired Caustic Graphics in 2010 where James continued to work on the integration of the technology into the PowerVR GPU that was used in many mobile devices, including all of Apple's mobile products. Prior to this, James was a lead software engineer on the OpenGL graphics system at Apple between 2001 and 2006, where he developed the low power graphics firmware used in the 5th generation video iPod, subsequently serving as a basis for the surface compositor on the 1st generation iPhone. James holds 32 granted patents in the areas of parallel hardware scheduling, numeric representation, and spatial data structure assembly algorithms.

Chris Birkhold comes from a background in high-end console, mobile and VR games development. Prior to joining ViewMagic Chris worked as a Core Technology Developer, Technical Director and Head of Studio with technology and games startup NaturalMotion. Chris took a leading role in developing and integrating NaturalMotion's groundbreaking procedural animation technology Euphoria into two of entertainment's biggest franchises, Rockstar Games' Grand Theft Auto and LucasArt's Star Wars. In 2012 as part of the company's ambitious expansion into mobile Chris built NaturalMotion's San Francisco mobile games studio from the ground up and served as it's Head of Studio and Technical Director. NaturalMotion was acquired by Zynga in 2014.

Rolf Herken is a highly respected visionary in the software technology industry, specifically in visual computing and cloud platform technology, and is widely known for his ability to recognize strategic business opportunities and to find and manage world-class engineering teams in a global environment. In 1986, he founded the company mental images in Berlin and turned it into the recognized international leader in providing component and platform software for the creation, manipulation and visualization of 3D content, driving the company's innovative technologies and products since its inception. In 1999, he founded the company incremental images in San Francisco to develop the world's first cloud-based scalable software platform for interactive 3D content accessible from any device. Both companies were merged in 2003 and later acquired by NVIDIA in 2007. He left NVIDIA in 2011 to create his next venture, the universal innovation engineering company MINE. ViewMagic was spun out from MINE as a stand-alone start-up company in 2016. Rolf Herken holds a number of fundamental granted patents in visual computing and cloud platform technology.