**Overview**

Varjp Technology was founded in 2016. The company features a high-resolution VR headset that utilizes the idea of foveated vision. The headset aims to mimic how your eyes naturally work to let you see virtual reality as clearly as you see the rest of reality.

**How it works**

Varjo is attempting to perfect foveated vision, which mimics the human vision’s out-of-focus peripheral and in-focus center. The technology is widely considered as a critical step toward the next generation of VR headsets. If the technology executed correctly, high pixel density HMDs will be available without all of the manufacturing challenges of building a continuous high-density HMD, and without the massive rendering workload required to fill such an HMD.

For their new Alpha Prototype HMD; the high-density zone, called the "Varjo Bionic display," features for each eye 1920 x 1080 at 8 bpp, with a 35-degree horizontal FOV and refresh rate to-be-determined later. The outer peripheral, or the "context display," runs at a 100-degree FOV 1080 x 1200 at 90Hz and 8bpp. Also, Varjo stated that the the displays are "typical row-updateable displays, with microsecond switch time" and so note that latency is generally low.

Moreover, inorder to achieve foveated vision, the headset needs to accurately tracks the user eyes, the Alpha Prototype features integrated 100Hz stereo eye-tracking, as well as Steam VR tracking with controller support.

Lastly, while not present on the Oculus based prototype, their headset concepts and test types have external cameras to allow for mixed reality (MR) and augmented reality (AR) functionality via video see-through

**Challenges**

the displays need to be visually seamless

the displays must have synchronized high refresh rates

Perfect eye-tracking to ensures that the focused high-density region is always at where a user’s gaze is. These become especially important once video see-through based AR/MR is in the picture. The retrofitted Oculus highlighted some of these concerns, as some press observed jitter due to the disjointed refresh rates; for the Alpha Prototype, the context display still features the Oculus/Vive specifications of dual 1080 x 1200 at 90Hz. It also remains to be seen how objectively capable Varjo's eye tracking can keep up with rapid eye and head movement.

**Simulation Sickness**

This is mostly unknown since the product has not been released. However, if Varjo technology succeeded in their vision to create a realistic seamless image with minimal latency, then the technology would render images so similar to the human’s eyes such that it would lead to a minimal degree of motion sickness.

**Requirement and price**

Alpha Prototype, Varjo is recommending AMD FX 9590 or Intel Core i7-6700-level CPU performance or better, AMD Radeon RX Vega or NVIDIA GeForce GTX 1080-level GPU performance or better, and at least 16 GB of DDR4 RAM.

Under $10,000

**Similar devices and competition**

Varjo headset boasts 70 megapixels versus around 1.2 megapixels per eye for the Oculus Rift and HTC Vive. Which is one justification for its cost

**Where is it used?**

The Varjo headset is intended for the professional market, and thus is priced for the professional market such as architects, designers, and artists.

References:

<https://varjo.com/>

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