<http://www.popularmechanics.com/technology/gadgets/a15324/how-microsofts-hololens-works/> (May 2015)

„This is where the rest of the HoloLens' sensors come into play. In the top part of the HoloLens visor there are a number of cameras facing out that scan the area and collect as much data as possible. HoloLens then turns that information into a digital model where the holograms can live in 3D space. Microsoft hasn't explained the nitty gritty of how these work, but it's reasonable to assume they're basically like a head-mounted version of the Xbox's Kinect camera, and that they use a combination of standard video and infrared depth-sensing vision to draw a digital picture of your surroundings.”

“But just seeing things isn't enough. To make these holograms convincing as you move, the HoloLens needs to know exactly where your head is. To that end, it also contains an accelerometer (to measure the speed your head is moving), a gyroscope (to measure the tilt and orientation of your head), and a magnetometer (to function as a compass). With all those sensors, HoloLens will be able to collect enough data to know what your room looks like and where your head is.”

<https://channel9.msdn.com/Events/Build/2015/C9-08>

<http://www.tomshardware.com/news/microsoft-hololens-components-hpu-28nm,32546.html> (August 2016)

“At a presentation over the weekend, we got the goods. “HoloLens enables holographic computing natively,” began the presenter. “You don’t have to place any markers in the environment, no reliance on external cameras or other devices. No tethers. You don’t need a cell phone, you don’t need a laptop. All you need to interact with a fully built-in Windows 10 mobile computer is 'GGV'--gaze, gesture and voice.”

“The environmental sensing cameras provide the basis for head tracking, and the (custom) time of flight (ToF) depth camera serves two roles: It helps with hand tracking, and it also performs surface reconstruction, which is key to being able to place holograms on physical objects. (This is not a novel approach--it’s precisely what Intel is doing with its RealSense 400-series camera on Project Alloy.)

These sensors work in concert with the optics module (described above) and the IMU, which is mounted on the holographic lenses, right above the bridge of your nose.

Said the presenter, “Environment cameras provide you with a fixed location in space and pose,” and the IMU is working fast, “so as you move your head around...you need to be able to feed your latest pose information into the display as quickly as possible.” He said that HoloLens can do all of this in <10ms, which, again, is key to preventing “swimming” and also to ensuring that holograms stay locked to their position in the real world space.”

(von <https://www.microsoft.com/en-us/research/people/awf/> ):

<https://www.microsoft.com/en-us/research/wp-content/uploads/2016/02/stuehmer2015toftracking.pdf>

<http://www.cv-foundation.org/openaccess/content_cvpr_2014/papers/Guzman-Rivera_Multi-Output_Learning_for_2014_CVPR_paper.pdf>

<https://developer.microsoft.com/en-us/windows/holographic/spatial_mapping>