Research Issues in Hololens

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Abstract-:

The present study proposes a novel technique for one to one imagery using a single hololens imaging configuration for the first time to the best of our information. Detailed theoretical analysis and experimental realization of a single hololens imaging configuration has been presented. In order to substantiate the one to one imaging capacity of the system, experiments have been performed in both transmissions as well as reflection mode.

Keywords-:

holography hololens zone plate imaging system one to one imagery resolution test target

1.Introduction:

Microsoft Hololens is a smart glass which is the first cordless device , self-contained holographic computer running Windows10. The hololens similar to google glass in that it uses AR (Augmented reality) terchnology. most advanced holographic computer the world has ever seen.its a self –contained computer .

Microsoft hololens is developed in **21 January 2015** . this is availabe in **US and Canada**. Hololens developed by **Microsoft**. Hololens is written by **Rich Delgado in 23 February 2015.**

Price of this device **$3000**. Wear hololens headsets and collaborate in augmented reality.

Enabled by Windows 10.Windows 10 is the first platform to support holographic computing with

APIs that enable gaze, gesture , voice , and environmental understanding on an untethered device.
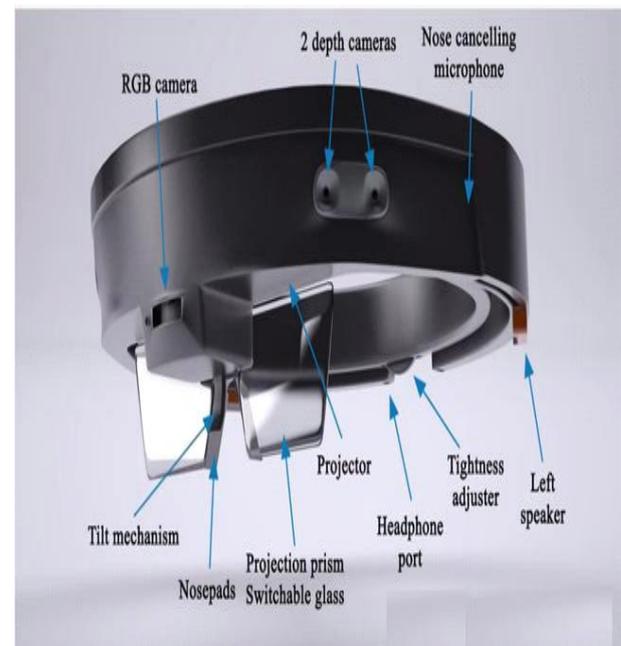
Structure of hololens

it is completely untethered   i.e.no wires,phones or connection to a PC required.Microsft Hololens uses Augmented Reality (AR) Technology that allows it to pin Hologram in your physical environment.

Example:

If any person this glass is wear. So that person emagine any thing such as a person to wear the glass and playing the game as we play game in computer or mobile so a person of your side which is handle by you .same as you to wear this glass so

you replace on which person handle by you. and you self play any game. See the given below image of emagine the design.

1.1 Vertual Reality:

VR is a computer simulated environment that can cimulate physical presence in places in the real world or imagined worlds. Virtual reality can recreate sensory experiences, which include virtual taste , sight , smell , sound , and touch.

1.2 Augmented reality :

AR is a live direct or indirect view of a physical , real world environment whose elements are augmented (or supplemented) by computer generated sensory input such as sound , video , graphics or GPS data.

Windows 10 is the first platform to support Holographic Computing with API that enable

1.2.1   New way of computing:

gaze, gesture voice and environmental understanding on an untethered device like Hololens. Microsoft Hololens , together with Windows 10, brings.

High-definition holograms to life in real world. As holograms, digital content will be as real as the physical objects in the actual world.

1.2.2   Hologram:

A hologram is an object like any other object in the real world, with only one difference instead of

being made of physical matter a hologram is made entirely of light.holographic objects can be viewed from different angles and distances, just like physical objects,but they do not offer any physical resistance when touched or pushed because they don't have any mass.

Holograms can be two0-dimensionalm, like a piece of paper or a TV screen, or theyt can be three-dimensional, just like other physical objects in your real world.

1.2.3   **Holographic processor :**

2   Holographic form is used to 3D Environments,3D Data ,Holographic Avatars ,Holographic UI Elements.

3   In addition to a CPU and a GPU. The third chip is the holographic processing unit (HPU) that Microsoft invented specifically for the hololens.

4   CPU and GPU are based on intel's Cherry trail Atom chip. The cherry trail is small, fast and includes a lot of fetures that can easily fit into the hololens.

2. Hololens Design pattern:

Hololens Design pattern is combination of physical space ,user input,holographic form, 3D sound, Mixed Reality Design method.

2.1 Physical Space : combination of walls and Ambient space is called as physical space.

2.2 User Input : combination of Gaze , Gesture , Voice Commands , Mouse &Keyboard,Locomotion is called as User Input.

2.2 Holographic Form : combination of 3D Structure , 3D Object , 2D Data , 3D Environments ,3D Data , Holographic Avatars , holographic UI Elements is called as Holographic form

2.3 3D Sound : combination of User Dialogue , User Interaction , Feedback Audio ,Audio-Cued Spatial and Navigation is called as 3D Sound.

2.4 Mixed Reality Design Methods : combination of Spatializing Data , Screen to World , Mixed Reality Immersion ,

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Information Overlay , Annotating Shared Spaces is called as Mixed Reality Design Methods.

3. Feature of Hololens :

Microsoft hololens have high definition hologramto life in your world, where they Integrate with your physical places, spaces , and things. No cords, No phones, No wires, No tethers. Transparent lens and advanced sensors allow you to see your world and move confidently in it Lightweight and adjustable to fir any adult head size. Built in spatial sound lets you hear holograms wherever they are in the room with pinpoint precision next generation technology enabled by Window 10.

4. Future scope:

- Actually show up in space around the user indicating exactly what you need to do next.

- This application could even extend to the battlefield, where detailed medical instructions could be given to untrained personnel in the midst of combat.

- Pin holograms to physical objects so user can size and scale them in each angle and with gesture do all new creation.

5. Real uses in future:

That is use in Remote Instruction . 3D computer-Aided Design , Gamification of Tasks , Gaming ,Decorating , Holographic Attractions and Entertainment ,Virtual Reality User Interface , Heads Up GPS.

5.1 Remote Instruction:

This use was demonstrated in the Microsoft hololens introductory video. Imagine getting step by step instructions on things like home repair from an expert. visual diagrams would actually show up in space around the user indicating exactly what you need to do next. this application could even extend to the battlefield, where detailed medical instructions could be given to untrained personnel in the midst of combar.

This level of illustrated instruction could make getting the support you need much easier, and could even mean the beginning of a new industry of remote consulting experts.

5.2 3D computer - Aided Design:

Imagine building a 3D model of pretty much anything you can imagine in the physical space around you . It's similar to what's seen in the movie Iron Man as Toby stark interacts with holographic objects to build his devices It's also one of the ideas that has captured the imagination of when it comes to the Hololens.

5.3 Gamification of Tasks:

We all need a little extra motivation at times when it comes to exercising. the Hololens has the potential to turn such tasks into a game. Think how much more fun you'll have throwing jabs and hooks at apunching bag when your Hololens is superimposing a boxer (or threatening mugger) over the bag. Or, imagine getting on your treadmill and replacing the world around you with interesting, interactive, scrolling scenery as you jog. By turning monotonous tasks into a game, Hololens could make life much more exciting and help you build healthy, productive habits.

5.4 Gaming:

Gaming is another potential use that was shown off in t he introductory video from Microsoft (whose recent history of innovation and improvements is impressive.) and the possibilities of using the

Hololens for gaming are fascinating. Several journalists were anle to get a hands on look at how this would work during the product's launch event, and although the demo was rather basic, a fully immersive gaming experience is something gamers have been clamoring for quite some time. Imagine playing a game like Minecraft using holographic models in your living room. Hololens promises to make that happen.

5.5 Decorating :

Hololens is first being geared for use mostly inside the home or office and not necessarily on the go. One way it can be helpful is by visualizing how new decorations would look in your house or apartment. No more trying to picture how that new paint color for your wall will look with your new couch you 'll actually be able to see it projected holographically and make the best decision for your living space. and instead of awkwardly holding a picture up while trying to gauge how it looks in a certain location , your Hololens can show you exactly how it will look placed in any number of locations .

5.6   Holographic   Attractions   and Entertainment:

If you were a Hololens creepy attractions could become even scarier by integrating virtual elements that can't exist in tha real world. On a similar note, supporters of 3D movies have wanted to make the audience feel like part of the action for years. hololens could holp them bring virtual elements into the space of the user.

5.7 Virtual Reality User Interfaces:

people spend a lot of money on the latest, biggest, clearest flat screen televisions . But with the the hololens you could use a number of virtual screens of any size saving you or hundreds or thousands of dollars. you could even watch movies or browse the internet through a virtual screen no matter what part of the house you're in (say,lying comfortably in bed). physical screens and monitors may eventually become things of the past, as we transition to interfaces that exploit physical intutions about the world and naturally fill the space around you.

5.8 Heads Up GPS:

would require further development on the Holoens and even legislative approval(while smart devices are becoming even smarter, using devices like Google Glass while driving is still illegal) byt a heads up GPS display would be incredibly hilpful for drivers and pedensrians alike. you could see instructions and diagrams said out on the road in front of you.These are just a few of the uses I can see coming for Microsoft's new Hololens headset. As with many new smart devices, the potential is enormous. but it will be up to developers and intrepid consumers to try it out and see if it lives up the hype.

- collaborate with design, art, engineering, and partner teams to deliver consumer products, new experiences, features, and tools
- Own design goals, product design, creative briefs, feature specifications, level/world layout, tuning, ideation, prototyping, prioritization, and tradeoffs

• Contribute to task & dependency analysis, scheduling, and risk mitigation plans
• Explore and innovate new experiences, features, and tools
• Validate plans with market opportunity assessment, user research, and test
• Consult on a regular basis with leadership to align expectations and deliverables

6 Microsoft HoloLens specifications:

However ,Mirosoft doesn't officially announced tthe technical specification of Hololens. But as expected there may be :- CPU**:** Intel Atom cherry trail 2.7GHz .GPU**:** Intel Atom cherry trail 2.7 GHz. HPU: Holographic processing Unit. See through high definition Holographic lenses . Infrared optics.

6.1 HoloLens display:

Having seen HoloLens in use via various developer videos and Microsoft showcases, it seems that Microsoft's device will have a smaller field of view than previously thought. Significantly, the HoloLens' AR images won't extend to the user's entire field of view – and are instead confined to a central area.

6.2 HoloLens processor:

HoloLens will use a future version of Intel's Atom processors.

Looking at Intel's latest range of Atom processors can give us some clues as to what to expect. The "Cherry Trail" range offered a smaller form factor, faster speeds and more features – such as wireless charging – than its predecessor "Bay Trail". A next-generation Atom processor could be smaller, cooler and more efficient than before, giving the

HoloLens more oomph without compromising on space.According to PC World, an unnamed source "familiar with the hardware" claimed

Another major development Cherry Trail brought with it was RealSense gesture control. This technology allows an expansive range of hands-free control mechanics for interacting with tablets, and it's not difficult to imagine HoloLens potentially incorporating that framework.

Cherry Trail also features Intel's WiDi (Wireless display) technology, which can wirelessly stream movies, videos and apps from peripherals to larger external displays. This feature could easily find its way into HoloLens, as a way to stream the user's view to an external screen for creative or entertainment purposes.

Alongside the traditional CPU and GPU found in other computers, HoloLens also sports an all-new "Holographic Processing Unit". This coprocessor supposedly handles the integration and interaction of real environments and virtual objects, and essentially allows the HoloLens to interpret its surroundings.

6.1 HoloLens sensors:

In terms of sensors, our best guesses are currently informed by looking at the Kinect 2. Developed by the team currently working on HoloLens, the Xbox accessory included both depth and 1080p colour cameras, as well as an infrared sensor. It's fairly safe to assume that these will both feature in the design.


That is Custom holographic processing unit. The HPU is coustom silicon that processes a large amount of data per second from the sensors. Microsoft Hololens understands gestures and where you look, and maps the world around you , all in real time.

**7 . Hardware requarement of Hololens:**

That is Sensor fusion.Microsoft Hololens has advanced sensors to captue information about what are you doing and the environment you're in.
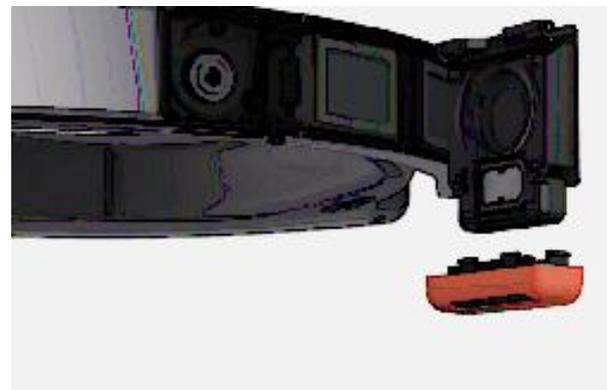
That is Built in speakers. Aprecise audio experience without headphones that is immersive , yet would not block out the real woeld. Spatial sound using a scientific model that characterizes how the human ear receives sound from a specific location, Microsoft Hololens synthesizes sound so that you can hear holograms from anywhere in the room.
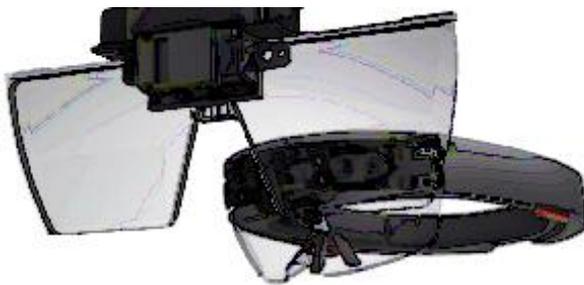
That is Advanced optics. See through holographic high definition lenses use an advanced optical projection system,genetating multi-dimensional full color images with very low latency so you can see holograms in your world.
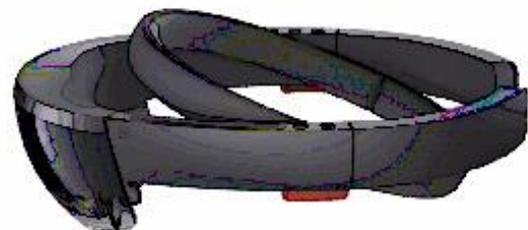
That is designed for comfort.The headband is designed like a performance car with great weight distribution for a comfortable fit. weight is distributed aound the crown of your head saving your ears or nose from undue pressure.

7.1   Inside the headset:

7.1.1 Camera: The project Hololens depth camera has a field of vision that spans 120by 120 degrees.

7.1.2 Computer: As many as 18 sensors flood the brain of the device with terabytes of data every second.

7.1.3 Lenses: To trick your brain into perceiving holographic images , light particles bounce around millions of times in the so called light engine.

7.1.4 Vent: The device is more powerful than a laptop but wont overheat. on the right side.

7.1.5 Buttons: A;;pw upi tp adjust the volume and to control the contrast of the hologram.**8. Advantage of hololens :** No cords , No phones , No wires ,No tethers. Transparent lens and advanced sensors allow you to see your world and move confidently in it. Lightweight and adjustable to fit any adult head size. work and play comfortably. Built in spatial sound lets you hear holograms wherever they are in the room with pinpoint precision. Next generation technology enabled by windows10.

9. Disadvantage of Hololens: Hololens is very exepnsive ,Hololens can be easily damaged or broken. User will have a tough time taking care of it. it may lead to accident while driving. privacy of people may break due to new glasses.

9.1 Problem of Hololens: Microsoft Hololens is the best technology till yet, it has certin technical and non technical problems: Battery life unknown , Can not wearanle if you wear glasses , on the long run it heats up , Less focus on virtual things , Camera tracking is enough color depth should be improved.

10. Conclusion : Holographic computing experiences with Microsoft Hololens are different from existing experiences, such as augmented reality and virtual reality. Hololens looks incredibly exciting , but what we have seen so far is a glimpse into the future. The team is working with creators and developers all over the world on exciting new holographic experiences.

References:
https://www.microsoft.com/microsoft-hololens/en-us
http://marketralist.com/2015/02/microsofts-hololens-faces-stiff-market-competition/
http://www.slideshre.net/vikeez/microsoft-hololens-46691964
http://www.quota.com/MicrosoftAnnounces-Hololens-Headset-January-2015