INNOVATION

AN IEEE-VESIT PUBLICATION

IEEE VESIT

AUGMENTED REALITY

Where Dreams Meet Reality

IEEE VESIT

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FROM THE EDITOR'S DESK

Dear Reader,

With each step towards digitization, "The Matrix" becomes less like fiction and more like reality. That's in part because engineers and developers like us continue to refine our technologies, making the line between real and virtual life even blurrier, no matter how much Keanu Reeves squints in an effort to distinguish between the two.

We at ***IEEE-VESIT*** are absolutely pleased to present to you our annual magazine, ***INNOVATION***, with a series of intriguing articles by the student fraternity centred around the avant-garde and ever-emerging field of technology, ***"Augmented Reality".***

The fundamental idea behind augmented reality is to add something extra to your experience of reality. So, if you are watching a movie or playing a game, AR adds to that experience in some way or form to turn the experience immersive and interactive. Augmented reality is, in fact, readily available and being used in a myriad of ways such as Snapchat Filters, in apps that help you find your car in a crowded parking lot, and in variety of shopping apps that let you try on clothes without even leaving home. Augmented reality is a cutting-edge technology that is slowly working its way into mainstream applications. As the technology matures, new possibilities to apply AR will emerge simultaneously. The possibilities of Augmented Reality are limitless.

I express my ***Heartiest Gratitude*** to the ***Editorial Team*** for their persistent support and help in putting this magazine together. I am extremely thankful to my Junior Editors, ***Aishwarya Patange*** and ***Siddhant Kasley***, for delivering their best efforts in ensuring fool proof success of this publication. A special thanks to our SE Co-ordinator, ***Malavika Anoop*** for her persistent efforts to help make this magazine more captivating. I would also like to take this opportunity to thank ***All The Members*** for their valuable contributions.

With so many futuristic ideas and complex concepts, we hope you all take the time to peruse what the innovative contents of this well-illustrated magazine have to offer and elaborate your knowledge towards the subject of science.

Best Wishes and Happy Reading!

Suraj Bathija
Senior Editor, IEEE VESIT

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AUGMENTED REALITY

By **Shiva Ahir**
(First Place, D19B)

So fellas, I'm pretty much sure you must have definitely used the upgraded versions of Snap-chat filters or must have played the highly hyped "Pokemon Go" on your smart phone? Well, all these smartphone applications that you've already used, uses the primitive forms of Augmented Reality.

So what exactly Augmented Reality concept tells us? Well, let's talk about it!

As well all know ***"Augmented Reality"*** is one of the most used buzzwords today. Augment: "to increase" or "to add". Hence, AR technology is increasing/adding to our existing reality. In simple terms in Augmented Realities ***"Computers adapt to Humans"***. The world itself becomes an interface as people exercise more intuitive controls. Well, the term Augmented Reality is derived from the term ***"Virtual Reality"***. This is basically a computer generated simulation or a place in one's environment. For example: You put on your headset, it locks down your world's view and substitutes into digital world as designed to fool your senses. From the point of view of your brain, you're already present somewhere else.

Well isn't that amazing that both Augmented Reality (AR) and Virtual Reality (VR) are the forms of "Mental Teleportation"? Let's elaborate more on this!

The term "Augmented Reality" is dedicated to the gaming researcher - Thomas Caodell. The history of AR could be traced back to 1962 where an American filmmaker Morton Heiling created ***"SENSORAMA"***, one of the earliest and popular known examples of multi -sensory technology, based on the concept of Augmented Reality. It consisted of all the key features as mentioned in Fig (i).

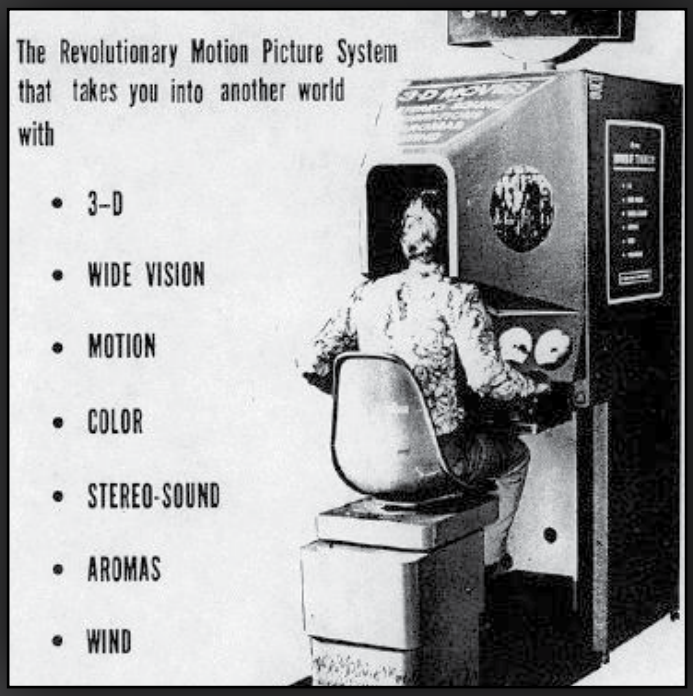


Fig (i): Sensorama (1962, Brooklyn, USA)

The first person who experienced Sensorama for the first time versed the feeling of riding a motorcycle on the streets of Brooklyn. The viewer would feel the 3-dimensional vision of the Brooklyn Bridge, wind blowing on his face, simultaneously feeling the vibration of the motorcycle and even experiencing the smells of the city. This was indeed a mutinous circumstance which highly revolutionized the gaming industry. Aha! All thanks to Augmented Reality of course!

As far as the motive of the Augmented Reality is concerned, it isn't to cut out the real world and take it to another one but rather it is an enhancement of our real world with a set of magical objects in it.

When a person's real environment is supplemented or commented with computer generated images usually a motion track, then that is augmented easily. Currently, AR is also showing promises to its assets like ***Microsoft Holo-lens*** and a very special ***Magic leap project***.

Well, as we summarize this, Virtual Reality tends to be complete immersion with no real world simulator affecting the experience. The goal of VR is to make the use of field as if they're in fact at another place. In contrast to this, Augmented Reality uses digital reality to its use as well, technology that superimposes a computer-generated image on a user's view of the real world, thus providing a composite view. For example: objects can appear on tables, information could be displayed on the flooding windows, and graphics can be generated as per user's field of view.

The thing that makes Augmented Reality different from any other forms of technology is that it directly affects perception and processes of the human mind in an obvious way. It is the only technology that can provide actual package to experiences. Well, there are large numbers of people who think both VR and AR are fads that will fade away like previous technologies that turned out to be a failure during the research process. Since it is pretty much appropriate to believe that the underlined technology is vastly more powerful this time around and is very much feasible. Think of it as an evolution of Mobile phones before the inception of iPhone. The world needs killer AR and VR applications, products and appropriate price to really begin the auto-reality spark.

At current rates, by 2025 active Augmented Reality technological experiences will definitely come in place as a substitution to most of the existing current form of technologies.

If everything's done right, Augmented Reality will show incredible potential for sure and we will see a newer and a better world. :)

Fig (ii). Augmented Reality Phenomenon

FUN FACTS!

Did you know?

Global Augmented & Virtual Reality (Ar/Vr) Market Size 2020

18.8 Billion USD

Forecast Consumer Spend on Ar/Vr Worldwide 2020

7 Billion USD

Share of Global Ar/Vr Spendings on Consumer Market Worldwide 2020

37.4%


RAGE
The Vengeance Overdue

RAGE

The Vengeance Overdue

By **Muskaan Bhargava**
(SE Coordinator, IEEE-VESIT)

Pulling around the corner of the street, Ethan pulls out 50$ from his pocket for the VR mystery game he has been waiting since forever, he found this old shack which had been recently stocked with a new series of VR games. Straggling through them, a peculiar game catches his eye, ***'RAGE: The vengeance overdue'***. Thrilled by the game description, he rushes to buy the game to this unpleasant cashier with cryptic eyes who looked at him with a leer.

Going towards his room, all he has in his mind is to know what the game upholds. He slides the disk in the VR player and puts on the gear. The game starts with his character description, a nerd boy, victim of extensive bullying who seeks to avenge for his pain and sufferings. The feature of the game asks him to enter his personal details with his mobile number. Feeling slightly peculiar about it he, chooses to ignore it and enters the details.

The game begins with the appearance of 4 different doors, 3 of them locked. Naturally, he goes through the first door. ***"LEVEL ONE"*** said a voice which Ethan found very familiar. He finds himself standing by the pool in front of a mansion which seemed similar to the one he and his friends used to have back in college days.

Suddenly, a Wolf pounces on him, his claws so sharp it pierces Ethan's back, leaving him wounded. His health goes down by almost 80%. He somehow manages to get up, in search for a weapon, something that he could use against the wolf. He manages to get hold of a leaf skimmer and attacks the wolf but the wolf with full force pushes him in the pool. Being a swimmer, he is not worried of drowning but the water seemed to restrict him every time he tries to swim, reducing his health drastically and he dies. ***STRIKE ONE***

"What kind of a game is this?" he shouts of of breath. Frustrated, he goes to sleep.

He wakes up to a call reporting the death of his friend Ryan by drowning in the pool.

"Doctors say its suicide" said the voice at the other end of the line. He can't believe what he's hearing, how can this happen to

him? He mourns. That evening it suddenly strikes him how he died in the game yesterday. "Weird coincidence" he says to himself and leaves to meet Ryan's parents.

A few days later, in order to distract himself from this sudden mishap, he starts playing the game again. But this time, there are only three doors left, He bangs open the door. ***"LEVEL TWO"***, says the familiar voice. He's standing looking towards a school similar to his, it develops a sense of confusion in his mind.. As soon as he enters the school, he sees a horde of zombies walking towards him. He frantically starts running and grabs the crossbow lying on the floor. But where are the bows? He runs towards the washroom to buy himself some time and starts to search for things that he can use as a bow. Just as he tries to reach out to get a metal tool out of the tool box kept in the corner, a zombie grabs his legs and pulls him back. The zombies don't kill' him easy though, they drag him to the toilet seat, force his face in it and suffocate him to death.

'STRIKE TWO' flashes big on the screen.

"WHAT IS THIS GAME! IT'S LIKE THE ONLY PURPOSE OF IT IS TO KILL YOU!" he screams in vexation. He throws the console away and decides never to play this game again.

It has been a long day for Ethan and he reaches home tired. Going towards the bed, he gets a call. "Is this Ethan?" "Yes, may I know who's calling?" "Sir we have found a body in the washroom of the school building and your name was first on the conta..-"

Without even letting him complete, Ethan runs to his car and drives to the school as fast as he can. Ashton is dead. Ethan can't believe his eyes that his best friend is laying dead in front of him. He starts sobbing , "It's a suicide attempt. He might have had memories with this place which compelled him to do this." says the police official. It abruptly strikes him. The last level that he played, his character was killed by the zombies at the same place as Ashton. This was so unsettling, Ethan felt sick, he wanted to run away, he was scared. He decides that he has to find the answer.

He rushes back to his house and reads the game description again.

'The Vengeance Overdue' "But who would want to take a revenge from us?" he conjectures. He needs to do something and he needs to do it quick. He spends days trying to figure out the motive of the game and how he can defeat it even when the game is programmed to kill him.

Finally one day, he decides to play it again, making up his mind that whatever happened in the past was not related to the game and it was all a stupid coincidence because it doesn't make sense. He logs in again and now he wants to win.

There are two doors now, as usual, one is locked. Hesitantly he opens the door, being very cautious of things around. ***"LEVEL THREE"*** the voice says. He finds himself in a football field. He sighs in relief. He was the vice captain of the football team, Gary being the captain. Warming up, he gets ready to play and give everything he has got. He sees two people bolting towards him with

the football. He gets ready to tackle them but suddenly something hits him hard hits him so hard that it almost pierces through his body. He tires to get back on his feet again but then a continous series of footballs hit him at a massive speed and he collapses. ***STRIKE THREE.***

Another defeat.

Ethan panics. He straightaway calls Gary. No Answer. He tries again. "PICK UP DAMN IT" he screams. No answer. He goes to dial the number again but gets a call himself. Its Meghan, Gary's girlfriend, sobbing on the phone. Gary's dead.

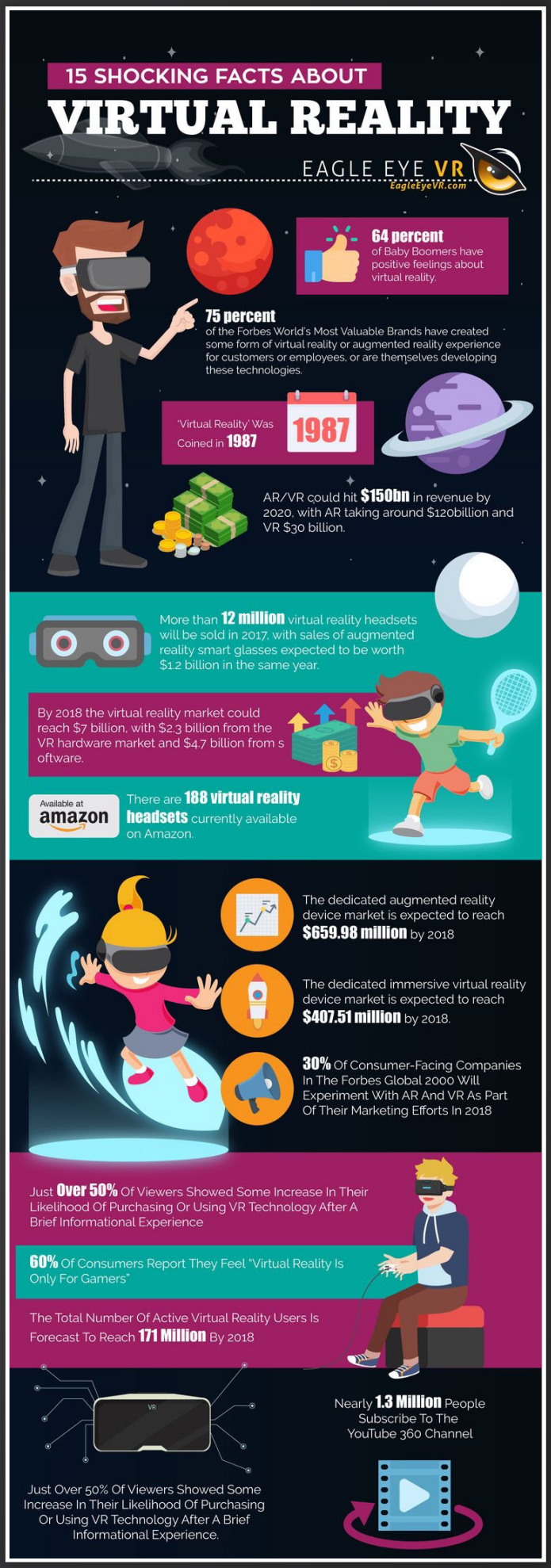
Everything's making sense now. That familiar voice, all the deaths, they are all related to the boy who Ethan and his friends bullied in high school. It's Kevin. Throwing him in the pool, forcing him inside the toilet, harassing him on the field, shooting on him with nerf guns. Ethan shivers; he could feel his heart racing. He takes the game in his hand and suddenly it hits him.

RAGE : Ryan, Ashton, Gary and E….

Who's next? He freezes. He runs to his room to destroy the game when suddenly he receives a text message. Unknown number: "Don't even think about it". He starts to panic but doesn't stop. He breaks the CD into two, that's when he gets another message: " Oh poor Ethan, you shouldn't have done it."

Ethan froze, he can't move and then suddenly there's a knock on his door, he runs to a corner of a room crying and doesn't move. There's a man standing in front of him with a gun. He smiles towards Ethan, "Congratulations Ethan, You finished the game"

STRIKE FOUR.



AUGMENTED REALITY

Melting Point of the Technical Acumen

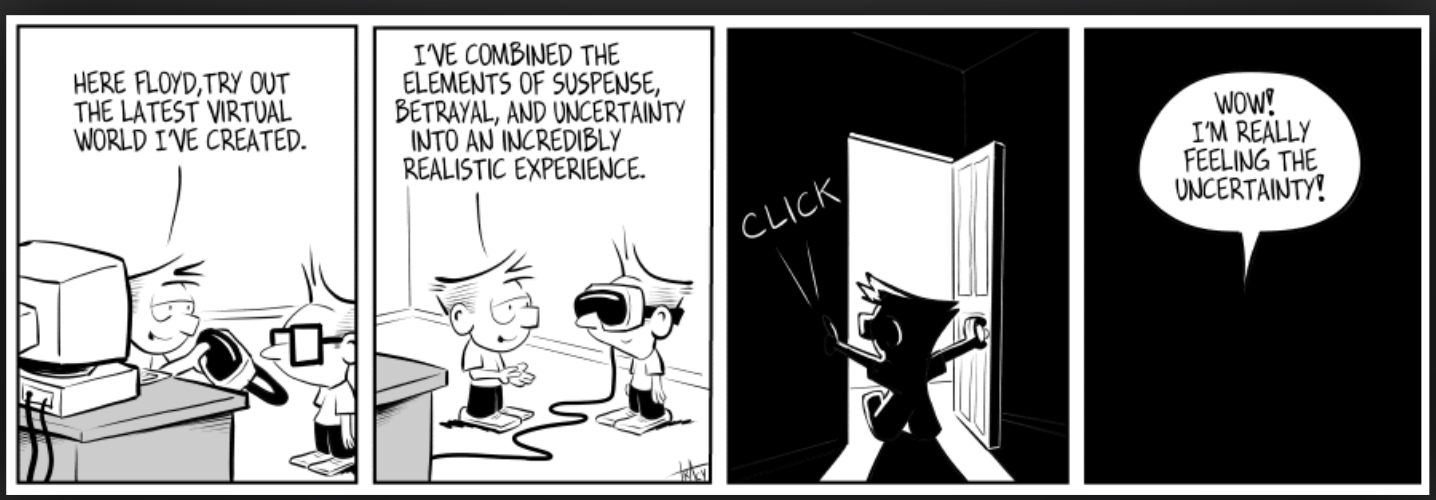
By **Kaushal Jagasia**
(Second Place, D2C)

The realities of the world seldom measure up to the sublime designs of human imagination. Augmented reality(AR) uses existing reality and physical objects to trigger computer-generated enhancements over the top of reality, in real time.

We've seen the use of AR in numerous sci-fi movies. One of the most advanced cases of AR in a Heads Up Display is Iron Man's suit. It is so kitted out with AR goodies that it gives stacks of real-time information so that Tony Stark can do what he does best. The Iron Man films are great examples of how AR could work for future soldiers with a mainframe computer feeding live data to combatants in the field.

Like many other technological innovations, Augmented Reality has emerged from the movies into the real world. Some of us already use AR in our daily lives without really realising. Pokémon Go (which bloomed in summer 2016), Snapchat's selfie filters and more recently 3D world lenses, and Facebook's AR Studio for example, use basic AR to create face masks and animations triggered by motion, gestures, facial expressions and user surroundings.

Augmented reality is achieved through a variety of technological innovations. Machine learning can be an important convergence for AR. We have to figure out the best user interface for what amounts to a more hands-free experience. Just as the keyboard was an important innovation in desktop or laptop computing and touchscreens were the key to mobile devices—machine learning may play a big role in AR interfaces. Machine-learning-enabled speech-to-text, as well as text-to-speech, could become important innovations in AR. 3D Printing will also add more value to it. Crafting, editing and visualizing models with AR will help bridge the cognitive gap between engineer and design, removing the degrees of separation between designer and product that currently exist today (i.e., keyboard, mouse, 2D screen, interface), and enable the designer to directly interact with the product in an intuitive, creative way.



Some software and hardware components required for AR include:

- General hardware components – the processor, the display, the sensors and input devices.
- Displays – while a monitor is perfectly capable of displaying AR data there are other systems such as optical projection systems, head-mounted displays, eyeglasses, contact lenses, the HUD (heads up display), Spatial Augmented Reality (SAR – which uses ordinary projection techniques as a substitute for a display of any kind) and handheld displays.
- Sensors and input devices include – GPS, gyroscopes, accelerometers, compasses, wireless sensors, touch recognition, speech recognition, eye tracking and peripherals.
- Software – the majority of development for AR will be in developing further software to take advantage of the hardware capabilities. There is already an Augmented Reality Markup Language (ARML) which is being used to standardize XML grammar for virtual reality. There are several software development kits (SDK) which also offer simple environments for AR development.

AR or augmented reality has gone from pipe dream to reality in just over a century and has vast applications.Use of AR headsets enables architects, engineers, and design professionals step directly into their buildings and spaces to see how their designs might look, and even make virtual on the spot changes. Urban planners can even model how entire city layouts might look using AR headset visualization. Any design or modeling jobs that involve spatial relationships are a perfect use case for AR tech. Medical students are also using AR Headsets which enables them to delve into the human body in an interactive 3D format. AR is also being used in retail. World famous motorcycle brand Harley Davidson is one great instance of a brand making the most of this trend, by developing an AR app that shoppers can use in-store. Users can view a motorcycle they might be interested in buying in the showroom, and customize it using the app to see which colors and features they might like.

Apart from this, AR presents a variety of opportunities to increase efficiency and cost savings across many areas of business logistics. It AR promises to make selling trips, travel, and vacations a whole lot easier in the future. Imagine a leisurely stroll around Paris to see what museums or cafes you might like to visit. We can also expect more games like Pokemon Go in the near future. Furthermore as mentioned above, we can see Augmented Reality being used in the Defence System. There is an unlimited potential for Augmented Reality. With a number of top tier companies such as Google, Amazon and Microsoft investing millions of dollars for the research and development of this technology, exciting times lie ahead of us.

MIMOSA

By **Malavika Anoop**
(SE Coordinator, IEEE-VESIT)

Fiddled with my keys as I stood outside the large oak door of my childhood home. Heavy blobs of cold rain, dripping down the hood of my dark blue raincoat, into my eyes and down the bridge of my sloping nose as I struggled to find the correct key. As I stepped in, my eyes adjusted to the dim lighting of the living room enabling me to identify the shape of the furniture. I moved over to the adjacent wall, flicked the switch to illuminate the room with a warm, orange light. On the walls hung family pictures full of merry smiles, individuals huddled together in solidarity.

After a few moments of reminiscing, I lodged myself loose from the thoughts with a quick shake of my head. I walked towards the little glass coffee table, the wet soles of my boots squishing into the thick carpet as I moved. I placed the damp plastic package, addressed to my recently deceased father, on the reflective surface, and began tearing the tape. I dumped all the contents on the floor in a clatter of wires and metal. A metallic virtual reality headset with multiple wires jutting out of it, stared back at me. After taking a long heavy sigh, I pushed myself away from the table and sat down on the dusty, faded couch.

I scooped up the headset in my hands and the inner part of the visor was somewhat odd, as there were perfectly sized, unnervingly realistic blue eyes behind the glass. The eyes were wide open as if in shock and the ice blue seemed to possess an inhumane sort of piercing clarity, almost like they could see the 'you' that only your mind and soul knew to be true. I began booting up the machine and the headset flicked to life with a bright white screen. I untangled the five wires and stuck the four cloth like ends on my temple, wrists and neck. The fifth one, with teary eyes, I inserted into the disk that had my late father's name written on it. The previously white screen of the headset turned dark. I swallowed the lump in my throat I never knew I had as I extended my hands towards the device to wear it on my head. I had never used this technology before, despite this however, answers seemed to flow through my head as if they were my own thoughts bubbling up from the darkest crevices of my brain. I thought of the one person I wanted to see and my own voice echoed in my head.

I opened my eyes and began to notice the small variances in the room around me. It was now sunny and warm outside, and in addition to the subtle differences like the blooming flowers in the vase on the coffee table, there was light coming from the kitchen. I got up from the couch which was remarkably less faded and moved my hands up to touch my forehead. My touch only met the

feeling of my own flesh, devoid of any headset, and it all felt real. After few moments of analyzing the surroundings, I noticed a distinctive yet very familiar earthy scent of roasting potatoes that permeated through the kitchen. I walked towards the kitchen as if I had been revitalized. I saw an elderly man sitting on the table, hopelessly looking outside the window with his deep old eyes. His face lit up with joy and he had the grandest, most relieved smile when he saw me.

"I was wondering when you would be around to visit me, my child," he whispered softly.

An immeasurable amount of nostalgia, longing and regret washed down my face and I felt my heart melting in my chest.
"I am sorry I wasn't around more father."
"I guess you could say I was hoping I'd have a visitor today," he said sweetly looking at the plates around the casserole with potatoes on the table.

"You have always been precious to me. You raised me but I was never there for you. I always made excuses like I had something better to do, someplace better to be. I didn't come to see you when they found you in the yard or in the hospital either and there is no real reason I can give you. I know nothing I say is going to change anything but I want you to know that I am very deeply sorry for not being the person I was supposed to be and for not being there for you," I said as I wiped my cheeks.

I squeezed his hands in mine and shifted my gaze up to meet his hopefully. I had waited all these years to tell him this and now I was yearning for his response. I wanted him to say something, even him yelling, crying or nodding in understanding, anything was acceptable to save me from the perpetual feeling of guilt that had curled up in my belly. I wanted some closure to free me from the regret that was festering deep inside of me.

"Please help me one last time father." I thought to myself as I stared into his eyes with our hands intertwined in a cute little bundle of flesh. He looked at me expressionless, with his mouth opening up to say something. It was in this euphoric moment, that the whole simulation around me went blank and everything disappeared in the blink of an eye. I spun around my toes trying to get some sort of bearing, searching for my lost treasure, when the familiar white screen began to flash in front of my eyes. It said,

"Memory of the user too insufficient for response from the system."

AUGMENTED REALITY

By **Arnab Saha**
(Third Place, D9B)

Reality, as per an average definition is 'the state of things as they actually exist, as opposed to an idealistic or notional idea of them', but that is not as much fun now, is it? After all, the entire norm of humanity is so unique because each one of us has a diverse perception of this 'Reality'. This notion combined with the act of coalescing one's ideal reality and portraying the same to the world and displaying the could've of 'Reality' is essentially what is defined as ***'Augmented Reality'***. Thus, Augmented Reality is essentially an interactive experience of a real-world atmosphere in which the objects that exist in the real world are improved by computer-generated perceptual information, hence incorporating both terms in the word 'Augmented Reality'.

Augmented Reality is currently one of the biggest technology buzz terms in the market right now, and with each discovery and step in this digital revolution, the critically exclaimed Sci-Fi trilogy of ***'The Matrix'*** series becomes lesser of a fiction by each day and more of plausible reality. But due to this increased buzz especially after the success of AR projects like ***'Pokémon GO'***, people are often confusing the principles between an Augmented Reality and a Virtual Reality. Although they do have similar hardware requirements and features, the main difference is that in ***Virtual Reality***, the handlers' perception of reality is completely based on virtual and computer-generated information. In Augmented Reality, the user is provided with additional computer-generated information that enhances their perception of reality For example, in architecture, VR can be used to create a walk-through simulation of the inside of a new building, and AR can be used to show a building's structures and systems superimposed on a real-life view.

The ***current applications of AR*** outside of games following the formula of Pokémon Go are-

- Enhanced and automated navigation systems use augmented reality to superimpose a route over the live view of the road.
- For officiating sports such as football, broadcasters use AR to draw lines on the field to exemplify and analyse plays.
- Furniture and housewares giant IKEA has come up with an AR app, called IKEA Place that lets its customers see how a piece of furniture will look and fit for their homes/offices.
- Military fighter pilots see an AR projection of their altitude, speed and other data on their helmet visor exponentially increasing the efficiency.
- Neurosurgeons sometimes use an AR projection of 3-D organs to aid them in surgeries.

Companies like ***Pepsi, Acura, L'Oréal and Disney*** are some who are grasping their shares on this phenomenon which is said to easily exclaim a Lion's share of the market in the future.

Concluding by some insight about the future, ***the plausible trends*** AR will contribute into, could be-

- AR's close relationship with AI could be a dynamic-duo with the possibilities each domain brings.
- AR as a tool of Teaching and Training.
- AR will be integral in the Automobile Industry.
- AR will momentously influence commerce and advertisements.

AR

AUGMENTED REALITY

HOW TO EXPERIENCE AR

CITY

IMAGES

PRINTED MEDIA

SHOPPING

INTERIOR DESIGN

HEALTHCARE

AUGMENTED REALITY

Summing Art & Technology to let the Magic Happen

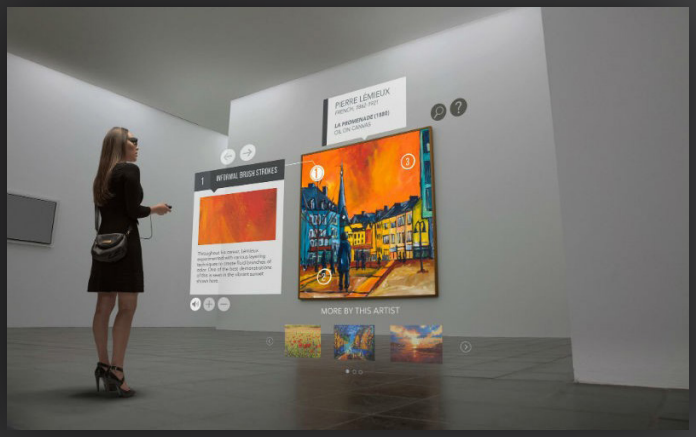
By **Rutwik Pendse**
(SE Coordinator, IEEE-VESIT)

Hello, I'm Alvin and the story I'm about to tell you is not mine nor yours but a story that inspired the creation of something beautiful and so extraordinary that it changed the way people see things.

This story is about my childhood friend Stella and her love for drawing. She used to love art so much that from a very young age she had an exceptional imagination. The castle, the mountains, the flying unicorn and everything that crossed her mind was fetched from her mind to hand and onto the paper. Stella didn't leave any surface unattended. She used to draw on the wall, the floor, notebooks and every levelled surface you could name. Stella always carried her sketchbook with her wherever she went and she often returned with pretty impressive drawings in it. As Stella grew up she started experimenting with colours and soon started painting.

Growing up together we spent most of our time at the Pedal park. The old oak tree was our meeting spot and we would spend hours sitting and talking under that tree. Stella would bring her drawings and flipped through each of them telling me what inspired her to draw the same. The story behind her drawings was remarkable. She told me how each layer had something to say, a story to speak and she narrated it. I was a person with the least knowledge of art and so I would listen to her stories and the think how was it related to the drawing. There was something I was missing and that was the ability to connect the story and the art and look at it as one.

As talent breeds success, Stella became an artist with a blooming career. By that time we were grown-ups and drifted on our own paths. I was a software engineer working on my startup which was going well. One day I decided to visit an art exhibition where Stella had her paintings displayed. I went there and was happy to see her. As I glanced one by one at her paintings Stella averted my attention towards her and said the lines that put me in question. She said smiling that she wished her painting would talk on their own so everyone could see what lies beneath those colours and that's when I remembered what I and most of the people were missing, we were missing the connection, the connection through which we could hear these paintings.



I went back and worked for three years on a technology that was not comprehended to many people. The technology that when mixed with reality gave us the answer to my question, it was the Augmented Reality. With the help of Augmented Reality, I designed an application that would bring life to those paintings when viewed through our devices. Augmented Reality connected us to the real world only through a different window to see things that were physically not present but was made possible. Augmented reality soon became a booming technology as it made reality more than ever we had seen.

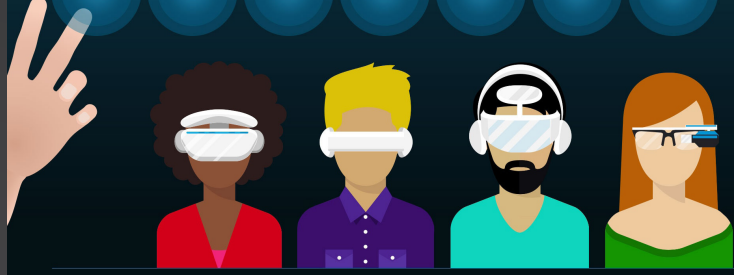
What is the Difference Between AR and VR?

RISING DEMAND FOR AR AND VR

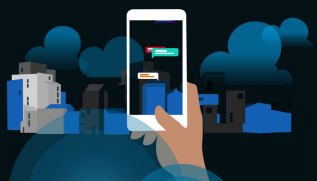
By 2020, the combined market size of augmented reality (AR) and virtual reality (VR) is expected to reach $150 billion. It is predicted that there will be 216 million AR and VR gamers by 2025.

Both AR and VR are used in a wide range of fields, including:

Entertainment · Healthcare · Education · Manufacturing · Real Estate · Logistics · Military



AUGMENTED REALITY VS VIRTUAL REALITY



Augmented Reality

Augmented Reality (AR) blends virtual reality and real life

Virtual Reality

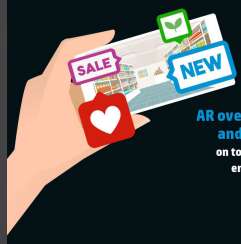
Virtual Reality (VR) creates a virtual world for users to interact with

AR is 25% virtual, 75% real

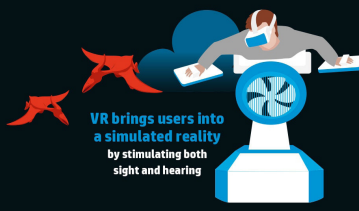
VR is 75% virtual, 25% real

AR PARTIALLY IMMERSES the user into the action

VR FULLY IMMERSES the user into the action

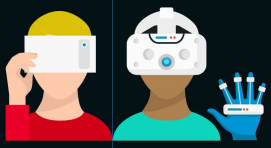


AR overlays graphics and animation on top of real-world environments



VR brings users into a simulated reality by stimulating both sight and hearing

AR allows you to see the world around you



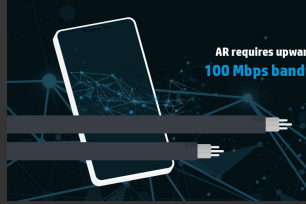
With VR, you cannot see the world around you

2020 PROJECTED AR REVENUE SHARE: **$120 BILLION**

2020 PROJECTED VR REVENUE SHARE: **$30 BILLION**

Requires use of **apps for smartphones and tablets**

Typically requires use of **specialized VR equipment**



AR requires upwards of **100 Mbps bandwidth**

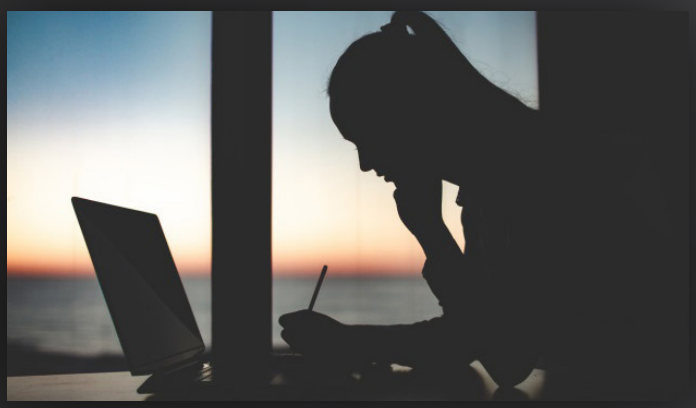
A 720p VR video stream requires at least a **50 Mbps connection**

ANAMNESIS

By **Madhumita Menon**
(SE Coordinator, IEEE-VESIT)

Maria is facing a difficult time controlling her 10 year old twins ever since her hench-man, her dad, passed away. Though she was glad that he succumbed only to old age, his absence was nerve-wracking. Being a young widow, she has to raise two 10 year olds all alone, juggling two jobs. "STOP WITH THAT PHONE!" She screamed at her kids, in tears. Everything was overwhelming her.

Aaron and Arya ran outside the door. She saw them run into the opposite door which has been their hideout from Maria's wrath ever since their beloved grandpa had failed to open his eyes one morning. Maria was getting worried at the kids' ventures at the neighbour's place. The house was inhabited by a 21 year old young woman. She always saw the girl, Sammy as Arya would often tell her, typing away aggressively at her computer. She never saw the woman at Church or at neighbourhood events. Even her groceries were delivered at the doorstep. Gossip had it that the woman abandoned her family to pursue her passion in gaming. "Huh, what life would she give herself with gaming? And to abandon your family to play a couple of video games?" Maria chuckled. Somehow she needed to curb Aaron and Arya's visits.



"Sammy, momma will take away our phone if we keep visiting you!" Arya complained. Sam was browsing through PG accommodations, when one advertisement caught her eye. It offered free wifi and dinner, minimal rent in return for helping the tenant, a single mom, with her kids. Sam loved children, it still hurt to think about her 11 year old brother she left behind. She promised herself everyday, she'll reconnect with him once he is old enough.

"Sammy! Talk to mommy, please" hot-headed Aaron was anxiously picking at the helm of his shirt. Sam could see how her "Augrandpa reality" project as the twins called, was as important to them as it was for her. "Did you bring me the recordings I asked you for, kids? Leave it there and let's see who hugs momma first. I'll bring your gift soon." The kids left a brown paper bag on the table and hurried back. Meanwhile Sammy sent an email.

It took her another week to complete her dream project and she couldn't wait to show it to Maria and her kids. For the first time, in a year, she visited the neighbourhood store. She brought gift-wrap and ribbons. Her hands were trembling with excitement, she had been working for this moment since ages!

...

Maria was relieved that Arya and Aaron had not visited Sammy once, in the past week. She had been ignoring Sam's email for a while now. Maria opened the door and was greeted by a super enthusiastic smile. Sam didn't wait for an invitation. Today she

didn't have time for pleasantries.. Maria was in awe with all the events unfolding before her. Through tears, she could see her father, interacting with her twins on the mobile screen. "How?" Maria wanted to ask Sam but she was choking. Sam couldn't stop smiling.

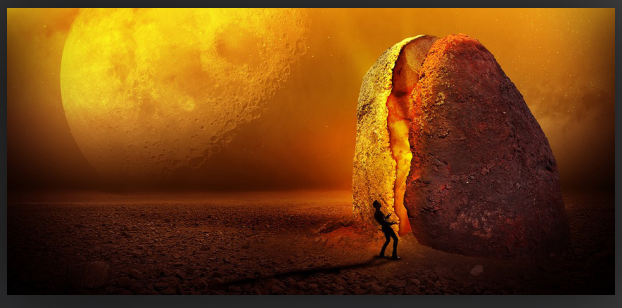
"Ma'am, this is the power of Augmented Reality. Through the screen you can watch grandpa do everyday chores and talk in real time. This is the preview of the app I was building. Tomorrow I have a meeting regarding launching of the app, which can help you revisit people that they miss. You have amazing children, I must leave now." Sam was tearing up now.

"Sammy!" Maria called out, startling Sam, "You didn't tell me when you want to shift!"

FUN FACT!

Did you know?

Virtual Reality Takes Consciousness Research into Mystic Realms of the Divine Play



Read more:
https://qrgo.page.link/fCceT

AR SMART GLASSES

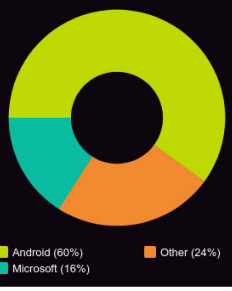
FORM FACTORS

42 AR smart glasses in market or in advanced stages of development

$1,000 median cost of AR smart glasses on the market

ANDROID DOMINANT OPERATING SYSTEM

60% of AR smart glasses are powered by Android



PRIMARY MARKET IS THE ENTERPRISE

60% of AR smart glasses are intended for commercial or industrial purposes

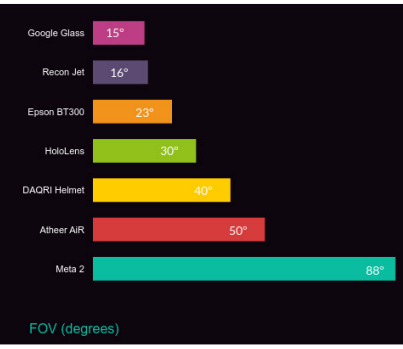
DHL drove a 25% increase in efficiency using Vuzix M100 smart glasses as part of a picking solution

Boeing cut production time by 25% and reduced error effectively to zero using Google Glass in its wiring harness assembly

Thyssenkrupp Elevator has reduced the average length of service calls by 4X by provisioning HoloLens to 24,000 technicians

THE HOLY GRAIL OF AR: FIELD OF VIEW (FOV)

33° average AR smart glasses FOV



COMMON USER INTERFACES

GESTURE	VOICE	BUTTON
48%	71%	79%

AR & VR

Blurring The Line Between Virtual & Reality

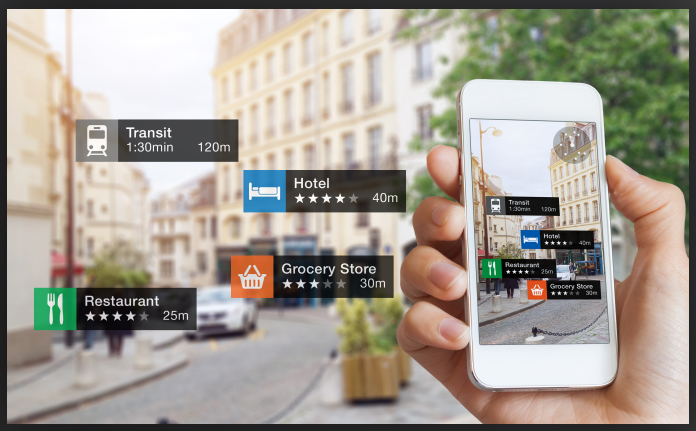
By **Suraj Bathija**
(Senior Editor, IEEE-VESIT)

Augmented Reality and Virtual Reality are two terms which all of us have come across in the past few years, as the technology advances, these two will become more and more a part of our daily lives.

Before we get into how we consume these technologies, Let's talk about what they are.

Augmented Reality Refers to "Augmenting", That is, Enhancing your reality, by Super-imposing objects onto your surroundings. Whereas, Virtual Reality Refers to Creating a Digital World Inside any computing device. This means that, Augmented Reality works in relation to the Real World and sits 'On-Top' of it, and Virtual Reality means Creation of a digital world, Irrespective of the Actual Real Surroundings.

Augmented Reality can work with any device with a Camera, a Screen and a little bit of Computing Power, Making it super affordable and Easily Available. Whereas, Virtual Reality Requires Special Headsets, Sensors for different movements and a Lot of Computing Power, Which is why it turns out to be expensive.



How does this Super-imposing in AR happen? AR uses a technique called 'Tracking'. It identifies points on a real world object that are easily distinguishable to the Device Camera, and uses those to create 'Tracker Points', These points can be called as "Sticking Points", like we stick an object over something else.

Augmented Reality has been a part of everybody's lifestyle for a while now, The famous Snapchat Filters, Pokémon Go, Even Google Translate uses AR to identify words, and then super-imposes new text exactly above it, to create an illusion of it actually being there.

In conclusion, To do AR you need four things: a camera, a screen, an object tracker and a real-time graphics processing engine.

Real-time tracking and Graphics-Processing are nothing new. You do it all the time in Snapchat when using a filter to give yourself cat ears. That kind of object tracking is 2D. It looks for the common features of your face (eyes, nose, chin) and uses that to warp its prebuilt graphics to animate in response to grinning or sticking your tongue out. It's cool, but the illusion breaks as soon as you turn your head too far, or if your face goes off camera.

The very recent, hyper-realistic movie 'The Lion King' was extensively made using Virtual Reality, by creating an entire world inside of computers. The director of the film, Jon Favreau wanted a 'Realistic Camera Movement', As if a real person was shooting it, and was actually inside that environment!

To achieve this, Custom Camera Rigs were built, which didn't actually have a camera on them, but sensors, Telling the computer about the movements of the Camera Person.

Allowing the crew to be inside that Digital World, using Headsets and Sensors, in Real-Time, Shooting, as they would shoot a Film in the Real World, All whilst standing in a Hollywood Basement, Surrounded by wires and computers.

The possibilities of AR & VR both seem endless and with advancing technologies, AR & VR can be easily seen to be adopted in our day to day life, enhancing productivity and may even help us stay safer and healthier, and that future doesn't seem to be very far away.

FUN FACT!

Did you know?

The Digital World Inside 'The Lion King' followed Real world time, and the Crew timed their shots accordingly, as if they were shooting in real life, This gave a better sense of reality to the crew working on set.

Learn More:

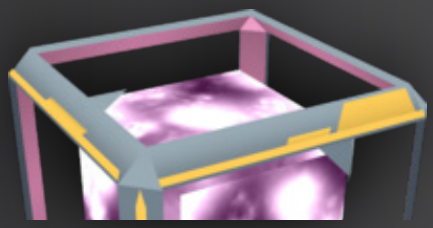
Scan the QR Code
https://youtu.be/KCnayCnM6Zk

DRUTHERS

It has only begun...

By **Siddhant Kasley**
(Junior Editor, IEEE-VESIT)

Every story has a beginning and an end. However this is not the one to follow the norms of spinning a yarn. A new kind of matter was discovered by Scientists working with the LHC at CERN, the existence of a mysterious particle, dubbed "exotic matter"(XM). When this was studied, it appeared to be transmitting "structured data" some kind of information, in other words since this was very unexpected and disturbing and implying all sorts of grave things (aliens communicating?) the top secret US Government agency "NIA" initiated a project to study it named "PROJECT-RADICAL".



The one who asked for the project to be initiated is a NIA neurobiologist called Dr. Ezekiel Calvin. Calvin had observed the "inspirational" effect XM had on his NIA colleague Dr. Oliver Lynton-Wolfe (among other things, Lynton-Wolfe discovered "puring" the preliminary project that XM came from "portals"). Calvin proposed assembling a team of "sensitives", people they believed to become unusually productive and inspired in the presence of XM - like Lynton-Wolfe.

The team assembled was:

- Dr. Debra Bogdanovich
- Roland Jarvis, a sculptor
- Carrie Campbell, a symbologist
- Henry "Hank" Johnson, a documentary filmmaker and ex-soldier
- Yuri Alaric Nagassa, a physicist

Lynton-Wolfe, the chief engineer of the project developed a powerful AI passing the Turing Test to assist in the project. It was dubbed ADA, for "a detection algorithm", as well as a way to turn smartphones into "XM scanners". It uses the GPS to locate and interact with "portals" which are in proximity to the real-world location. The portals are physical points of interest where "human creativity and ingenuity is expressed" often manifesting as public art such as statues and monuments, unique architecture, outdoor murals, historic buildings, and other displays of human achievement. A major goal of the project seemed to be to gather more XM for Lynton-Wolfe to study/use as adder all.

The team was assembled at CERN, since it was the location of a known portal. The Radical project quickly discovered that the presence of XM In high concentrations around places with cultural importance such as Acropolis of Athens, Ellora Caves etc is not natural and thus deduced that it was introduced by Aliens ("Shapers") and that it has a direct link with the creativity of human beings.

Lynton-Wolfe kept developing XM-related technology at a rapid pace: resonators, to gather and store XM from portals, XMP bursters, to blow away these resonators if necessary, and shields to protect resonators from XMPs. These behave quite oddly, doing things like duplicating themselves at portals. Debra was quite upset with his recklessness.

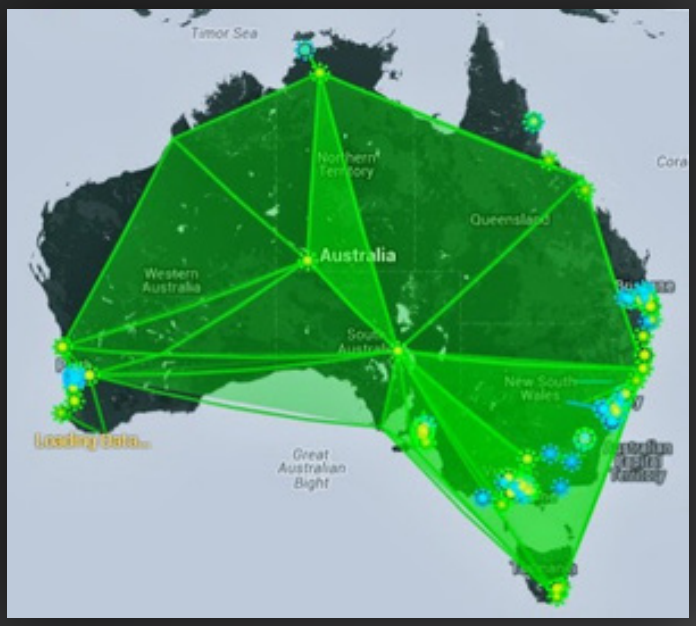
The sensitives hang around to test the scanner app, talk of their experiences to ADA, and report the effects it may have on them. At one point, they discovered a message from the portal containing Jarvis's voice, saying vaguely disturbing things. When they confronted Jarvis with it, he said he never said that, and ADA determined he isn't lying.

During the Radical Project, a prototype Power Cube explodes and the sensitives team are bathed in a very large dose of pure XM. They have some strange experiences, having a vision of a face in the portal for which they react very differently to it. Immediately, Debra and Jarvis (who are quite friendly) come to the conclusion that they must escape the project. They rush off on Jarvis's bike, pursued by NIA agents. They split up, planning to meet up later at the Zurich railway station.

However, Debra is prevented from meeting up there. Jarvis isn't, and there he meets up with a Debra-lookalike. He understands it's a trap, but too late-both Jarvis and the lookalike are shot and the bodies whisked away by NIA agents. We get to know who sent the lookalike, and had her & Jarvis killed: ADA. Debra, on the other hand, has been protected and allowed to escape by ADA. She doesn't know this, but she suspects someone (her "guardian angel") protects her, that didn't protect Jarvis. She deliberately "loses" her phone to gadget thieves on the train from Zurich, hoping to pass on this protection to others.

Meanwhile, NIA finds out that Jarvis didn't quite die like he was supposed to. His body keeps repairing itself during the autopsy, and at portal locations, messages appear to be coming from him, insisting that he is not dead, and warning to "prepare for the enlightenment". Debra's lost phone turns up in the first viral promotion video from PROJECT-RADICAL. The scanner app is leaked to the public along with the information of how to control Portals and acquire the powerful resource, Exotic Matter (XM). In this way, the agents are created all around the world.

According to the instructions provided in the app, the agent then moves through specific locations and accesses portals, sources of this mysterious energy where the goal is to claim these portals and to create control fields by linking three portals together in a triangle.



As ADA (and Debra?) intended, they can use it to "protect" themselves and others from XM. However, Jarvis is also out there in some shaped form, and through some sort of virus he offers an alternate vision: "embrace the full power of XM/shapers on your own terms, rather than the NIA's - and spread it". Thus the two factions, "Enlightened" (who approve the influence of the XM and the action of Shapers) & the "Resistance" (Faction defending the Earth from the Shaper ingression) are created respectively.

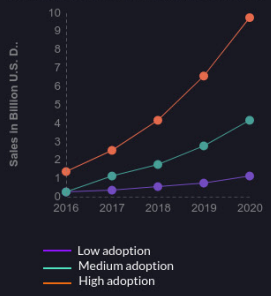
Thus, the future of the world depends upon the druthers of the agents & influence of the individual philosophies of the respective faction on them. As mentioned at the inception of the story, it has only just begun...

AUGMENTED REALITY

FACTS AND STATISTICS

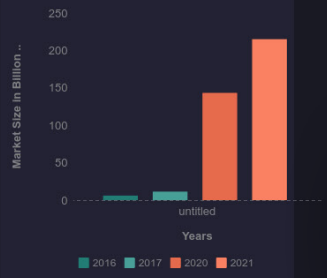
PROJECTED VR&AR SALES REVENUE

The statistic shows three growth scenarios for global augmented and virtual reality headset sales from 2016 to 2020. In the high-adoption scenario, sales of VR/AR headsets are forecast to be worth 9.7 billion U.S. dollars in 2020.



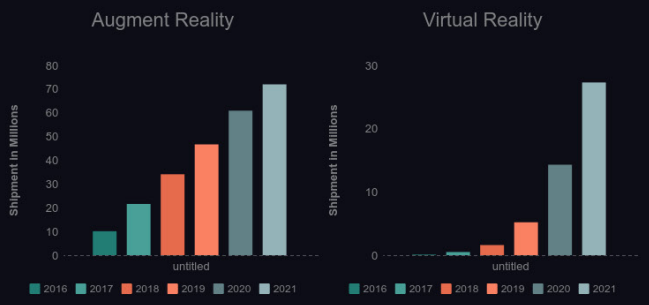
FORCASTED GLOBAL AR/VR MARKET SIZE

The statistic shows a forecast for the global augmented and virtual reality market size for 2016, 2017, 2020 and 2021. In 2021, the augmented and virtual reality market is expected to reach a market size of 215 billion U.S. dollars.



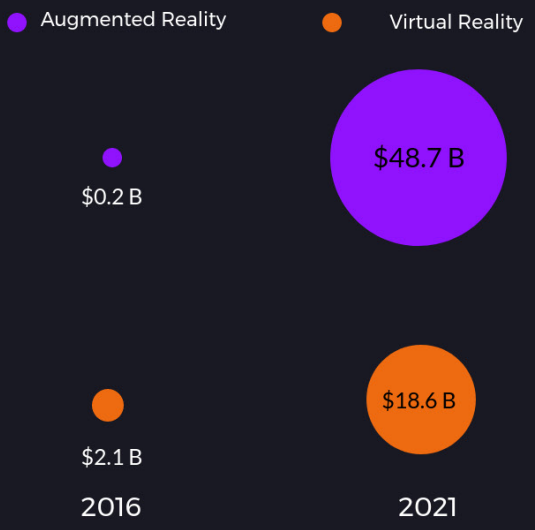
FORECAST UNIT SHIPMENT OF AR & VR HEADSETS FROM 2016 TO 2020

The statistic shows a forecast for the number of augmented and virtual reality headsets expected to be shipped worldwide from 2016 to 2021. In 2020, the global augmented reality headset shipments are expected to increase to 14.3 million units.



ESTIMATED REVENUE

According to their estimates, the augmented reality market could reach nearly $50 billion a year by 2021, which would explain why every major player wants in on the party.



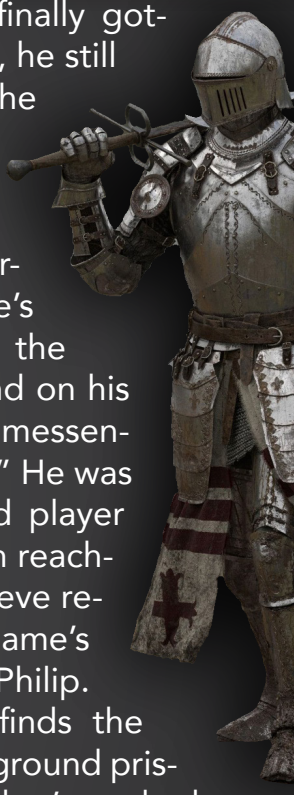
EVANESCE

By **Rudrakshi Deshpande**
(SE Coordinator, IEEE-VESIT)

CEO Steve receives a cryptic call from a Greek teenager regarding an intricate game. This teenager seemed terrified about something and begged Steve to fly to Greece as soon as possible. Steve reaches the hotel as directed by teenager Philip and wears the lenses as directed by Philip. As he walks by the streets, the sunny whether transforms into a storm and reaching by a fountain in the middle of a plaza and notices buildings on a faraway hill burst into flames. Then, a rock fires towards him and explodes in the air, crumbling to the ground around him. A sword slowly appears in front of Steve. The medieval knight kills Steve and he logs out of the game. After several such duels, Steve finally advances to level 2.

Meanwhile Nicholas, Philip's brother is petrified as Philip just disappeared a week ago and hasn't been able to communicate with him. Advancing to the level 4, Steve is astonished to see Nicholas in the game who seems to hold the key to the final level and all the weapons cease to exist around him. And no duel is allowed near him although Nicholas could provide the hints to the players. Moving on to next level Steve comes face to face with his long time rival and in a violent duel seems to have killed him. But he is shocked to know that even after both of them are logged out, his enemy seems to be dead without any trace of injuries. Steve looks shocked as he finally realises there may be a defect in this fascinating game. Trying to find back the error Steve again steps into this AR game only to see his dead nemesis reincarnated especially when it becomes increasingly difficult to discern the game from reality.

Though he may have finally gotten a grasp on how to survive, he still had plenty to own up to as the game expanded beyond its origins. Steve starts to believe that Philip has now hidden in this game for his survival Steve followed the game's directions and reaches up to the hawk, which flew down to land on his wrist. The game told Steve "A messenger from 'master' has arrived." He was now the second ranked third player in the game after Philip. Upon reaching a new tier in the game, Steve receives a mandate to find the game's creator, the thus far missing Philip. Advancing furthermore, he finds the area that used to be an underground prison, and a tiny spiral staircase that's marked by the game as the dungeon entrance, slowly heading towards the final level. On reaching the final level, Steve finds all his opponents back in the game in a close vicinity to Nicholas. Crushing all his enemies he finally receives the key and becomes the "Ultimate Master" thus freeing Philip who comes back home. But something astonishing happens, Nicholas stabs Steve with this key which is meant kill all the bugs. As soon as Steve is stabbed, he vanishes and there are no traces of him. People tried to find him everywhere for several years yet he Steve was nowhere to be found. What do you think? Was Steve killed? Or did he find the ambush for his survival?



THE POSSIBILITIES ARE VIRTUALLY LIMITLESS

By **Malavika Anoop**
(SE Coordinator, IEEE-VESIT)

Virtual Reality (VR) and Augmented Reality (AR) have gained a large following since VR research skyrocketed in the 1990s, and it is thanks to marketers and tech enthusiasts that these technologies have become a prominent force in the market. The applications for VR and AR are virtually limitless. As such, numerous industries are adopting these novel technologies to benefit from their extensive functions.

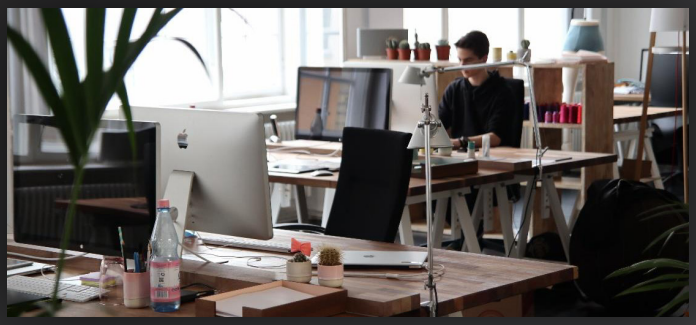
With VR, individuals are transported to a different reality through the use of closed visors and a headset. The visors display a virtual environment while the headset emits specific sound effects to match the setting. The motion sensitive visor allows the individual to experience the setting in a 360-degree view by turning his or her head to see their surroundings. To make the VR experience more immersive, active VR motion platforms are being developed so users can navigate the virtual world in first-person by walking or running.

In contrast, AR adds or "augments" an individual's reality often through the use of a transparent lens that blends computerized images with the surroundings in the real world. AR users, for example, can watch a shark pop out of a sidewalk, or see a dinosaur on the street, which they can also interact with. While VR is, in fact, more immersive, experts believe AR has more potential for commercial use.

However, there are some aspects that still hinder VR and AR adoption in a wide scale. For example, both of these technologies have difficulty rendering 3D environments in real-time. Additionally, VR and AR developers experience problems with creating high-resolution, life-like objects. To many critics, these technologies are still seen as "toys" geared towards a small community mainly fit for video game applications.

Admittedly, both VR and AR are fairly new and there is still much more development to be done, but already they have a wide array of uses besides video games. Everything from immersing a scientist onto the surface of Mars, to transposing a surgeon into an operating room that is halfway across the world. Commercial entities and private organizations alike are becoming aware of the vast possibilities of VR and AR and are making quick progress to implement these into their business practices.

AR/VR in Workplace Communication:

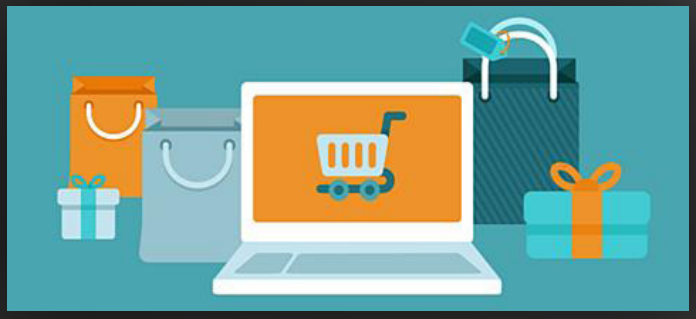


Effective visual communication in VR and AR is not only aesthetically engaging but offers a guiding hand as users explore this new world. Logically organized and carefully implemented visual communication can place your brand at the forefront of VR/AR.

AR/VR in Education:

Several studies have shown that people who learn and train in VR retain the information much more deeply and longer than other traditional methods. VR allows students to run the lesson as many times as needed, and they cannot be distracted while in the headset.

AR/VR for E-commerce - The Dawn of the Virtual Showroom:



AR will absolutely revolutionize the e-commerce industry and has actually already started doing so. The possibilities are endless, but one big change will be the shift to "virtual showrooms." Consumers at stores like Uniqlo and Gap can already try on different colors and styles of clothing in a virtual dressing room.

AR/VR for Treatment of Diseases:

PTSD treatment has been shown to benefit from VR and AR as well by gradually exposing the subject to the stimuli that caused the PTSD in the first place in a safe manner and allowing the subject to work through the trauma at the subject's own pace.

What we learn in VR and AR carries over to real life and we can practice safely as many times as we want.

In Conclusion:

One of the biggest benefits in a VR and AR-enabled environment is the ability to innovate your products and services in a completely new way. Many industries and business sectors are taking advantage of these technologies such as — healthcare, education, e-commerce, manufacturing, etc. Both virtual reality (VR) and augmented reality (AR) combined with AI and ML will create a better future and take your work to an entirely new level.

AUGMENTED REALITY

A PATH TO NOSTRADAMUSING

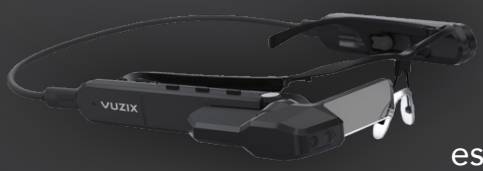
By **Ayesha Gulrajani**
(Women in Engineering, IEEE-VESIT)

March welcomed the warmth of the morning skies. The meteorological authorities had forecasted an early and scorching summer in the coming months. A few medical analysists and all self-proclaimed doctors of WhatsApp, welcomed the unbearable heat, in the wake of the largely accepted speculation that this would end the COVID-19, which had been the cause of widespread fear and global dread.

Our college respected the decision of the national authorities and had announced a complete shutdown. We all were connected to each other in the virtual world, albeit from the cosy dens of our respective homes. WhatsApp and Insta were at their highest peak and the baud rates suffered due to largescale congestion of the servers, meandering their way through the laid down optic fibres. It had been a long time since I had done nothing, and this uncanny new feeling was uncomfortable in a way. Subconsciously, my body agreed with my mind which wanted me to resume college, complete my education and get my coveted degree.

We all were making feeble and difficult attempts to continue with our work. Difficult as it was in these unsure circumstances, we all knew that our work had to be done, assignments had to be submitted, projects had to be done, curriculum had to be achieved and the overall mandated tasks had to be completed. Subconsciously, we also understood the co-opted stress on our teachers, educational faculties and the entire system. But this was a bridge that we all had to cross together. So, somnambulisticly, as a monotonic routine, I gradually chugged along the tortuous path of these uncannily divergent times.

The clock told me it was 1745h - time for our group to get together online and progress our project in our own delineated environments, albeit together by the wonderful platform made possible in today's times. Our Project was an augmented reality-based enhancement prototype. Augmented reality (AR) is an interactive experience of a real-world environment where the objects that reside in the real world are enhanced by computer-generated perceptual information, sometimes across multiple sensory modalities, including visual, auditory, haptic, somatosensory and olfactory . We lazily picked up our Vuzix 2500 blades - an enhanced version of Vuzix Blade Safety Enhanced Blade Smart Glasses with Z87.1 Certification and started working on improvising its existing features.



This was my daily routine for about a fortnight. Many days passed and we gradu-

ally cracked our heads into numerous code combinations that somehow didn't give us the anticipated output. On the twelfth day, after a healthy agree-to-disagree heated discussion, we somehow hit a covert code that happened to fit our system impeccably. Given the exhaustive energies that went into our brain-storming session, we decided to call it a day.

I still had my Vuzix glasses on when I heard a knock on my door. As I turned my head right towards the door, it opened and my brother entered the room in his soiled football shoes (quite like the 'Messi' person). As I was about to check him, a few horizontal bars appeared- a glitch- as in the static on an LCD monitor, and the image disappeared. It took a fraction of a second for me to realise that the image was formed by the Vuzix, and maybe our code had to be refined, or maybe my long working hours were causing hallucinations. I removed my Vuzix, disconnected it from my laptop, switched the power off, closed the lid of my laptop, put everything back in its place, nonchalantly stretched and gently rubbed my eyes. It was soothing and relaxing. I was ready for my cuppa coffee and I picked myself up and tuned towards the door. Just about then, I heard a knock on my door. "As I turned my head right towards the door, it opened and my brother entered the room in his soiled football shoes." What!! A déjà vu?!! Seriously!! Was I so tired that hallucinations were turning to be realities!! At that point in time, all I knew was, that I deserved my cuppa coffee.

I pondered for a fleeting moment.... but, what if, I had cracked a code to take a peek into the future?! I could not rule out this possibility, and this fantabulous optimistic marvel kept scrabbling my subconscious, making me want to take the leap of faith. So, for the next two days I tried to replicate the sequence of events in the exact manner like sitting in the same pose, doing the same things, talking to the same friends etc. When that didn't work out, I tried to go to different places. I executed the same sequence of actions on both the floors - in my Dad's den, the garden, the dining hall, my backyard, every little corner that I could find in my duplex. But nothing happened. So, I relegated the past event into either a hallucination or my 'superior sixth sense'.

Discarding all fantasies and perceptions, I decided it was high time that I got back to serious project work. Fortunately, our project was progressing in the right direction and we were pretty comfortable about the steady and positive progress. You know how it is, for any software-related Mini Project, there are glitches and bugs , and we have to surpass them at every step. So, as expected, in a couple of days, yet again, we were at a crossroad, another glitch, overcoming which was mandatory for the successful implementation of our project. We all decided to test our own individual theories and eventually chose to go ahead with the one with maximum benefaction.

So, there I was in my room again, at my table working out the various permutations and combinations creating several strings in the existing code to surpass this impediment. Just as I was thick into it, the door knocked and my little brother Ishaan popped in and said "Ayesha, it's time for dinner." I looked at my watch, looked at him and told him "Ishaan, its only 1930h for God's sake. There is still time for dinner." (I knew that simple-hearted prankster too well by now).

As I was about to resume my work, a few horizontal bars appeared- a glitch- as in

the static on an LCD monitor, and Ishaan's image disappeared. It took a fraction of a second for me to realise that the image was formed by the Vuzix (again), and maybe I had hit upon the correct code to look into moment-next. Could it be?

The next half an hour was the longest thirty minutes of my life, and I kept looking at the door. Sure enough, at 2000h, the door knocked and my little brother Ishaan popped in and said "Ayesha, it's time for dinner." Eureka!

Well, we all are back post combating the COVID-19 in our own contributing ways. At present, I am working overtime, refining the code with my teammates, and I think we are at the brink of making a major breakthrough into the dream project of a lifetime. Consciously, I know we are not the only ones working on something like this. It may take months, it may take years, but with a successful Mélange of quality code, sound teamwork and the right strings at the right time, it's bound to come through in good time.

Epitaph: Major Outbreaks in the history of Augmented Reality

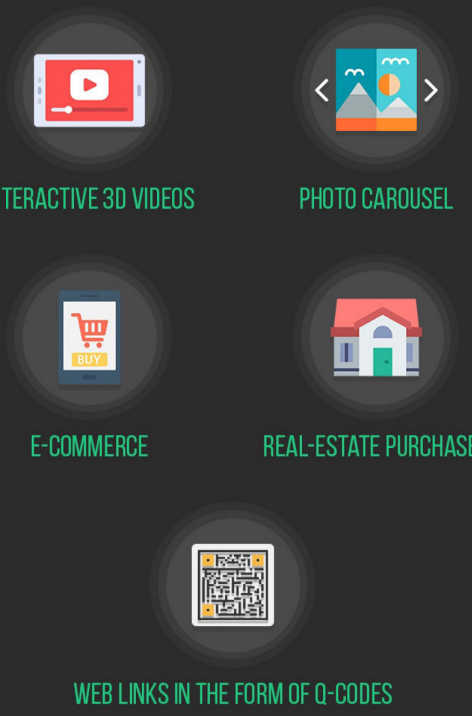
1901: L. Frank Baum, an author, first mentions the idea of an electronic display/spectacles that overlays data onto real life (in this case 'people'). It is named a 'character marker'.

1980: Steve Mann creates the first wearable computer, a computer vision system with text and graphical overlays on a photographically mediated scene.

2019: Microsoft announces HoloLens 2 with significant improvements in terms of field of view and ergonomics.

MOST POPULAR USES OF AR

Augmented reality's popularly used in several fields **starting from entertainment to that of business.** Some of the most popular uses of augmented technology are found in these genres:



MAJOR COUNTRIES INVOLVED IN AR RESEARCH

Augmented reality's popularly used in several fields **starting from entertainment to that of business.** Some of the most popular uses of augmented technology are found in these genres:

VALUE PERCEPTION

Research indicates a **135% increase** in the likelihood of a buyer to **purchase a product** if augmented reality is associated with it. Hence, it can be said that AR does have **a positive impact on value perception.**

Consumers value products associated with augmented reality **33% more** than the ones without.

The Multiverse Census

By **Mansi Kasar**
(SE Coordinator, IEEE-VESIT)

In the large Amphitheatre a hundred of me have gathered. I thought it was going to feel like a fun palace with all the mirrors—but it's nothing like that. It's more like a family reunion, except you don't know anyone and every member of the family is nothing but you, funnily not the exact version of you.

Introvert Me is in the corner with a plate of French Fries. Every so often she shoots a glance at the spread of doughnuts, bagels, and cheese cubes, but wants to avoid any conversation. Across from her sits Blonde Me. I'm tempted to say that Dad was right. I should never get my hair colored. Exuberant Me—better, not great—is chatting with Fashion Disaster Me, who wears a neon Green jumpsuit. She's not the only one in an outfit. There's Prom Date Me in a beautiful gown, bo-ette Me in a gray toboggan, and a potential Cyndi Lauper fan Me in a pink wig. "Hey! Gloomy Eyes!"

It takes a second to realize she means me. It's Pixie Me, waving me over to a table filled with more of me.

I say, "Hi. I'm Olivia," and they all bust a gut. "Oh. Right. I guess you knew that."

"Hi, Olivia. I'm Olivia," says Blazer Me.

"Guys, this is uncanny," says Sarcastic Me. "We really should get nametags."

"First time?" says Blazer.

"Didn't mean to give myself away."

"We can always tell," says Pixie.
Then comes the expected opener: What do you do?

I think about bending the truth, saying I study Science, but I've never been a good liar. Maybe there's a Con Woman Me? She could give me a few pointers.

"No way," says Tanned me. "Me too. What subject?"

"Biology."

"Ouch," she says. "The different complex anomalies. Should have switched to math. Numbers, buddy. Practically teaches itself."

"Funny. That's what Mr. Kepling used to say."

"Hey!" the table cheers. "Fork point!"

A fork point, Pixie explains, is the moment

oneself splits into two. You know, like two roads diverge in the woods and all that. One self walks down one road; one walks the other. Except it's more like two roads and then two more roads and then two more… until you have an infinite number of selves, only some of whom attend Quantum.

"You remember that day, in the hall?" Tanned says.

Weird. I do remember. One day, when I was done with my Lab, I was walking down the hall with three folders of Assignments. I turned a corner and ran smack into Mr. Kepling. Calculus quizzes and book reports went flying. As we picked them up, Kepling told me he didn't envy my grading.

He had a point. Both my parents are Doctors—my mother a Gynaecologist, my father a Surgeon. They used to come home after long appointments and operations. Taking a "sick leave" for them would be a joke.

But math? Math seemed so sterile. There was no magic in it. You couldn't perform respiration experiments, enzyme kinetics, sterile culturing of microalgae, morphological taxonomic determination of fish larvae, or fatty acid sample preparation to characterize the nutritional status and composition of marine plankton.

The rest of the table shares what they do. Pixie runs a farm. Blazer's a Research Scientist. Sarcasm works at a college canteen. When Sarcasm talks about her job—lunch duty, messy floors and table, no benefits, food stamps.

I could see myself in Blazer, Tanned, or Sarcasm, but Pixie? I remember joking once to Evelyn-my best friend about quitting studies and doing something that required zero mental energy, like opening a farm, but I wasn't serious.

Blazer's the one I'm most interested in. The better version of me. collecting samples, presenting results, preparing research proposals and funding applications, developing original solutions to problems, making breakthrough discoveries.

"Do you work on any secret discoveries?" I ask.

"Let that be a secret" Blazer says.

"Oh god."

Blazer shrugs. "It's Fun when your job is to EXPERIMENT"
"Yeah, but are you fulfilled?"

Everyone at the table looks at me. A beat. It's awkward.

Then they all crack up. Tanned laughs so hard she spills her beer. Pixie slaps me on the back. I don't see what's so funny.

The reason I came to Quantum is simple: I want to find Perfect Me. Evelyn is skeptical about Perfect Me. She thinks she's a myth. I mostly agree with her. Except, when you think about it, there are an infinite number of studying biology in the multiverse, which means an infinite number of me. And somewhere in that infinity there's a me who made a right choice and then another. . .
and another. . . .

Only few minutes at Quantum and I'm beginning to suspect Perfect Me might be more difficult to find than I thought. I'd settle for "Me".

"It's like lunch duty in here" Sarcasm says

I say. "Isn't this what Quantum's all about? To get to know your alt selves and become better people?"

"Someone ate all the dessert," Sarcasm says.

"That's how they sell it," Tanned says.

"You think if any of us were fulfilled we'd be at Quantum?" Blazer says.

"What do you mean?"

"Look around, Gloomy Eyes. You see any well-adjusted selves at this table? Olivia here is a dropout. Then you got Olivia, who won't have her student loans paid off until she's seventy. And behind door number three, there's Olivia, who literally picks up animal dung for a living."

Good Lord. This was not what I had in mind when I clicked on that pop-up ad, while simulating the frontal cortex of the human brain on my Augmented Reality (AR) module, for my on-going project, to derive and assess why a human goes for the choices and the decisions he/she takes.

"Are any of you happy?" I ask.

Blazer nods. Sarcasm rolls her eyes. Tanned chugs the rest of her beer.

Surprisingly, Pixie nods. "Mostly. Then again, it's like Olivia said. I spend most of my day picking up dung."

"Then why do any of you come here?"

Blazer shrugs. "To eat free food."

"To keep our selves company," says Sarcasm.

"To share miseries," says Tanned.

Everyone, sans the one who ate all the dessert, left without having it. On my way home I picked up a Red Velvet Cheesecake for myself from a local shop- made me realize my choices are bound to me, I'm responsible for making them-either they turn out good or bad but you always Learn.

FUN FACT!

Did you know?

EchoPixel's True 3D AR product uses a wide variety of current medical image datasets to enable radiologists, cardiologists, pediatric cardiologists, and more to see patient-specific anatomy in an open 3D space. The system works by using four cameras to track the user's head movements, glasses to turn images into 3D visuals, and a stylus to let users move and interact with objects in real-time.

MIRAGES

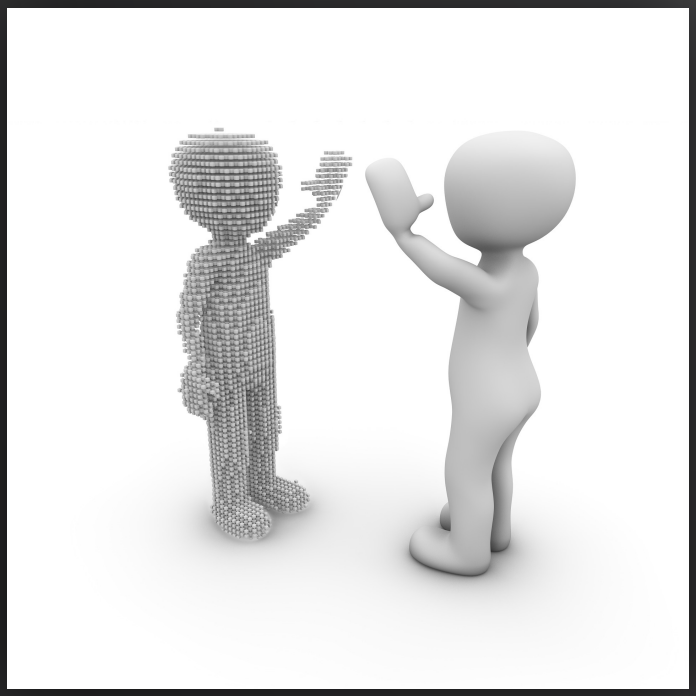
By **Atique Kudchi**
(Membership & Publicity Officer, IEEE-VESIT)

6041 AD. There's good news and there's bad news.

The good news is that humans survived the Coronavirus outbreak.

The bad news is that only a billion of them did.

4000 years of cleaner skies, seas and better air has transformed these humans, into a much smarter, stronger and robust entity. Project Gilgamesh, the global initiative of making humans immortal was sped up. Inspired by Augmented Reality, scientists wondered if it was possible for humans to exist in an augmented state i.e to exist in a virtual world in the form of immortal bits rather than organic cells. In 5000 AD, Dr. Robert Lazar converted a dead body's bio information into quantum bits and projected them into a computer simulation of our world. 500 years later, we perfected the tech for living humans.



It was now possible to enter a small cylindrical chamber, called a Projector, and transfer your consciousness anywhere onto a virtual version of the Earth. Also in true AR fashion, the computer could, at any time, project your bits onto the real world (called Bouncing), granted that people needed special glasses to see you, and you couldn't touch anything since your hand went right through! Such a computer projection of yourself was called a 'Mirage'. This allowed humans to transfer their consciousness into a new, healthier body whenever needed, rendering them immortal. This new species of humans arrogantly began calling themselves Homo Deus (The Godly Man).

The World Government had kept this tech as secret as possible, allowing it to be used for only the most high profile military operations. This story is about one of those.

"You know you're not completely immortal, right Sergeant Han?", crackled Han's earpiece.

Chuckling, he replied, "Yeah sure, Sergeant Chi! I'm so afraid I'll die because an enemy Mirage might somehow appear from somewhere and snap my neck!" Chi snorted back. "With that attitude, I'm sure Boris would love to do just that!"

"I don't even think Boris knows what he's up against. I wanna see the look on his face when his bullets pass right through me!", boasted Han. Chi frowned. "We're not looking for trouble tonight Sergeant Han, you know that. It's a simple capture-the-flag. Boris Slovic is the biggest bio-terrorist in the world right now, and I already don't like this. Him being alone in a warehouse with 50 tons of Element 201? Sounds pretty fishy to me!"

"Doesn't matter. We're prepared anyway. We're your eyes and ears. Just stick close!", assured Han.

The Infiltration Team was accompanied by a team of Mirages. Even though they couldn't carry guns, this helped avoid casualties, and sometimes confrontation altogether. In this case, Sergeant Chi led the Insertion Team and Sergeant Han was the Lead Mirage. It was almost time.

"Positions!", ordered Han, and his 10 co-Mirages crowded around the wide warehouse entrance. They were to scout ahead for the Infiltration Team to safely subdue Boris and secure the Element 201. They effortlessly passed right through the double doors and entered a long corridor lined with more metal doors, 5 on each side. The Mirages passed through the second set of double doors at the end and paused as they took in their surroundings. They were in a huge room with no exits except for the one they had just come through. At a desk in the middle of the room, sat Boris, with his back to the team. Obviously, he wouldn't be able to see them, but it still made Han extremely uncomfortable. At almost 7 feet and 330 lbs, Boris made for an intimidating presence.

Outside, Chi's earpiece sprang to life. "Sergeant Chi. He's here. You'll pass through 2 reinforced metal doors to get to him."

"Is he alone?", inquired Chi.

"Well, he does appear to be alone, although-". Han stopped abruptly as he gasped.

Boris had just turned his chair around to face Han's team.and he was wearing what looked like Superviolet sunglasses, which allowed one to clearly see Mirages. They hadn't planned for this, but Han kept his cool. "Sergeant Chi. Target seems to be wearing SV".

Chi couldn't believe what he was hearing. Chi replied, "That's impossible to believe, Sergeant. Nobody else has this tech! Please call his bluff!"

"I am trying."

Han signaled his team to slowly surround

Boris, but before they could move, Boris spoke with a heavy Russian accent.

"Do you think I'm an idiot?"

Everyone froze instantly.

"I can see you, you naive idiots!" He then looked Han straight in the eye. "And from your actions, I assume you're the head idiot?"

"We have you surrounded by an Infil Team, Boris. You can't escape. Just make it easier for everyone. Surrender quietly and tell us where your Element 201 is!"

"Why, you're stupider than I thought! There is no Element 201 here! Planting false info was almost as easy as getting my hands on your tech."

A muffled explosion sounded outside as the Infil Team breached the first double doors.

Spirits rising, Han growled, "Surrender Boris. You can't do anything now. We're taking you back with us!"

Boris smirked. "I may not be able to do anything. But they can!"

The hair on the back of Han's neck stood up as Boris' goons stepped in through the walls.

Chi got a nasty sting in his ear, as Han's panicked voice shouted into it.

"SERGEANT! BORIS HAS MIRAGES OF HIS OWN!"

"No way! Do not panic Sergeant! Are you absolutely sure?"

"As sure as day, Sergeant. We're ambushed! Ten of them just walked in through the walls!"

It was common knowledge that Mirages could see and hurt each other. The Infil Team's biggest advantage had been nullified.

"Wait. Did you say ten?", said Chi as he looked at the doors in the corridor.

"Yes, why?"

"Hang in there Sergeant. I have a hunch to check on."

"Don't take too long. I have a feeling we'll need you."

"Oh yes, you will! I called you here so your deaths can be an example of what happens when you mess with Boris Slovic. Your Government has been hiding this tech for too long. Not anymore." He turned to his goons. "Take them!", he said, and his goons charged.

Han's team seemed to be equally matched with Boris', but Boris didn't seem to care. He simply turned back around in his chair.

Han sent a goon flying with a roundhouse kick, and as he stopped to regain balance, he noticed the curtain that Boris was facing. It was the exact color as the walls, almost camouflaging it. Before he had time to wonder what it could be hiding, he was

grabbed from behind in an iron deadlock. His chin dug into his chest, unable to move his arms. As he felt a small explosion outside, his enemy flung him violently into the wall, his ears going numb, drowning out all noise. As his vision cleared, he saw a foot hurtling towards his face at full speed, and then the entire goon suddenly vanished into thin air! Before his brain could process what happened, Chi's voice came over the earpiece.

"I was right, Sergeant! Boris' mirages are projecting from these rooms. I just captured one of his men. Hold on just a little longer!"

Nine explosions later, Han's Mirage team slowly got together. 5 of them were grievously injured and stopped projecting to avoid any irreparable damage to their biobits.

A final explosion blew apart the main room's doors, and from the smoke emerged Sergeant Chi, pointing his rifle forward.

"There goes my last explosive. Luckily I had enough for the last double doors. My team is holding Boris' men hostage outside. Let's get this bastard!"

Han would've cried from the relief he felt seeing Chi again. They had been friends for a long time, dreaming of being in the Army together. He considered it his life's biggest honor to have served alongside him for 8 years.

"Give up already Boris! Your men are gone and you're alone against 10 of us, all armed."

Boris' face remained expressionless. "Fine. Arrest me, Sergeant. Go ahead. I will not try anything clever."

Chi and San exchanged looks. Boris couldn't be trusted, but there wasn't any other plan of action. Besides, he had an entire squadron as a backup. Boris was surrendering.

"I'm coming to you, Boris. Remember, no funny business. Put your hands where I can see them until I come to you. Any sudden movements and I empty this entire magazine into your skull", said Chi.

Boris quietly extended his hands forward. He did not move even when Chi put away his gun to draw the cuffs. "You've evaded us for too long, Boris. And surprise! You're responsible for your own downfall!", said Chi as he slapped the cuffs shut and they went right through Boris' wrists!

Chi dropped the cuffs in shock as Boris let out a guttural laugh. "I told you you're idiots! Way too easy!"

As Boris went off on a rant, Han spoke quietly into his earpiece.

"Sergeant Chi. Do you see the curtain behind Boris? If his men were projecting from nearby, he must be too! I'm going to distract him while you look for his projector. And hurry up."

Before Chi could protest, Han bellowed, "Hey ugly! So what if you're a mirage too? There's still 5 of us and 1 of you! We'll tear your bunker down to find your projector if need be."

Boris hated being interrupted. He also hated Han's overconfidence and charged towards Han's team with surprising agility.

Beyond the curtain, Chi followed a long dark passageway, glowing at the end of which was Boris' projector. Relieved, he ran up to it and thanking his stars, pulled the switch.

The projector refused to shut down. It showed no signs of being affected in any way in fact.

In the main room, things had gotten worse. The Soldier Mirage's projectors had been emergency shut. Han was barely standing on his feet, parts of his body glitching out, indicating irreversible bit damage. He had the Master control for his team, meaning his projection couldn't be shut remotely. Only Han himself had that choice.

Boris sounded more arrogant than usual, knowing he had won. "You won't stop projecting, will you Sergeant? I thought so! Your pride wouldn't allow you to abandon the battlefield! I'm giving you one last chance. Leave me alone, or face death!"

Han looked Boris dead in the eye. "You will never win Boris.", he uttered through gritted teeth. Boris' face hardened as Chi's voice carried over to Han. "Sergeant Han. Boris' projector is here. But he has master control. I cannot stop his transmission. Unless...."

Han's eyes widened in realization. "No Chi! You cannot do that! You don't have the clearance. Besides, we need Boris alive!"

"What the hell are you saying?", scowled Boris as he bent towards Han.

"Boris would rather die than give us any information, Sergeant. We have his men outside. They will be safe. You will get more than enough information from them!"

"But the explosion will kill you, Chi! This is completely unnecessary!"

"I've had enough of you! You die now!", said Boris as he lifted Han up by his neck.

"Oh and there's also the small matter of him almost killing you. I have to force shut the power before he realizes it, else he will stop the transmission and it won't work, Han. I'm sorry." said Chi, his fingers flying over the control panel, overriding various warnings. "This is completely my decision. Do not blame yourself. I am honored to have served by your side all this while, my friend. Goodbye."

Han's legs kicked frantically as he choked, tears streaming down his face. He screamed with whatever he could, "CHI NOOOOOO!"

Time seemed to slow down. Boris realized what was happening and immediately let go of Han's neck. He activated the remote on his wrist, but before he could stop the transmission, Chi had abruptly stopped power supply to the projector.

Owing to the massive energy requirements, Projectors needed some time to discharge after each projection was over, which is done via the power supply itself. Cutting off the power supply mid-projection meant the projector had no route or time to discharge, thus releasing millions of units of energy into the air around itself.

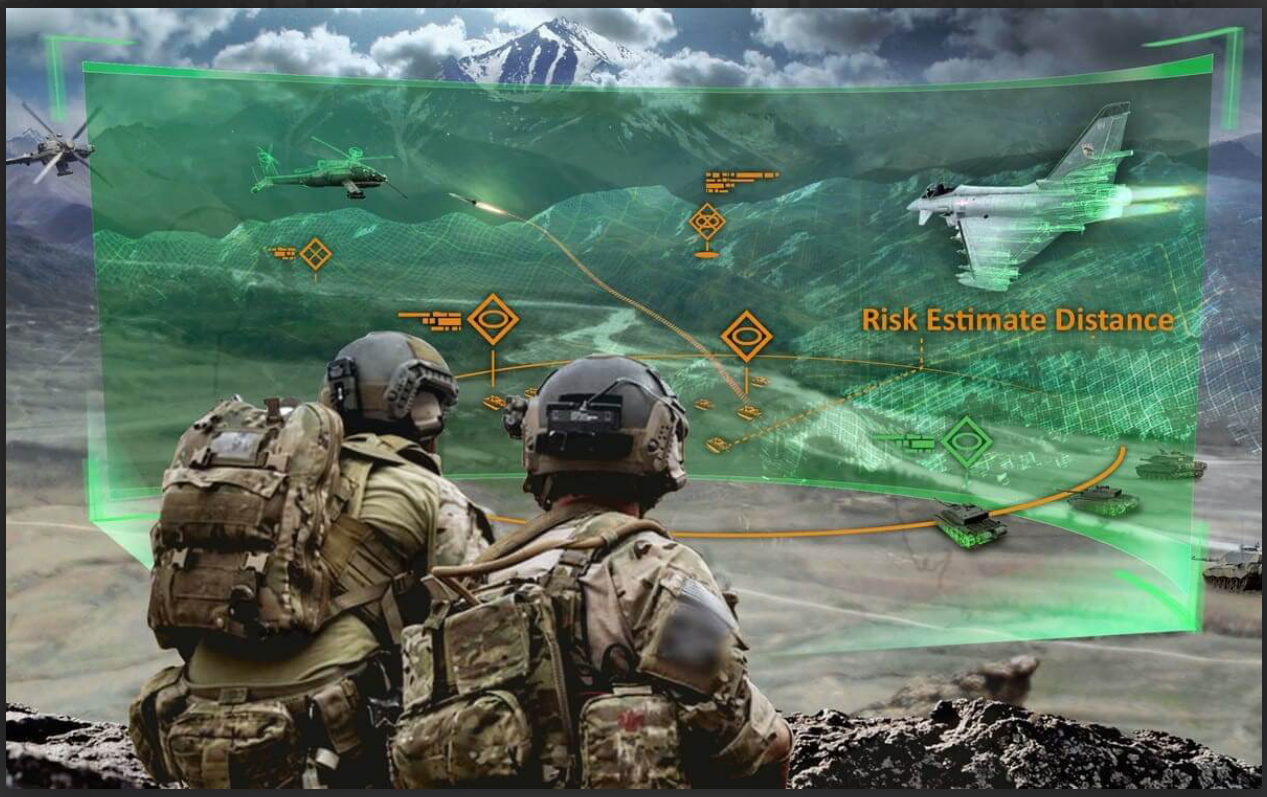
Han closed his eyes as a bright explosion washed over him.

AUGMENTED REALITY IN MILITARY

Three solutions to warfare augmentation:

TAR STE ARES

Source: Jasoren



The military sector has always been at the forefront of using emerging technological advancements for the purposes of training and combat enhancements and augmented reality (AR) is no exception. Far before Snapchat released its filters (which is the simplest form of AR) and augmented reality mobile app development wasn't a thing, the army had already implemented the technology of real-time overlaying for their fighter-jet pilots.

Three solutions to warfare augmentation:

1. Tactical Augmented Reality (TAR)
2. Synthetic Training Environment (STE)
3. ARES – Augmented reality sandtable

Read More:
https://qrgo.page.link/TEwH5

MICROSOFT'S HOLOLENS 2

A $3,500 MIXED REALITY HEADSET FOR THE FACTORY, NOT THE LIVING ROOM

Source: The Verge

The Microsoft HoloLens 2 is available for preorder today for $3,500, and it's expected to ship later this year. However, Microsoft has decided that it is only going to sell to enterprise customers who want to deploy the headset to their workers. As of right now, Microsoft isn't even announcing a developer kit version of the HoloLens 2.

Compared to the HoloLens we first saw demonstrated four years ago, the second version is better in nearly every important way. It's more comfortable, it has a much larger field of view, and it's better able to detect real physical objects in the room. It features new components like the Azure Kinect sensor, an ARM processor, eye-tracking sensors, and an entirely different display system.

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