



VISION AND MISSION OF THE INSTITUTION

Vision

To be one of the premier Institutes of Engineering and Management education in the country

Mission

- To provide Engineering and Management education that meets the needs of human resources in the country
- To develop leadership qualities, team spirit and concern for environment in students

Objectives

- To achieve educational goals as stated in the vision through the mission statements which depicts the distinctive characteristics of the Institution
- To make teaching-learning process an enjoyable pursuit for the students and teachers

VISION AND MISSION OF THE DEPARTMENT

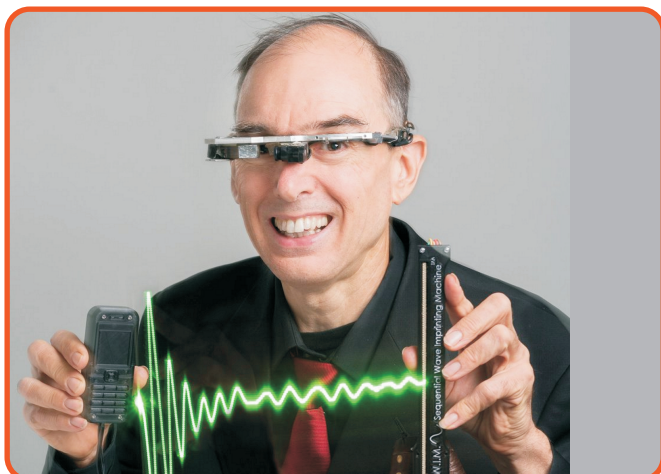
Vision

To be a premier department of learning in Information Science and Engineering in the state of Karnataka, moulding students into professional Engineers

Mission

- Provide teaching-learning process that develops core competencies in Information Science and Engineering to meet the needs of the industry and higher education
- Create an environment for innovative thinking and self-learning to address the challenges of changing technology
- Provide an environment to build team spirit and leadership qualities to succeed in professional career
- Empathize with the societal needs and environmental concerns in Information Science and Engineering practices

William Stephen George Mann



William Stephen George Mann (born on June 8th 1962) is a Canadian engineer, professor, and inventor known for his work in augmented reality, computational photography, particularly wearable computing, and high-dynamic-range imaging. Mann is sometimes labeled the "Father of Wearable Computing" for early inventions and continuing contributions to the field. He cofounded InteraXon, makers of the Muse brain-sensing headband, and is also a founding member of the IEEE Council on Extended Intelligence (CXI). Mann is currently CTO and cofounder at Blueberry X Technologies and Chairman of MannLab. Mann was born in Canada, and currently lives in Toronto, Canada. We dedicate our current edition of 'INSPIRE' with the theme 'Impact of AR and VR in 2021 and Beyond' to 'Steve Mann' for his wonderful contribution to the field of Augmented Reality.



B. N. M. Institute of Technology

An Autonomous Institution under VTU. Approved by AICTE.

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Message from the Editorial Team

We are delighted to present Volume 6 issue 2 of our Newsletter 'Inspire'. The Newsletter has culminated from a plethora of efforts extended by Department of Information Science and Engineering. We feel privileged to highlight our theme “Impact of AR & VR in 2021 and beyond” to indeed inspire and provide a forum for exchange of ideas with innovative, empirical and conceptual cases having an inclusive ethos open to a wide range of methodological approaches and philosophical support in the field of AR & VR. We are indeed indebted to our reviewers who have spared their valuable time and contributed towards this endeavor. Lastly, we would like to express our heartfelt thanks to our honorable Secretary of BNMIT Sri Narayan Rao R. Maanay for his continued guidance and motivation. We sincerely hope that the readers will find the case contents interesting, relevant and intellectually stimulating, leading to diverse outlook in research issues.

About the Department

The Department of Information Science and Engineering (ISE) is presently headed by Dr. Shashikala. The Department was established in the year 2001 with an intake of sixty students. Since its inception, the Department has forged a path of technical excellence and innovative teaching methods. It comprises highly qualified, research-oriented teaching staff, committed to instill moral values among students, in addition to providing cutting edge technical knowledge. The Department has well equipped laboratories with state-of-the-art computational facilities. The Department is accredited by NBA for academic years 2018-19 to 2021-22 & valid upto 30.06.2022. The vision of the department sets the goal and the mission portrays the process of achieving the vision. The vision of the Department is to be a premier Department in correlation with the vision of the institution. The Program Educational Objectives (PEOs) depict the strength of the Department in moulding students to become successful graduates by inculcating professionalism with concern to society and the environment. The PEOs are defined, based on the vision and mission of the institute and the Department. The program outcomes are also taken as input for drafting the PEO's of the Department.

Impact of AR and VR in 2021 and Beyond

The history of virtual reality and augmented reality technology goes back to the year 1838, when Charles Wheatstone created his stereoscope, which superimposed an image over each of the user's eyes, thus creating a distant 3D image.

Augmented Reality(AR)

Augmented reality technology is less mature when compared to virtual reality due to the limitations of AR technology, lack of standardization and a higher price tag; it is already being utilized in industries including manufacturing, healthcare and logistics. Augmented reality experiences are typically delivered through headsets, such as Meta, ODG, Vuzix and HoloLens, and are showing early signs that the technology is set to transform commercial and industrial markets. The Covid-19 pandemic forced more urgent priorities for organizations, chiefly around enabling remote working and bolstering cloud infrastructure. Yet this 'new normal' will help the AR and VR markets in going forward. Market leaders like Microsoft, Apple (ARKit 4), Google (ARCore), Facebook (Oculus VR) are now using and developing AR supported technologies to enhance product performances, optimize functions, greater app support, improved navigation and tracking. This unexpected use of mobile AR has successfully validated the consumer mass adoption of augmented reality.

Virtual Reality(VR)

This has been the most accessible entry-point for consumer VR use. Virtual reality is a lot more mature than the existing augmented reality market. The required software tools and hardware platforms to create an immersive VR experience are already available. With the availability of more advanced systems such as the Oculus Rift, coupled with 360 cameras, virtual reality experiences are quickly finding new avenues into our lives.

- Some of the future trends in AR and VR are:
- Introduction of AI in AR/VR space.
- Rise in the number of AR avatars.

- Gearing up vehicles with the power of AR.
- 5G will speed up AR/VR evolution.
- Advent of WebAR.
- Remote assistance via virtual and augmented reality.
- Emergence of AR-based indoor navigation and educational domains.

The AR/VR gadgets of the future will give customized, accessible, and well-designed experiences. As these components grab hold, a platform shift is undeniable. AR and VR have a sharp rise in its trend and has a lot of future scope for improvements in the coming Days.

Sahana Hegde
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Augmented Reality and Virtual Reality in Education



AR-VR Overview

With the development of computer technology, the subject of computer simulation science and technology has been formed. In 1965, Dr. Sutherland, an important founder of computer graphics, described a new display technology in an article, put forward the idea of simulating of the real world from the perspective of computer display and human-computer interaction. In 1973, Krueger M. proposed the word "artificial reality" (VR), which is an early VR term. For "what is real", the movie "The Matrix" has a classic line: If you mean what you can feel, what you can taste and what you can see, then "reality" is just the electronic signals your brain

compiles. Virtual Reality (VR) or Augmented Reality (AR) formally based on this principle, through scientific and technological means to reconstruct or strengthen the surrounding environment.

At present, the combination of VR, AR and education is in the ascendant, and the market demand is strong. The domestic and foreign institutions and organizations have laid out the VR education market. China's VR started late because its technology development is not so sufficient, it is in the rising stage of development. There are not many products, and its application is limited. But if it is well combined with the education industry, then it is easy to get through the technical barriers.

AR, VR and a combination of the two, often referred to as MR, has been remarkable in creating impactful transformation in learning and assisting students right from pre-school to high school. Some of the key application roles of these technologies in education can be highlighted as under:

- Immersive learning
- Interactive and self-paced
- Democratisation of content, and special learning for differently-abled
- Enhanced teacher-student engagement

Reference:

1. <https://www.highereducationdigest.com/role-of-ar-and-vr-in-transforming-the-emerging-education-technology-sector/>


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Image Processing using Augmented Reality

AR image recognition is one of three AR technologies that brings digital content into the real world. The other two AR technologies are object recognition and ground plane detection. AR image recognition typically uses an AR app where learners scan real-world 2D images and overlay 2D video, text, pictures, or 3D objects on it. Image recognition is a marker-based AR technology. Think of a marker as an anchor that connects virtual content with the real-world. The marker can be an image, shape, or surface. Once the marker is detected by the application, the AR experience begins by placing preloaded digital content on top of it. With a mobile device or tablet, learners scan a static marker in the real-world, like a poster, then the AR application recognizes it and attaches digital elements to it, like informational text boxes or videos. Marker-based AR can be local, meaning data is stored on the phone or tablet itself, or cloud-based where data is stored on a remote server. AR has a long history and entertainment is one of the areas in use today. AR is pervading the industry with new start-ups appearing almost weekly, while older established corporations, such as Apple, have been buying up these start-ups almost as fast as they appear. They see a future in technology. AR image recognition has the following three benefits:

- **Update Content Digitally:** AR image recognition allows developers to update content digitally and still use the same static marker. For example, developers could update the wording for an informational text box attached to a poster through a remote, digital software.
- **Increased Mobility:** With AR image recognition, learners have the ability to move freely with their devices. Learners scan real-world images with ease, approach images from different angles, and walk up close to overlaid digital elements.
- **Repeatable:** Unlike learning material that is delivered orally, AR image-based learning can be repeated at any time. If a learner forgets information or needs to repeat a process, they can do so with an AR image-based learning program. Although AR image recognition comes with unique benefits, this technology comes with its drawbacks. Many of these limitations are related to challenges posed by the real-world setting that learners must scan.
- **Visual Contrast Is A Must:** For the program to work, markers, like a poster, must have strong contrast to its borders. Otherwise, the program will not recognize the scan of the real-world image. Learners May Need Guidance With Technology: Not every learner knows how to operate the software and hardware necessary for AR image recognition. Organizations may need to provide tutorials or how-to's regarding the use of technology to ensure learners are confident when learning.
- **Learners May Need Guidance With Technology:** Not every learner knows how to operate the software and hardware necessary for AR image recognition. Organizations may need to provide tutorials or how-to's regarding the use of technology to ensure learners are confident when learning.

Tanish Tallam
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- *As long as you think someone else is responsible for the way you are, you cannot become the way you want to be.*
- *Never look up to anyone – never look down on anyone. When you see everything as it is, you will navigate through life effortlessly.*
- *If you know how to be at ease within yourself, every situation is an opportunity.*

- Sadhguru Quotes

Augmented Reality and Virtual Reality in the field of marketing and advertisements



AR-VR in Marketing & Advertisements

Digital technology for advertising conventionally uses online video, pop-ups, pop-unders, displays, banners, etc. Several users found these annoying and intrusive. As a result, blockers started appearing, and this reduced the effectiveness of the advertisements. It was felt that new techniques were required to provide novel experiences to the target audience.

Use of VR and AR for marketing changed the playing field dramatically. Leading businesses are incorporating AR or VR, or both, as part of their digital marketing strategy to attract customers, promote their products, increase sales, retain customers and provide unique

experiences to shoppers. Their use is growing across various industries, be it healthcare, medicine, astronomy, education, defence or consumer goods. AR and VR technologies enable integration of digital technology with marketing strategies, transforming the shopping experience to a new level.

AR is relatively more effective as it involves lower costs and helps customers in making shopping decisions while being engaged with the content. AR and VR also provide in-store experience in the comfort of home without having to physically visit the marketplace. E-Commerce platforms are increasingly using AR to enable customers to experience the product as if present in the real-life setting. Use of AR and VR in retail stores, e-commerce and advertising is the next big thing ready to disrupt marketing concepts.

For example, while shopping for a car, users can try out different colours, check out features and man oeuvre the car through a virtual test drive. Realtors use VR to design virtual tours to provide 360-degree walkthrough of the property, try out different paint colours on the walls or simply add furniture to experience how the property will actually look. ARM combines traditional advertising with mobile devices to attract customers' attention by projecting 3D images of products onto the screen of their mobile devices, offering them a unique and personal experience.

Reference:

1. <https://www.electronicsforu.com/technology-trends/must-read/ar-vr-applied-marketing>

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Taking gaming out of the box using AR and VR

Augmented Reality (AR) can be used in many possible application domains, such as in medicine to show virtual anatomical structures in a real patient's body, marketing where computer graphics appear to pop out of a magazine, and architecture where unbuilt virtual buildings can appear in the real world. There are many possible AR entertainment applications. For example, the Pokémon Go mobile phone game has an AR element that allows people to see virtual Pokémon appear in the live camera view, seemingly inhabiting the real world.

AR mobile apps were simple and used for information browsing applications such as a bank app that places virtual tags in the real world showing where ATMs are. Recently, these AR apps have branched into location-based gaming with the most well-known being Pokémon Go (2017). These games allow players to travel to a location and battle with virtual enemies that are overlaid in the real world. Being the fastest mobile app ever to achieve more than USD 1 Billion in revenue, Pokémon Go shows the huge potential that combining location-based gaming, AR and a well-known brand can have. Spatial AR technology has been used to create room-scale AR entertainment applications. Depthbased cameras are employed to map the real environment and to capture the likely, gestures and movements of people in the space.

In this way, graphics can be seamlessly projected on the walls and the user can move freely around the space and interact with the virtual content. For example, a handheld gun prop can be used to shoot the virtual creatures in the living room. Virtual reality (VR) is no longer a niche. VR applications are evolving fast, and they are penetrating many industry sectors. From healthcare to the automotive industry, VR is changing the way things are done, and expectations for the future remain high. This is particularly true for video games. VR gaming has learned a lot and come quite a way since it began back in 2014. VR arcades are becoming more common among the gaming community. They are allowing players to fully experience VR gaming without having to purchase a headset of their own. The VR gaming as a service industry earned \$286.7 million last year, according to SuperData Research, but could grow to a \$2.3 billion industry by 2021.

Before virtual reality technology, players sat in front of flat screens and controlled characters with their hands. Today's technology and VR hardware allow players to dive into an immersive and fully personalized experience with a deeper level of engagement. With a VR headset and other gear, players are absorbed into the gaming environment. They can interact with objects and other players in a richer way, playing out their stories in an adventurous new world. Virtual Reality technology can be used on desktops, laptops, game consoles, and to some extent on mobile phones as well. The demand for virtual reality games has grown substantially over the past few years, and the COVID-19 pandemic drove this demand even higher. It would take a lot of time and effort to add VR support to all existing games. But players love virtual reality and demand is growing quickly, so we can expect the catalog of new VR online games to grow every year.

References :

1. Stewart Von Itzstein and Bruce H.Thomas - Augmented Reality Entertainment:

[Springer MRW: \[AU:0,IDX:0\] \(researchgate.net\)](#)

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Augmented Reality Technology in the Manufacturing Industry

AR technology is becoming increasingly diffuse, due to the ease of application development and the widespread use of hardware devices (mainly smartphones and tablets) able to support its adoption. Today, a growing number of applications based on AR solutions are being developed for industrial purposes. Although these applications are often little more than experimental prototypes, AR technology is proving highly flexible and is showing great potential in numerous areas (e.g., maintenance, training/learning, assembly or product design) and in industrial sectors (e.g., the automotive, aircraft or manufacturing industries). It is expected that AR systems will become even more widespread in the near future.



AR in Manufacturing Industry

In construction, for instance, workers could use AR wearables to measure various changes, identify unsafe working conditions, or even visualize a finished product or structure.

In manufacturing, the AR technology can be used in much the same way. The beauty of it is that you can use it to present more than digital characters, images, or content. You can also overlay text, stats, and information relevant to the worker's current task. Looking at a furnace or piece of equipment might show its current running temperature, revealing it as hot and unsafe to touch with your bare hands.

Just the concept of this tech sounds like something from a sci-fi movie, but this is the reality we live in. These devices will become more commonplace everywhere, not just in a single industry. Augmented reality glasses are forecasted to reach around 19.1 million units by 2021, and when combined with VR devices, could hit 59.2 million units.

Imagine knowing everything that's happening around you, including whereabouts of colleagues, what machinery is malfunctioning, or even what parts of a factory are off limits. These are just a few things an augmented reality device can tell you.

References:

1. <https://www.hindawi.com/journals/ahci/2019/7208494/>
2. <https://www.tandfonline.com/doi/full/10.1080/24725854.2018.1493244>

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Augmented Reality and Virtual Reality in Autonomous Vehicles

Everybody in the automotive industry is hustling to progress autonomous driving technologies and deploy driverless cars. We have seen a steep rise in adoption of technologies like augmented reality and artificial intelligence. In light of current circumstances, Tesla CEO Elon Musk may really have the option to make a completely autonomous vehicle in the near future. So, how is augmented reality fuelling the innovation of safer self-driving cars? Let us discuss how AR is used in improving Road Safety: Augmented reality's capacity to integrate a virtual environment into the real world makes it ideal for testing driverless cars. It provides not only a faster approach to testing but also a more economical one. The University of Michigan uses AR and other virtual technologies to create a safe space for testing self-driving cars in their Mcity Test Facility. It has 32 acres' worth of fake road and infrastructure. From there, real vehicles can interact with computer-generated cars in real-time. In this simulation, researchers have set up different environments and scenarios that mirror real-world challenges. This enables them to assess the safety of driverless cars. Researchers also used this AR simulation to test a patent-pending software that enables real and virtual cars to communicate. By exchanging information on the road, self-driving cars can make better decisions. Thus, they can navigate any environment safely without endangering the lives of their passengers. Researchers are also conducting tests to improve the self-driving experience. Their simulations assess how drivers respond to abrupt stops and other challenges when the car is in charge of the driving. In doing so, they seek to improve the quality of the ride.

There's a tremendous amount of investment in research and development of autonomous driving advancements. In any case, not many products have hit the market. Starting now, all we can do is wait. Obviously, completely autonomous vehicles will change our everyday lives. They will disrupt enterprises as much as or maybe considerably more than augmented reality so far has.

References:

1. <https://www.analyticsinsight.net/augmented-reality-in-autonomous-cars-advancements/>
2. <https://arpost.co/2019/09/12/the-future-of-augmented-reality-in-autonomous-driving-technology/>

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A Command-and-Control System for Air Defence Forces with Augmented Reality and Multimodal Interaction

In many modern battlefields, in a war situation, the explosive growth of information to the commander's perception of the battlefield situation has brought new challenges. The battlefield information needs to be quickly transmitted to the commander through the information display interface. After the commander makes a decision, the control information is quickly fed back to the accusation system through appropriate means. The traditional way of displaying system information is mainly based on the two-dimensional computer screen. The information display is not intuitive and efficient, which leads to the increase of the commander's cognitive load and the low efficiency of human-computer interaction. Augmented reality, as a tool that assists people in cognition and interaction in the real environment, has its own technical characteristics to provide new solutions to the situational awareness of commanders. Augmented reality systems used in military command and control systems can greatly improve war fighter situational perception can force. This article uses Virtual Reality and Mixed Reality technology to develop a set of air defence anti-missile holographic battlefield command and control system. The system provides a holographic battlefield situation information construction and command interaction implementation method, which can enhance the realism and immersion of situation awareness, enhance the system's intelligent information service level, and intelligently and efficiently provide images for commanders and staff. The intuitive battlefield situation and visual information interaction interface realize a kind of intelligent information service method for future advanced command post that supports different combat personnel and different combat forms.



Fig 1: HoloLens holographic processing unit

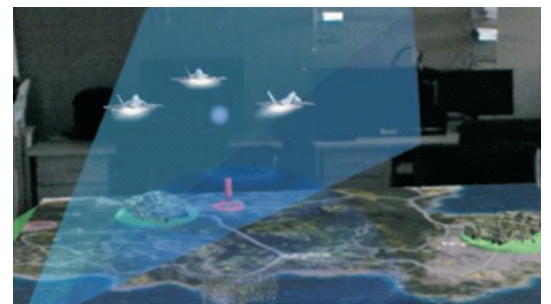


Fig 2: Radar range display

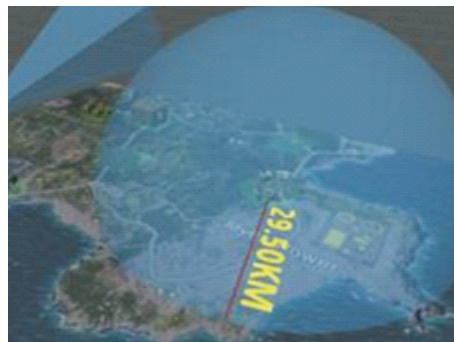


Fig 3: Air defence missile fire range display

HoloLens is a typical hardware device of mixed reality technology. When users wear the device, their vision is not blocked, and they can still walk in real space freely, this is shown in figure 1. HoloLens can track the user's movement and line of sight changes, project the virtual holographic image into the user's eyes in the form of light projection, and at the same time support the user to complete various forms of real-time interaction with virtual objects such as gestures, voices and gazes.

Reference:

1. <https://iopscience.iop.org/article/10.1088/1742-6596/1627/1/012002/pdf>

Virtual Reality in Immersive Travels and Tourism



VR in Immersive Travels & Tourism

Technology has been expeditious in recent years with novel innovations and advancements released and tested in the market. Especially with Covid-19 pandemic hit, business having to switch to all things digital for the sole purpose of replacing physical presence with virtual presence, Augmented Reality & Virtual Reality has seen a sharp rise and this increased demand has led to AR and VR gain popularity in various industries, be it entertainment or retail or real estate.

Virtual reality is having an impact on the travel and tourism industry, as many users can now experience a region without having to leave the comfort of their own homes. This is mainly

focused on potential travellers testing a location before they spend the money to travel there. This allows people to get a better understanding of an area before they invest in a ticket and hotel room, with travellers being able to experience everything virtually before committing.

360 VR focuses on the real world rather than computer generated imagery. This makes it perfect for the tourism industry where it is important to show users a real location rather than a mock-up or a simulation.

Alongside this is the fact that many VR apps allow users to re-experience their holiday after they've returned home. This has been a significant improvement on traditional photos, which makes it one of the bigger trends that may affect the industry in the years to come.

This indeed is just the beginning for Virtual & Augmented Reality for its growth in various industries. The AR/VR industry is predicted to have one billion users by the end of 2021. AR and VR headset sales are expected to grow to \$9.7 billion in 2021. With such statistics, many businesses will have to immerse adopt such technologies into their strategies to grow, attract new customers, and stand out of the crowd.

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Special Article on “Securing your Reality”

No matter how pervasive immersive technologies become, the enterprise market should always be mindful about the potential vulnerabilities and cybersecurity challenges of virtual and augmented reality.

The evolution of entertainment offerings has enabled people to revolutionize the way they consume media. From newspapers to radio to television to smartphones, the way people find and gobble different information is worth mentioning. And since the advent of cutting-edge technologies, AR and VR, the media landscape has seen revolutionary alterations in people's choice and preferences.

Cybersecurity Challenges with Virtual and Augmented Reality

Experts and the press have always been optimistic about the immersive technologies. They have anticipated that the AR and VR market will continue to soar and reach 170 billion dollars by 2022. With these technologies maturing and going mainstream, unscrupulous people will try different illegal ways to disrupt the simulation of users.

Take for example, you visited a new place. Since you have negligible comprehension about the place, you open an AR-based navigation app on your smartphone, place the phone in front of your face, and allow the app to outline the directions on streets while you walk. Now imagine, what if hackers manipulate the data and the navigation system as a whole. What if the compromised navigation app provides you wrong route details? What if the app highlights restaurants that match your food preferences, but you walk forward and found nothing? What if these malicious players leak your current location to criminals? Well, just thinking about situations like these highly disappoint us, isn't it? Incidents like these haven't occurred yet, but mind you, hackers are capable of doing all of these and many more.

New Data, New Security Threats

- Earlier when the applications were run on computers, companies were not able to collect comprehensive data about customers. Only concrete information like browsing patterns or interactions with websites was the way out for companies then. But since the inception of smartphones, companies can collect every little piece of customer data, including their location, preferences, and interests. Today with the advent of IoT sensors, companies are able to collect accurate and in-depth information on their customers. With AR and VR stepping on the ramp of the technological world, new opportunity gates open for companies in terms of data collection capabilities. Wonder how?



AR-VR in Cybersecurity

- Let's first start with the AR and VR headsets you wear. You may be well aware that these portable headsets have cameras and sensors on them. Right from your head to your eye, every movement can be sensed and captured by these display devices.
- Some VR experiences include interactions like virtual meetings. In cases like this, the display devices comprise of microphones too. So basically, everything we speak will be captured by the headset.

This information about customers can be managed and controlled in ways AR/VR companies want to. You may ask why? Well that's because there are no set rules or strict guidelines that potentially back these technologies. And the major reason behind this is immaturity of the AR/VR technology. Even if companies be transparent about their data collection, storing, accessing, sending (to other companies), or handling to users, there may be a risk as hackers are always up for stealing our data using malicious ways.

Credential Exposure

We have already mentioned that the headsets can collect our physical behavior. Now imagine, what if someone type in his/her credentials virtually? What if hackers attack your system at the same time?

Cyber Defense Practices

- Although Augment Reality or Virtual Reality has not yet reached the mass adoption rate, and none of the above security incidents have occurred yet, it is always better to be safe than sorry. Here are some cyber defense practices that every AR/VR organization should follow to save themselves from the heroes of the evil world:
- Configure all Augment Reality or Virtual Reality application tools for regular security analysis and audits.
- Ask permissions from users before collecting their data.
- Deploy security monitoring methods across every device and even the touchpoints.
- Use appropriate authentication methods when communication takes place between Augment Reality or Virtual Reality devices.

To gain a competitive edge in the market and to stand unique among all, companies rushed with their manufacturing process, without paying heed to security concerns. They might have never thought that such simple devices could wreak havoc one day. Taking inspiration and lesson from this, AR/VR companies should analyze security risks, find appropriate solutions, create a strong AR/VR system, and protect against hackers. Security care should be most importantly taken care of before innovative [AR/VR use cases](#) reach market shelves.

Srikrishna V
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8th SEM

Achievements of Staff

1. **Dr. Shashikala**, Prof. and Head of the Department, has received Fund from AICTE Training and Learning (ATAL) for organizing Online FDP on “Research and Innovation for Growth” during 23/08/2021 – 27/08/2021 under the trust area Computer Science and Biology. She is a part of MoU signed with Balajanagraha NGO on 23/07/2021 for conducting VTU related AICTE activities for current 4th and 6th semester Students in the department.
2. **Dr. Saritha Chakrasali**, Prof. and Head of Training and Placement, was a speaker in Online Webinar conducted by Soundarya Comp. PU College on "Future Prospects in Engineering". She has also received Certificate of Appreciation from Zenken for the support provided for Japanese placement events.
3. **Dr. S. Srividhya**, Associate Professor, received acceptance for AICTE-ATAL online FDP on “Machine Learning in Infotainment Systems” to be organized from 13th Dec 2021 to 17th Dec 2021. She has also published a paper on "Comprehensive Study on LiDAR based Object Detection" in Journal of Huazhong University of Science and Technology Volume 50 Issue – 04, 2021.
4. **Dr. Geetha D**, Associate Professor, received acceptance for AICTE-ATAL online FDP on “Big Data and Analytics” to be organized from 20th Sep 2021 to 24th Sep 2021.
5. **Mrs. Jagruthi H**, Assistant Professor, Presented a paper "A Novel Framework for NIDS using Stacked Ensemble Learning" at International Conference on Soft Computing for Security applications(ICSCS 2021) organised by Dhirajlal Gandhi College of Technology, Salem, India during 10th -11th Jun 2021.
6. **Mrs. Laxmi V**, Assistant Professor, Published a paper on "An Efficient Augmented Reality for Medical Application based on Peicp - Odcnn Sp" in Journal of Annals of R.S.C.B., ISSN:1583-6258, Vol. 25, Issue 6, 2021, Pages. 6443 – 6450, May 2021.
7. **Mrs. Huda Mirza Saifuddin**, Assistant Professor, Published a paper on "Segmentation of Skin Lesion Images uses Discrete Wavelet Transform" in Biomedical Signal Processing and Control, Elsevier Ltd. All rights reserved in May 2021.
8. **Ms. Jamuna S Murthy**, Assistant Professor, is a part of MoU signed with Balajanagraha NGO on 23/07/2021 and currently a Faculty Coordinator for conducting VTU related AICTE activities for current 4th & 6th Semester Students in the department. She has published a book chapter titled “EdgeCloud: A Distributed Management System for Resource Continuity in Edge to Cloud Computing Environment” in March 2021 by IGI Global Book Publishers. She has also presented Research Paper titled "A Novel Framework for Multimodal Twitter Sentiment Analysis using Feature Learning" at 5th International Conference on Advances in Computing and Data Sciences (ICACDS 2021) on 24th April 2021.

Achievements of Students

1. **Sharanya G, Shivani M Makam and Thejaswini B** Published a paper entitled “Brain Tumor Perception By Deep Neural Learning” at Journal of Huazhong University of science and Technology, ISSN-1671-4512, Vol 50, issue 7.
2. **Rajat M Jain, Adithya M and Raghavendran R**, Published a paper entitled “Video search using Scene Analysis” at Journal of Huazhong University of science and Technology, Volume 50 Issue 07.
3. **Aishwarya S, Naman Chandra, Disha Bhavesh Maru and Varshini V**, Paper title “Yoga Posture Classification using Computer Vision” has been published with the “International Journal of Engineering and Management Research”, Volume-11, Issue-4.
4. **S Amith Nadig** served as at Platformary Labs Private Limited as “Developer Intern” from 17-05-2021 to 16-11-2021.
5. **Ayushi Lodha** Successfully participated in “The Guinness World Record Event- Most users to take an online computer programming lesson in 24 hours” from 24-04-2021 to 25-04-2021.

Events Details

1. Webinar Series on 'Project Management' under “Institution of Engineers (IE)”.

The Department of ISE organized a Webinar Series on 'Project Management' under Institution of Engineers (IE) on 3rd July 2021. Resource Person Mr. Sandeep B K, Lead Consultant at ITC Infotech tried to emphasize on the fact that the manager should be well versed with the growing technologies and environments of the outside world and should be smart enough to adapt to these changes and implement the same in order to let the company grow and to meet the market users demand to use. For example, he spoke about leading companies like Nokia, Kodak and many such companies. At the end of the talk he engaged student in a question answer forum where he cleared the queries that the students had about Project Management. Overall, the technical talk was very informative and eye opening. Students were made aware of a lot of things about project management and job opportunities related to that.

2. Webinar Series on 'Augmented and Virtual Reality' under “Institution of Engineers (IE)”.

The Department of ISE organized a Webinar Series on 'Augmented and Virtual Reality' under Institution of Engineers (IE) on 5th July 2021 and 6th July 2021. Resource Person Ms. Spoorthi, TEQUED LABS, India gave a brief introduction and practical insights on applications of AR in the gaming and multiple research areas. She made students "Understand the Future scope of AR Applications". She made students install Blender Software for Hands-on sessions. She later gave "Demonstration and Explanation of different AR Applications" by "Building an AR Project from Scratch and Testing on Devices". The Day 1 session ended with completion of two simple AR Projects such as 3D Modelling of Mug and a 3D Modelling of a Man. On Day 2 Ms. Spoorthi started with the agenda i.e. "Introduction to Virtual Reality". She explained the importance of "Future scope and applications of VR Projects" in today's scenario. She made students install "Unity Software" for building VR Projects. Day 2 ended with "Building Real-Time VR Project such as 3D House Building and testing the same on VR Headset".

3. Webinar Series on ‘Mobile Application Development’ under “Indian Society for Technical Education (ISTE)”.

The Department of ISE organized a Webinar Series on 'Mobile Application Development' under Institution of Engineers (IE) on 28th June 2021 and 29th June 2021. Resource Person Mr Rishab Verma covered topics such as new android studio project creation, understanding of targeted SDK for the android project, the significance of android package name, android virtual device, enable developer option on physical android device, Views, basic widgets (TextView, Button), Layouts (Relative Layout, Linear Layout, Frame Layout), and an introduction to listeners on the first day. The topics covered on the second day were Widgets (EditText, ImageView), Explicit Intents, Implicit Intents, "startActivityForResult" callback (onActivityResult), finish function, the difference between VISIBLE, INVISIBLE, and GONE, Setting up firebase account, Creating new firebase project and linking with the project, Firebase Realtime Database (setting value, singleValueEvent, value event), Wallpaper Manager and Third Party APIs.

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- Anirudh V Sanketh, VI Sem.
- Pratheek G Aithal, VI Sem.
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- Mahesh Kumar S, VIII Sem.

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