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Augmented Reality Technology and Case Studies Related with Technical and Employer based Data for Maintenance and Performance

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Abstract — Augmented reality (AR) is a visual based interactive technology which is helping people from kids to employees with their respective learning and working areas. The paper explains on how augmented reality is helping people across borders with educational, medical, industrial, sales, product launching with automobile and other electronic deliverables. The augmented reality area is empowering the work force with better visual learning methods during training. One such area with automobile industry case study is done and the results are derived out of that. It shows the better executed data results in number, less manual work involved, easy documentation and practicing training sessions in real world scenario. The best results of implementing and using augmented reality in many application areas shows the better return on investment (ROI)

Keywords: *Augmented Reality; Virtual And Augmented Reality; Automotive Industry.*

1. Introduction

To quote Stephen Hawking "In my opinion there is no aspect of reality beyond the reach of human mind", thus is the case of virtual and augmented reality possibilities and the multitude of applications booming out each day for all probable areas of applications and studies that can be related to the world. As the saying "since we cannot change reality, let us change the eyes which see reality" could be referred to as the motto of augmented reality ".The latest happenings are airing on AR platforms, where mobile, telecom industries are trying out the latest version launch with AR as with the announcement of One Plus Nord version unveiling itself launch and access demonstration with the support of apps that can be downloaded from the respective play stores of mobile OS' And it's quite surprising to read and watch about rural areas accessing and had selected these particular Technology applications which all are the whole and sole support for educational demonstrations during the Covid times for better understanding of the subjects and as well learn about the limitless possibilities of the AR and the apps from distant mentors to both students and non-IT teachers. The AR technology and apps are gaining recognition & momentum with the better amalgamation of Virtual Reality and real use cases with the technology introductions to big shot companies like Google, Microsoft, Facebook, Alibaba etc. And capitalize more with the existing successful case studies. Areas where AR and its string of apps find its possible usage can be briefly viewed as and can be explained with various perspective-based data and explanations.

- AR for Manufacturing of Tools and Machines & its maintenance
- AR in marketing & Sales through Advertising to Logistics
- AR for Service sectors like Education and HealthCare.
- AR for Entertainment with Gaming and Tourism in terms of leisure

2. Applications

AR for Manufacturing of Tools and Machines & its maintenance:

2.1 To list a few application areas among the many

- Thyssen Krupp AR app for designing is a recently started Microsoft hollow lens based fully auto integrated tool which allows a salesperson to provide the customer with visualization of the new design and its functionality.
- Boeing, the leading manufacturers of aircrafts, is also using this technology to reduce complex wiring tasks with the support of Google glass and skylight software platform ranging from up skilling to amplifying the wiring process.
- Quality controlling and maintenance when it comes to manufacturing unit
- of automobile industry where companies have visions like Porsche Production 4.0 where robotic expertise is being used to figure out precise design information and dimensional accuracy etc.
- An embryonic technology application for a pilot project named
- Caterpillar is expected toperform machine-based tasks.

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2.2 AR in marketing & Sales through Advertising to Logistics

Whether the technology is to be applied with shipment trackers to movie marketing, simulators to weather forecasting, from Pokemon Go to make-up pro apps, it not always about profit but also many successful AR campaigns by the Beunos-aires city government were successful in their advertising to save the planet and reach a zero-waste city.AR for Service sectors like Education and HealthCare:

Bio flight VR/AR, Echo Pixel, Proximate are the few notable and widely used revolutionary apps where the surgeons learn about new products and procedures with enhanced 3600 view to 3D visuals and to interact with real objects in real time where Proximie has an upper hand with digitally created content to function on a live video stream and provide hands on virtual assistance. As of now the utility of AR in health care system is still in baby steps due to the enormous ethical issues related to incorporating technology in patient care.Education system is limited to text book knowledge and Wikipedia searches where more interaction-oriented learning methods needs to be introduced and explored. Google sky map, FETCH, Geo Google, Zoo burst, across air are the few AR apps that changed the face of learning by the innovational and interesting story-based narrations, 3D/4D compass calculations to astronomical studies for a better AR classroom setup and training.

2.3 AR for Entertainment with Gaming and Tourism in terms of Leisure

From the very first AR games Ingress and Pokémon Go to the latest Ghostbusters world, Harry Potter, Zombies most of the games have gone beyond the concept of time killer to experiencing fun with the real world and analyzing things and handling adverse situations &enhancing teamwork.

In relation to the varied interests of travellers, the tourism sector from restaurants to museums, enjoying a night sky to discovering the townships, mountain and the necessities like ATMs and petrol bunks, better results with navigation are offered by the apps like World around me, Smartify, AR city, Night Sky lets the user experience a reality platform to locate things and places with a pretty handy AR app in our smart phones when travelling.

3. Case Study- AR in Automotive Industry

Let us take the example of an AR application in the automobile industry like Land Rover-Jaguar or Volkswagen. The following assumptions are made with regards to the assumed capital (to say 1cr) invested in AR and the returns of the investment made on the technology.

- A few of the constraints are listed as
- Training of personnel and technicians
- Working time augmentation with real time data
- Customer satisfactionand thus placing more orders for the model
- Hardware shipments

AR reduces the cost and the time in training a larger volume of personnel where Airbus is using AR technology with manufacturing processes for multitude of tasks. Assuming 1,000 employees use AR on more than 100 tablets which reduces the inspection time by 80%, saving cost leading to a high ROI. Thyssen Krupp is conducting field tests with a Microsoft Holo Lens based AR system that supports technicians to identify the faulty component of the elevator system thus enabling them to effectively reduce working time to 20 minutes instead of 2 days.BMW uses smart glasses to diagnose the problematic path and to instruct the technician with a wearable device on how to fix the fault step by step.Volkswagen uses Mobile Technical Assistance AR to identify work items with great accuracy and speed.In a pilot program at Porsche, quality assurance is done by virtually inspecting the machine's assemblies and comparing it with the company's prototype through AR overlay thus enabling to easily detect any alteration in quality of the model resulting in significant time saving.

4. Mitsubishi's Survey Analysis

Where Mitsubishi's AR system supports a technician with smart glasses to validate an orderof the inspection on a display and then enter the results by voice command, thus reducing the workload and entry errors. Using AR live demonstrations and test-drive simulations the cost of machinery, hardware and working space of showroom can be considerably cut down and the shipment cost saved thus proving to be good ROI.

TOTAL EXPENSES =55, 00000

ROI= ((Amount gained- Amount spent) / Amount Spent) * 100= ((100, 00000 - 55, 00000) / 55, 00000) *100= 81% profit

So, Pay Back Will Be In 2 Years And 2.5 Months.

5. Case Study: Health Care

Table 1. Healthcare examples of Proximies or any other app for robotic and AR assisted surgeries

Operational Expenses	5,00000
Software For Training	15,00000
Hardware	25,00000
Labor Needed In Showrooms For Demo	5,00000
Consultation & Professional Support	5,00000

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The fact that manuals and theatre arrangement delay for maintenance and anatomy operations with AR could "reduce eye and head movements improving spatial perception and thus increasing productivity", changing the attention between the object to maintain and the listen to instructions. The space, time cost and risks are comparatively less and even the rate is zero fault and zero wastage, thus saving the stakeholders capital.

But to say with AR with healthcare sectors are affected and can be altered by ethical and legal laws and conflicts, thus applications are now limited to only trainings where saving of costs and saving by medicos at cadavers and the tools to practice can be saved when related to setting up a simulated & full-fledged AR lab, where support cases can be done by far flung Surgeons across boundaries through virtual medium saving lacs to meet requirement for training a medico.

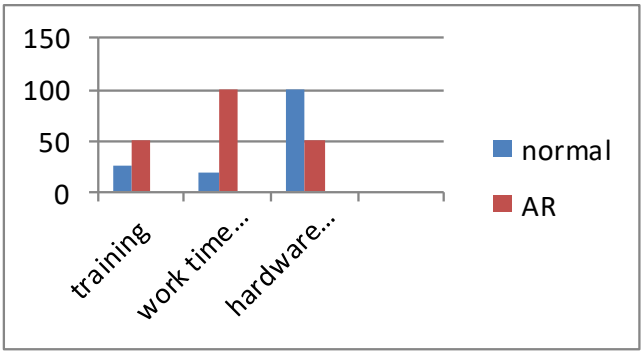

Fig. 1: Work calculation

6. Conclusion

To conclude with the samples are assumed values and researched based which can be better studied with data collected from Field surveys. Where to always remember Moore's law on adding more people to the project will delay the project completion can be achieved better with AR and better project risk management and cost rate output saving for the company and better ROI.

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