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Augmented Reality and Virtual Reality Technologies Using AI

T.Jansi Rani, B.Moovin Natesh, Sanjai K, Tamil Selvan M

Assistant Professor, Department of Information Technology, P.S.V College of Engineering & Technology, Krishnagiri, Tamilnadu, India

UG Student, Department of Information Technology, P.S.V College of Engineering & Technology, Krishnagiri, Tamilnadu, India

UG Student, Department of Information Technology, P.S.V College of Engineering & Technology, Krishnagiri, Tamilnadu, India

UG Student, Department of Information Technology, P.S.V College of Engineering & Technology, Krishnagiri, Tamilnadu, India

ABSTRACT: Whether augmented reality and virtual reality technologies could change the flow of project management in the future? The aim of this paper is to consider implementation of these raising technologies in the field of project management. It is important to answer why they are unavoidable in the future, how their usage would affect many future projects, the way of management of such projects, and the education process of the project management experts. However, this is still an insufficiently explored field, so the authors want to stress the significance of augmented reality and virtual reality technologies for future development of project management practice: The impact of VR in education is evident in its ability to create immersive and engaging learning experiences. Students can be transported to virtual environments that facilitate experiential learning, from exploring historical landmarks to simulating complex scientific experiments. The result is enhanced student engagement, improved retention of knowledge, and the development of practical skills. The impact of VR in education is evident in its ability to create immersive and engaging learning experiences. Students can be transported to virtual environments that facilitate experiential learning, from exploring historical landmarks to simulating complex scientific experiments. The result is enhanced student engagement, improved retention of knowledge, and the development of practical skills.

I.INTRODUCTION

1. Augmented Reality (AR):

- AR overlays digital information onto the real world. It enhances what we see by adding virtual elements (such as graphics, text, or 3D models) to our surroundings.
- **Common AR applications include:**
- **Mobile Apps**: AR apps on smartphones or tablets that provide interactive experiences (e.g., Pokémon GO).
- **Headsets**: AR glasses or headsets (e.g., Microsoft HoloLens) that allow users to see digital content superimposed on their view.
- **Industrial Use**: AR for maintenance, training, and visualization in fields like manufacturing and healthcare.
- **AR development often involves:**
- **Marker-Based AR**: Using markers (e.g., QR codes) to trigger virtual content.
- **Markerless AR**: Tracking real-world objects without markers.
- **SLAM (Simultaneous Localization and Mapping)**: Combining real-time camera data with 3D mapping.
- Popular AR frameworks and libraries include **ARCore** (for Android) and **ARKit** (for iOS).

2. **Virtual Reality (VR)**:

- VR creates entirely digital environments that users can explore and interact with.
- Key components of VR:

- **Headsets**: Devices like the Oculus Rift, HTC Vive, or PlayStation VR that immerse users in virtual worlds.
- **Controllers**: Handheld devices for interacting with the virtual environment.
- **Content**: VR experiences, games, simulations, and training modules.

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- VR development involves:
  - **3D Modeling**: Creating 3D assets for the virtual world.
  - **Physics Simulation**: Ensuring realistic interactions (e.g., gravity, collisions).
  - **Optimization**: Balancing performance and visual quality.
- VR applications span gaming, education, architecture, healthcare, and more.

3. Project Ideas:

- **AR Navigation App**: Create an app that overlays navigation instructions on the real world (e.g., guiding users through a museum).
- **VR Art Gallery**: Build a virtual art gallery where users can explore famous paintings in 3D.
- **AR Product Visualization**: Develop an AR app for visualizing furniture or home decor in a real room.
- **VR Training Simulations**: Design VR simulations for training purposes (e.g., medical procedures, flight training).
- **Railway Track Inspection**: Since you mentioned a project related to railway track image analysis, consider using AR or VR to simulate track inspections or maintenance.

II.PROPOSED MODELS FOR AR AND VR DEVELOPMENT

Certainly! Let's explore some proposed models for **Augmented Reality (AR)** and **Virtual Reality (VR)** development. These models can serve as a foundation for creating immersive experiences:

1. AR Development Models:

- **Marker-Based AR**:
  - In this model, AR content is triggered by specific markers (such as QR codes or images). When the camera detects these markers, it overlays virtual elements on top of them.
  - **Use Cases**:
  - Interactive museum exhibits: Visitors scan QR codes near artifacts to access additional information.
  - Advertising campaigns: Scanning a product's packaging reveals promotional content.
  - **Challenges**:
  - Marker detection accuracy.
  - Limited scalability (requires predefined markers).
- **Markerless AR (SLAM)**:
  - Simultaneous Localization and Mapping (SLAM) techniques allow AR to work without markers. The system tracks the user's position and maps the environment in real time.

Use Cases:

- Navigation apps: Overlaying directions on streets without relying on markers.
- Furniture placement: Visualizing how a sofa would look in your living room.

Challenges:

- Robust tracking in varying lighting conditions.
- Occlusion handling (virtual objects behind real-world objects).

Projection-Based AR:

- Projectors cast virtual content onto physical surfaces (walls, floors, tables).

Use Cases:

- Interactive storytelling: Projecting animations onto a book's pages.
- Art installations: Creating dynamic murals.

Challenges:

- Calibration for accurate projection.
- Limited viewing angles.

2. VR Development Models:

- **Immersive VR**:
- This model aims for complete immersion. Users wear headsets and interact with a fully digital environment.

Use Cases:

- Gaming: Exploring fantasy worlds, simulating sports, or solving puzzles.
- Training simulations: Medical procedures, flight training, or hazardous scenarios.

Challenges:

- Motion sickness mitigation.
- High-quality 3D assets.

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- **360-Degree VR**:
- Users experience 360-degree panoramic videos or images. They can look around in any direction.

Use Cases:

- Virtual tours: Exploring historical sites, museums, or real estate properties.
- Concerts and events: Attending virtually.

Challenges:

- Stitching together seamless 360-degree content.
- Optimizing for different devices.

Social VR:

- Users interact with each other in shared virtual spaces.

Use Cases:

- Virtual meetings: Collaborating remotely.
- Social gatherings: Parties, conferences, or art exhibitions.

Challenges:

- Realistic avatars and social presence.
- Moderation and privacy.
- Remember that choosing the right model depends on your project goals, target audience, and available resources.

III.EXPLANATION OF TERMINOLOGY RELATED TO AR/VR

Certainly! Let's explore some key terminology related to **Augmented Reality (AR)** and **Virtual Reality (VR)**:

1. Augmented Reality (AR):

- **Overlay**: AR overlays digital content (such as graphics, text, or 3D models) onto the real-world environment.
- **Marker-Based AR**: In this approach, specific markers (e.g., QR codes) trigger virtual content when detected by a camera.
- **Markerless AR (SLAM)**: This technique tracks real-world objects without relying on markers. Simultaneous Localization and Mapping (SLAM) is used to create a map of the environment.
- **Projection-Based AR**: Projectors cast virtual content onto physical surfaces (walls, floors, etc.).

2. Virtual Reality (VR):

- **Immersive VR**: Users wear headsets to fully immerse themselves in a digital environment. Common in gaming and training simulations.
- **360-Degree VR**: Users experience 360-degree panoramic videos or images, allowing them to look around in any direction.
- **Social VR**: Users interact with each other in shared virtual spaces.
- Remember that these terms provide a foundation for understanding AR and VR. If you have more specific questions or need further clarification, feel free to ask!

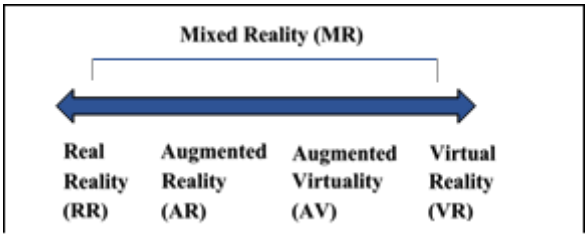

Table 2: Application of AR/VR in PM

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Architecture, civil engineering, construction, and real estate	Instead of standard 2D format of drawings and renderings, investors and customers can now experience realistic impression of their future buildings,flats, business places, both from the outside and from the inside. Applicationof AR/VR technologies in these kinds of projects significantly reduces costs and time expenditure, improves design, and facilitates construction planning. Also, there is a research that synthesizes current VR/AR applications from the point of construction safety with the conclusion that AR/VR applications already achieved lot in that field, and there is more space for further improving their application in construction safety (Li, Yi, Chi, Wang, & Chan, 2018).
Marketing and sales	Many companies have recognized additional values for both marketers and customers. For instance, Ikea Place app helps customers in fast decision- making when purchasing furniture, by using cameras of smartphones or tablets. It analyses customer's room and puts furniture in adequate position.For wider use, there is a tool that promotes commercial sales - Amazon's app which lets to place items inside customer places using AR, to see how items will fit the space.
Education	AR/VR technologies offer great opportunities and diversity in education (remote learning, interactive learning, 'real' lessons, etc). This also involves education of experts for PM, who should be both educated by using such technologies, and be educated to apply these technologies in their work. There are many examples of AR/VR projects for general use in education, for example: SCARLET – Special Collections using Augmented Reality to Enhance Learning and Teaching (University of Manchester), cARe – Creating Augmented Reality in Education (City, University of London), ARstudio – Australian research project (the University of Canberra, the Australian National University, and Macquarie University), NYC Media Lab prototyping projects (New York University, Columbia University, etc), AR-FOR-EU - Augmented Reality in Formal European University Education (several universities from UK, Norway, Germany and Russia). However, university curricula for education of the PM experts for AR/VR based project management appear rarely. Besides university education, education in enterprises (e.g. trainings) and individual education (e.g. apps available on the Internet) are also applicable in this innovative field.
'Visual' industries	There are many examples of using AR/VR and related projects in this field:game industry, fashion industry, entertainment industry – cinema, film, travelling exhibition (e.g. landmarks, museums), etc.

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Automotive	AR/VR solutions are used for test drives, car elements testing, car dealership experience, etc. For example, Volkswagen adopts VR and AR solutions with belief that they help the company to successfully deal with increasing demands that automotive industry has been facing on. The company systematically engage employees to use VR and AR solutions for training and collaboration to empower their brands and business departments. They developed smart infrastructure that enables training, collaboration and service integration worldwide. Employees and whole teams learn within an interactive 3D space. This solution increases training efficiency, reduces learning time and travel costs, and helps transfer of relevant knowledge in solving practical tasks. In trainings, they use scenarios that involve workersfrom different brands and locations. During the training, the workers can discuss different topics with expert trainers and developers. It makes possible to create content faster and more efficient.
Manufacturing	In complex manufacturing processes AR is useful in delivering the right information at the right moment to factory workers on assembly lines (Porter, & Heppelmann, 2017). This is efficient in reducing errors, reducing costs, time saving, and productivity improving (Porter, & Heppelmann, 2017). Any operator in Industry 4.0 with the help of AR could be a smart operator soon, while simulation and optimization will be supported by VR technologies (World Economic Forum, & Kearney, 2017).
Healthcare	Training of surgeons is one of the most important field of application of the AR/VR technologies in healthcare. There are examples of usage AR/VR technology in triage and urgent care, for example Red Cross Triage AR application using Google Glasses.
Defence	TARGET (Training Augmented Reality Generalized Environment Toolkit) is European project which started 2015 and planned to end in 2018. It is funded by the EU Horizon 2020 (LIST website). The project develops AR and VR solutions for training of the security critical agents (for example, policeman, fireman, emergency medical staff, anti-terrorist units, etc). The project uses different approaches allowing remote connection of AR and VR systems to geolocation and other tools, involving 3D modelling, photogrammetry, drones and many other state-of-the-art technologies. It creates new-made mixed reality environment where trainings are provided in extreme under-pressured security situations. Improving and optimizationof training is the aim of the project, which has several key impacts, includingdeveloping easy customizable and low-cost advanced training environments. The current phase of the project has been successfully finishing. The projectcontinues to unfold, harvesting already achieved results.
Servicesupport	Remote technical and expert support, visualized instructions, remote repairing, knowledge exchange, etc. Thanks to AR/VR technologies, maintaining and repairing at remote locations is possible. For example, industrial giant ABB uses AR to maintain and repair equipment at remote locations which they found particularly useful in dangerous and complex remote procedures (Harvard Business Review Staff, 2017).

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IV.CONCLUSION

Implementation of AR/VR technologies in PMis multiple:

- **AR/VR as a topic of project.** Training of surgeons, pilots or special anti- terrorist forces using AR/VR technologies are some of many examples.
- **Project may refer to the developmentof products that contain some type of AR/VR**. For instance, a project in commercial airline traffic – production of HUD which shows superposition of projected landing route on the runway (example: Aero Glass).
- **Remote collaboration and PM based on AR/VR technologies**. There are many examples of remote collaboration in PM. For example, Unity presents such projects in automotive for testing cars (Audi), training (Volkswagen), virtual showrooms (Cadillac), etc. **AR/VR-based projects for education.** There are a lot of such projects in educational field, like Google Expeditions where „teachers can takestudents on immersive journeys both with AR and VR“ (retrieved fromGoogle Expeditions website).
- **Development projects of completeAR/VR-based platforms for real-timeremote collaboration**, which include hardware, software, knowledgeexchange, and real-time remote assistance in many different types of projects (for example, Vuforia Chalk).
- **Virtual PM and e-PM.** Mihić, Petrović, & Obradović, (2012) stress the importance of communication and collaboration in virtual project teams. AR/VR technologies naturally support these processes. Since, resources of virtual projects and e-projects are

REFERENCES

1. Campbell, M., Kelly, S., Jung, R., & Lang, J. (2017). The State of Industrial Augmented Reality 2017. PTC, White Paper.
2. Coleman, B. (2009). Using sensor inputs to affect virtual and real environments. IEEE Pervasive Computing 8 (3), pp. 16-23, doi: 10.1109/MPRV.2009.60
3. Google Expeditions website: https://edu.google.com/expeditions/#abo ut (accessed on 21st July 2018).
4. GutCheck. (2018). Consumer Perceptions of Augmented Reality. Exploratory Research Group, 40 pages.
5. Harvard Business Review Staff. (2017). A Manager's Guide to Augmented Reality. Article collection, November-December 2017.
6. Kugler, L. (2017). Why Virtual Reality Will Transform a Workplace Near You. Communications of the ACM, 60 (8), pp. 15-17, doi:https://doi.org/10.1145/3105444
7. Li, X., Yi, W., Chi, H. L., Wang, X., & Chan,
8. A. P. C. (2018). Automation in Construction 86 (2018), pp. 150–162, doi: https://doi.org/10.1016/j.autcon.2017.11. 003
9. LIST website - Luxembourg Institute of Science and Technology, https://www.list.lu/ (accessed on 23st July 2018).
10. Mann, S., Furness, T., Yuan, Y., Iorio, J., & Wang, Z. (2018). All Reality: Virtual, Augmented, Mixed (X), Mediated (X,Y), and Multimediated Reality. 14 pages, arXiv:1804.08386
11. Martin, B. S. (2017). Virtual Reality. Norwood House Press: Chicago, Illinois, US.
12. Mihić, M., Petrović, D., & Obradović, V. (2012). Analysis of Communication Aspects to Virtual Project Management. In Proceedings of the XIII International Symposium SymOrg 2012: Innovative Management and Business Performance, SymOrg 2012, Zlatibor, Serbia, June 5-9, 2012; Levi-Jakšić, M.; Barjaktarović- Rakočević, S. (Ed.), 1517 – 1525.
13. Milgram, P., Takemura, H., Utsumi, A., & Kishino, F. (1994). Augmented Reality: A class of displays on the reality-virtuality continuum. Telemanipulator and Telepresence Technologies.
14. Porter, M. E., & Heppelmann, J. E. (2017). Why Every Organization Needs an Augmented Reality Strategy. Harvard Business Review, 95 (6), pp. 46–57.
15. World Economic Forum, in collaboration with Kearney, A. T. (2017). Technology and Innovation for the Future of Production: Accelerating Value Creation, White Paper.

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