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A Security Framework for M-Commerce Applications using VR/AR Technologies

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ABSTRACT :
As global circumstances evolve and progress. Generation Z is within a confined environment whereby they desire reliable and expeditious platforms for the exchange of goods and services. People's behaviour also demonstrates an inclination to change traditional approaches to purchasing and buying products. The primary drawback in e-commerce pertained to the aesthetics and tactile experience of the goods, encompassing its quality and suitability for the user. Fortunately, thanks to the advancement and practicality of augmented reality (AR) and virtual reality (VR) technologies, consumers can now easily make purchases and feel completely at ease sharing personal information to assess the desirability of products before buying them. In order to increase enjoyment and usefulness, retailers should strengthen the quality of their systems, provide helpful product information, and ensure that the reality of their products aligns with consumers' expectations. These factors are derived from the experience of enjoyment and usefulness. They should also up the engagement to get high purchase intentions, as this will provide confidence about the selected products and promote product liking.

Keywords: GenZ, AR, VR, M Commerce, Technology

I. INTRODUCTION

In highly dynamic and technology integrated environment the m commerce applications are very much in use by many people post COVID era. The applications are used because of many factors like the accessibility, fast usage, and 24*7 availability. People don't have to wait and visit the stores for buying the goods and services. With an advancement in the technology the AR (Augmented Reality) and VR (virtual Reality) is also playing an effective role in upscaling the use of the applications by the users. [1] These technologies These technologies are transforming the landscape of M commerce by offering various features which are interactive, immersive, and having a personalized shopping experiences that always go beyond the drawbacks of the traditional shopping. With these technologies being used in the Lenskart and Nykaa where the fashion is always considering the priority and how it looks on you is the main agenda and the shopping is done with the visual effects while shopping. Nowadays people do the shopping, selecting the product and choosing the effects, judging the product while visualizing the effect and look of the product on the picture uploaded. These technologies empower retailers to engage the customers in new and functional ways which enhances the visualization and customization which ultimately enhances the sales and customers satisfaction The major concern is now that all the effects.

In the last decade, augmented reality has experienced significant growth and has become a quickly increasing technology trend. Augmented reality (AR) technology is continuously advancing and being used in various industries, such as gaming. Additionally, AR interactive features provide customers with virtual ways to engage with products and provide engaging shopping experiences [2]Augmented reality (AR) eliminates the perceived gap between online and in-store purchasing. Augmented reality, an interactive technology, has the capacity to enhance the retail process by providing customers with an enhanced shopping experience and influencing their preference for specific firms. Customers may make informed purchases by using augmented reality to bring e-commerce products to life with detailed information. The immersive experience that augmented reality technology provides with 3D

visuals, virtual try-ons, and product. [3] The unique feature of try before buying that the consumers used to do while shopping is also experienced with the help of these technologies. The various platforms are now using or enabling it with the various categories of the products that seems to be very comfortable with the platforms and user friendly also. more and more consumers are searching outside of their nation for goods. According to recent research, over half of online respondents who had made an online purchase in the preceding six months had also done so from a foreign merchant [3]. But, despite the enormous potential presented by internet buying, there is a significant barrier associated with it, whether one is shopping domestically or internationally. The shopping experience is a major differentiation, as consumers have access to more options than ever before. [4]A thorough awareness of the local market (including local attitudes), the delivery infrastructure, the acceptance and usage of technology, the financial and monetary systems, and the legal and customs requirements are the first steps towards optimizing this experience. [4]Furthermore, retailers need to make sure that the products meet the quality standards Retailers also need to make sure that their goods are up to par, that prices are fair, that their logistics are running smoothly, and that their after-sale services are designed to benefit both the buyer and the seller

The symmetry between traditional and augmented reality-based electronic commerce as well as between electronic and physical trade are not well covered in the literature [5] We think that by analysing these symmetries, improvements may be made and implicit decisions about online purchases may be influenced. The use of these cutting-edge technologies has many benefits, but there are also some drawbacks. For example, some applications use these technologies to take pictures of customers and users' homes for better visualization, which involves taking personal data about the user—their eyes, faces, homes, and entire images. Since the data can be altered and utilized anywhere, it is all unsecure. With the applications loaded on the mobile device, there is no tracking and minimal security of these data, and every application has total access to the records and photo library [6] The writers have talked about the security requirements as well as the framework for the privacy of the data.

II. ESTABLISHED GUIDELINES AND FRAMEWORKS FOR DATA SECURITY

There is so much information which is asked by the applications which is considered to be sensitive for the consumers who are using the application. Every time when you click the feature of try on the application ask for the usage of camera which has no security protocol to layer the content of the customer. There are various security practices that can be implemented to function or work with the security norms

1**.Use of an IRIS password-** IRIS is a technology which is secured to lock the screen and also lock the functionality of usage of the data within the device. This technology along with the secured password will help in the 2-step authentication process for locking and unlocking the screen to control the damage of the data. [1]

2. **Implement Two-Factor Authentication (2FA):** Implementation of the 2-factor authentication process which have an additional protection layer for sharing the data. It is an OTP which is auto generated to authenticate the user identification and know that it is the same user who have registered the same.

3: **Install Security Software:** Implement the usage of the security software and also it alarms any fraudulent activity or the spam messages. Also, it is an alarm to regularly update the Operating system in the devices to fill the gaps of the various unsecure patches. [8]

4.**Be alert in giving access to the permissions to the access of the data:** Its s a common mistake that everyone does i.e., giving permission to the access of the data while downloading an application, while downloading an application it asks for the contact accessibility, pictures permission and also

the permission to the location. If we give the accessibility to all of these to an application owner. There can be a possibility of the data loss and misuse of the data. [9]

5. **Use of the secured Network**: For using the try on feature which is the use of the AR/VR in doing the shopping online, switch your network to the mobile data or use the VPN (Virtual Private Network) or the use of the rather than accessing the open and free networks [7]

6. **Exercise caution with phishing attacks:** Refrain from clicking on links or downloading attachments from unfamiliar or dubious emails and communications. Also work on the various functions of the security functions which alarm about the spam message and spam links. [10]
7 **Encrypt Sensitive Data and Regular backups.** Use apps that offer end-to-end encryption for sensitive data transmission. Use the tools or technology to secure the sensitive data within your device. Regular backups are required to maintain the security of the data.

Above mentioned are the general security guidelines advised by all security experts, network providers and sometimes social media sites. By following these security measures, a user can significantly reduce the risk of personal information being compromised while using m-commerce sites on the phone. There are established models and frameworks for data security and privacy that can be applied to the context of m-commerce sites, especially those involving sensitive personal information. Table 1 presents a compiled view of some well-known models and frameworks [8]By leveraging these established models and frameworks, m-commerce sites can create a robust security and privacy posture that protects user data and builds trust with their customers [11]

Model/ Framework	Scope	Key Principles
General Data Protection Regulation (GDPR)	European Union regulation that applies to all companies processing personal data of EU residents	Lawfulness, fairness, transparency, purpose limitation, data minimization, accuracy, storage limitation, integrity, and confidentiality
ISO/IEC 27001	International standard for Information Security Management Systems (ISMS)	Risk management process, controls for information security risks, and continual improvement.
NIST Cybersecurity Framework	U.S. framework for improving critical infrastructure cybersecurity, but applicable to any organization	Identify, Protect, Detect, Respond, and Recover
Payment Card Industry Data Security Standard (PCI DSS)	Security standard for organizations that handle branded credit cards from major card schemes	Secure network maintenance, cardholder data protection, vulnerability management, access control, monitoring and testing networks, and maintaining an information security policy.

California Consumer Privacy Act (CCPA)	California state law that gives consumers more control over the personal information that businesses collect about them	Right to know about the personal data collected, right to delete personal data, right to opt-out of the sale of personal data, and the right to non-discrimination for exercising privacy rights
Fair Information Practice Principles (FIPPs)	Framework guiding the collection and use of personal information	Notice/Awareness, Choice/Consent, Access/Participation, Integrity/Security, and Enforcement/Redress

Table 1: Established Frameworks for m-commerce platforms data security [12]

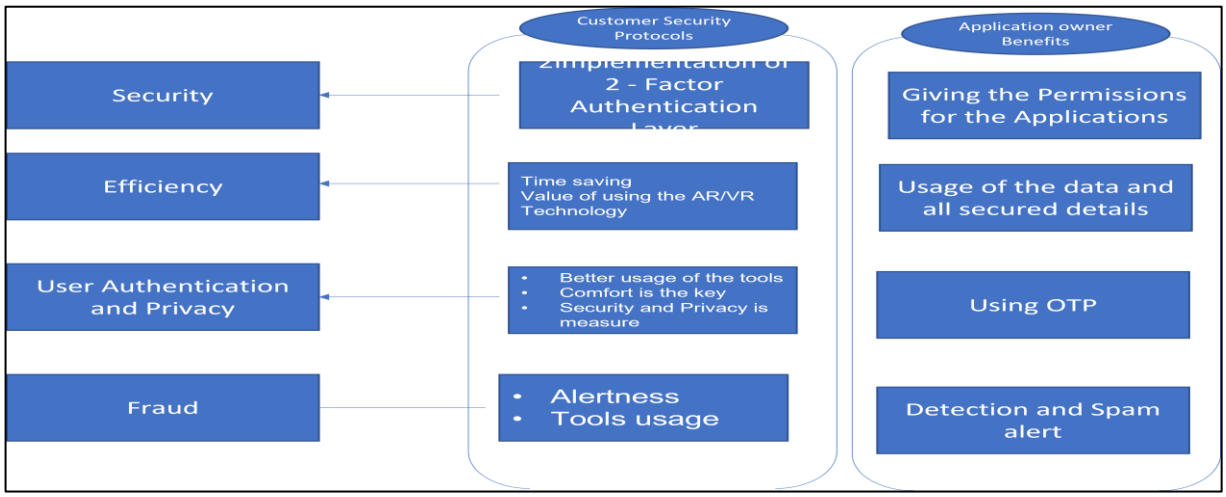

Figure 1 Complete Proposed Framework based on the security of using the applications with AR/VR technology [13]

III. A FRAMEWORK OF THE MODEL FOR THE M COMMERCE APPLICATIONS USING AR/VR TECHNOLOGIES FOR SECURITY PERSPECTIVE

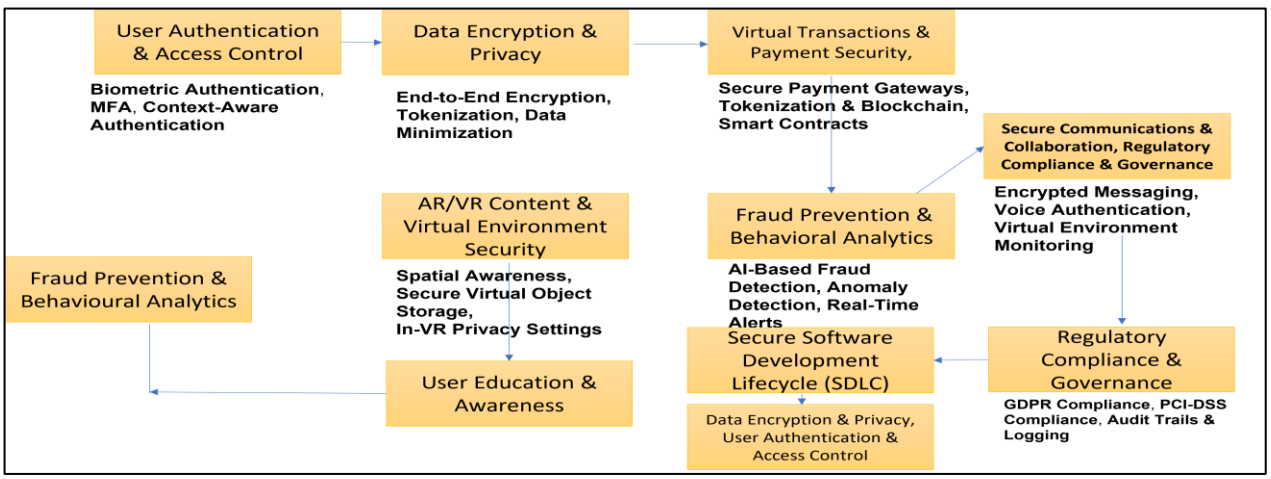

Figure 2 A proposed framework for the M commerce applications using AR/VR technologies for security

This security above architecture has been enhanced by incorporating the most effective strategies from other established frameworks and customizing them to address the specific difficulties faced by AR/VR-enabled m-commerce sites. By incorporating these principles and procedures, mobile commerce (m-commerce) websites can establish a secure and privacy-conscious setting for their users, ensuring the protection of sensitive information such as photographs, voice recordings, and real-time location data

IV. USE OF AR/VR IN MOBILE APPLICATIONS

With the increase in the use of AI technologies in the m commerce, there is a huge paradigm shift in the consumers approach for buying the products after uploading your own picture and checking whether that product looks good on you or not. This can be little scary if we don't know whether the data that is being captured using the photo gallery or the camera is safe. it is possible to modify security and privacy frameworks to incorporate these issues. To address the distinct difficulties posed by AR/VR technology, it is advisable to utilize a blend of established standards and supplementary recommendations specifically tailored for AR/VR. [14]

1. Data Minimization and Authorization: Collection of the necessary data and the utility of the data to minimize the requirement based on the privacy and requirements. To make the system more transparent, inform users about what AR/VR data is being collected, how it will be used, and who it will be shared with. It is recommended to obtain explicit consent for the collection and processing of AR/VR data, including biometric data. Implement robust security measures to protect AR/VR data, including encryption and secure storage. [15]

2. **Risk Assessment**: Identify the risk connected with the privacy policies and also the various security issues which have the restricted access to the AR/VR data to the authorized personnel access. Also there has to be the pop-up messages to ask for the access and the functionality uses [11]

3. **Security Protocols**: Catalogue AR/VR data assets and understand their security requirements. Implement security controls specific to AR/VR environments, such as secure APIs for AR/VR data transmission. Monitor for unusual activity related to AR/VR data usage. Plan for responses to AR/VR-specific security incidents. Establish recovery plans for AR/VR data. [16]

4. **Compliance with Regulations and Standards**: A regular monitoring and compliance cell should be established and a detailed audit of every user complaint with audit report should be reviewed. A security audit compliance report needs to be put under consideration with necessary patch work installed at user applications. [17]

5. **User Education and Awareness**: with the advent of technology, it has become an accepted standard to allow all notifications and settings recommended by the m-commerce application. There should be an awareness program for the user to educate them about the threats and vulnerabilities associated with use of images, biometrics, and other services in every m-commerce app unnecessarily [5]

Above recommendations are the extensions to the existing security frameworks which is possible to reduce the impact of the data privacy and decreases the insecurity of the loss of data.

By implementing this in an efficient security framework it protects the user data (such as photos, voice, and live location) for AR/VR-enabled m-commerce websites which requires a thorough strategy that combines privacy, security, and user preferences. [18]

V. CONCLUSION

The protection of the customer data using AR/VR technology should always be enabled in the m commerce platforms which should have a customized security features for the user's safety in the data. The framework designed by the author defines how the model functions and how the security of

the data can be achieved. The authentication of the users details with the help of the IRIS and the biometric system functions with the protocols of the applications so that the data can be extracted and saved in a proper format with the security layer. Therefore, the enhanced security framework incorporates the principles of minimizing data, obtaining express authorization from users, implementing strong data security mechanisms, and continuously monitoring data in real-time. These measures involve encrypting data while it is stored and while it is being transferred, adopting authentication methods that require several factors and biometric information, and enforcing stringent access limits. Transparency and user control are of most important, ensuring that there is clear and open communication regarding the utilization of data. Users are provided with detailed consent alternatives and tools to access, correct, delete, and transfer their data. Consistent security audits, regular monitoring, and a clearly defined incident response plan guarantee continuous protection against potential threats. It enhances the security framework even more. User education campaigns emphasize optimal methods, enabling users to protect their data. Through the integration of these components, mobile commerce websites can establish a safe and user-focused atmosphere that safeguards valuable information such as photos, voice recordings, and real-time location data. This fosters confidence and improves the overall user experience.

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