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Research Article

Potential Technology of Virtual Reality (VR) With Ai-Powered Object Recognition and Analysis Towards Technology Users in Entertainment

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ABSTRACT

Introduction: Virtual Reality (VR) has swiftly transformed into a ground-breaking technology, augmenting experiences across multiple domains, especially in entertainment.

Objectives: This study examines the amalgamation of Artificial Intelligence (AI)-driven object detection with virtual reality (VR) to enhance interactivity and engagement in entertainment experiences. Integrating AI algorithms enables VR systems to actively assess and interact with virtual worlds, enhancing user engagement and informational precision.

Methods: The study investigates technological elements affecting the efficacy of AI-driven VR systems, their prospective uses in entertainment, and user attitudes towards usability, precision, and overall experience. Employing quantitative methodology and statistical instruments such as SPSS.

Results: The results demonstrate a robust correlation between simplicity of use, perceived utility, and the adoption of AI-driven VR technology. These observations offer essential direction for developers seeking to enhance VR systems for wider acceptance. The coefficient of determination is 0.708, which indicates that Perceived Usefulness, Perceived Ease of Use, Performance Expectancy, Effort Expectancy explain 70.8 % of the variability in acceptance of VR technology. If p is less than 0.05 in this study, one may conclude that the coefficients are statistically substantially different from 0 if they are significantly different. There is a statistically significant effect of each variable on the acceptance of VR technology

Conclusions: The quality of a model's ability to predict the value of a dependent variable, such as acceptance of VR technology, is measured by the "R" statistic, which requires the description of the multiple correlation coefficient. The degree of prediction that is excellent is shown by the value of 0.715, which suggests that. The "R Square" statistic measures the amount of variation in the acceptance of VR technology variable that can be explained by Perceived Usefulness, Perceived Ease of Use, Performance Expectancy, Effort Expectancy.

Keywords: AI recognition, Acceptance of VR technology, Perceived Ease of Use, Perceived Usefulness, Performance Expectancy, Effort Expectancy, Entertainment.

INTRODUCTION

Virtual Reality (VR) has transcended its origins in entertainment to become a potent tool in diverse fields. The incorporation of Artificial Intelligence (AI), particularly AI powered object recognition, enhances VR technology by enabling systems to interact dynamically with their environment. This integration allows for real-time analysis and contextual understanding, transforming how users interact with both virtual and real worlds. This proposal explores the potential of VR equipped with AI object recognition and analysis to provide users with immersive, informative experiences. It seeks to determine how such technologies can enhance user engagement and understanding by providing detailed information about their surroundings instantly and intuitively.

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Initially confined to the imaginative landscapes of science fiction and pioneering experiments, Virtual Reality (VR) has experienced profound evolution since its conceptualization in the 1960s with the creation of early head-mounted displays. Over the years, enhancements in computing power, graphic capabilities, and user interfaces have dramatically refined VR technology. The incorporation of Artificial Intelligence (AI) heralded a new era, introducing sophisticated interaction capabilities within virtual environments (Fiona Moran, 2023). VR's utility now permeates multiple sectors beyond its traditional entertainment stronghold. Educational frameworks leverage VR for immersive experiences that transport students to ancient civilizations or inside complex molecular structures (Rong, Q., Lian, Q. and Tang, T. 2022). In the healthcare sector, VR facilitates surgical training and therapeutic interventions without physical risks. Industrial applications include training for equipment operation and safety procedures, significantly mitigating workplace hazards.

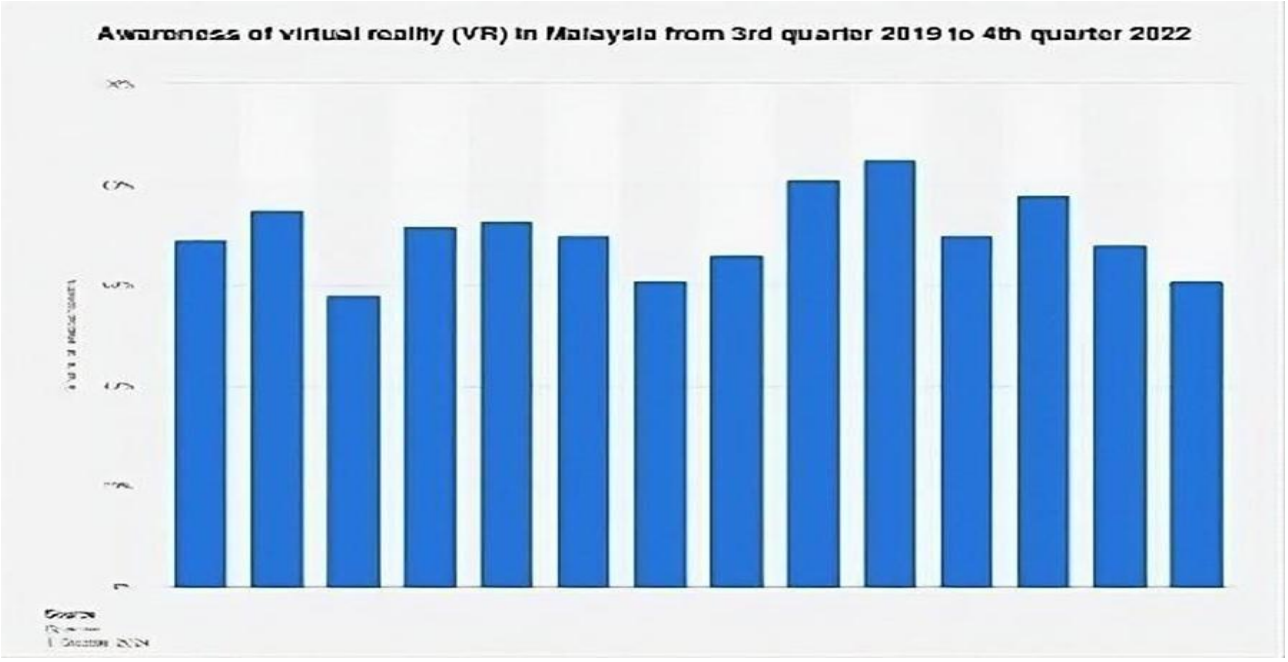

Figure 1 Awareness of virtual reality (VR) in Malaysia from 3rd quarter 2019 to 4th quarter 2022 (Sources: Statista, 2023)

The Figure 1 depicts Malaysia's level of awareness regarding virtual reality (VR) throughout the third and fourth quarters of 2019 and 2022. The percentages that are in use in this image are 0%, 20%, 40%, 60%, 80%, and 100%. As we can see, the maximum percentage is almost 85%, and the lowest percentage is lower than 60%. This is because of some issues that affected the data. According to a 2022 report from Artillery Intelligence, 65 percent of respondents said that the high cost of creating and acquiring VR content is one of the main obstacles to the broad adoption of VR. It costs a lot of money to build software, create content, and use technology to create VR experiences that are high quality. Furthermore, a lot of customers may find the high-end VR headsets and robust computer systems required for an immersive VR experience to be unaffordable. A wider audience cannot utilize VR technology due to its high entrance cost (Kruk, Mętel, & Cechnicki, 2019). So, the objectives of these study were to determine the key factors influencing the accuracy and efficiency of AI-powered object recognition in VR environments, to identify the potential applications of VR with AI object recognition in entertainment to users in terms of enhanced interactive experiences and to determine the user experience when interacting with VR systems enhanced by AI object recognition.

OBJECTIVES

Virtual Reality (VR) is an immersive technology that simulates an environment and allows users to interact with computer-generated 3D environments. Users can get a sensation of presence in virtual worlds by using specialized equipment such as VR headsets, gloves, and motion sensors, allowing them to interact with them in a way that seems nearly real. VR's effect extends across other industries, but its position in entertainment has been particularly

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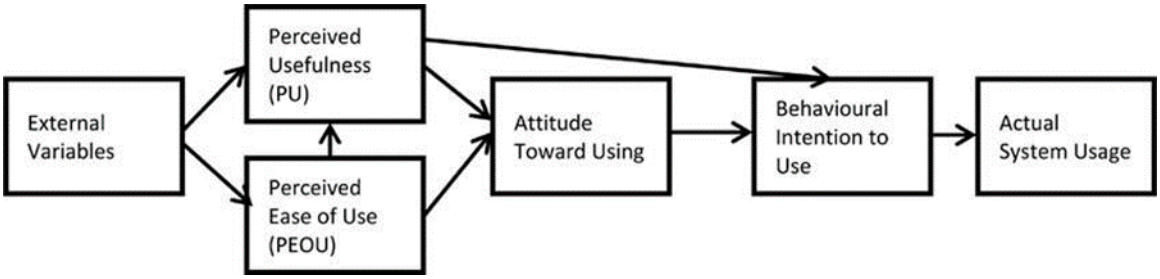
disruptive (Henry E. Lowood, 2024). Secondly, VR is fundamental about creating a digital environment that a human can interact with in a presumably tangible sense. VR systems often include hardware and software. Hardware components commonly include high-resolution head-mounted displays (HMDs), spatial audio headphones, and motion tracking sensors. The software element entails creating interactive material, such as video games, virtual tours, and cinematic experiences (Henry E. Lowood, 2024). The combination of these technologies attempts to trick the user's senses into feeling they are on another planet. In conclusion, virtual reality is transforming the entertainment sector by enabling previously imagined immersive and interactive experiences. From gaming and film to live events and theme parks, virtual reality is changing the way we interact with entertainment. As technology advances, its ability to revolutionize industry and create new, fascinating experiences will only increase, cementing VR's place as a cornerstone of modern entertainment.

Artificial intelligence (AI) is an innovative technology that replicates human intellect in computers, allowing them to accomplish activities that would normally need human cognition, such as learning, reasoning, and problem solving. In the entertainment sector, artificial intelligence has emerged as a strong tool, revolutionizing everything from content development to personalized user experiences (Howard, 2024). This article investigates the role and acknowledgment of artificial intelligence in entertainment, emphasizing its enormous effect and future possibilities.

The future of AI in entertainment appears bright as technology advances. Improvements in AI algorithms, along with the rising availability of big data, will boost AI systems' capabilities, resulting in more complex and compelling entertainment experiences. Furthermore, as AI becomes increasingly incorporated into creative processes, it will provide new opportunities for creativity and artistic expression.

Virtual reality (VR) has gained popularity in recent years, providing immersive experiences that transport users to virtual worlds. Artificial intelligence (AI) plays an important role in improving these experiences by developing dynamic and interactive virtual spaces (Crockett, S. 2023). In this section, we'll look at how AI-powered content is revolutionizing VR, from improving immersion to revolutionizing content development. Firstly, AI-generated settings offer enormous promise in VR, enabling the construction of realistic and dynamic virtual worlds. AI algorithms can reproduce real-world environments with incredible precision, producing detailed features, textures, and lighting. These settings can include dynamic features like weather, day-night cycles, and crowd behaviour, resulting in immersive and ever-changing virtual worlds (Crockett, S. 2023).



The Technology Acceptance Model (TAM) is widely used to predict and explain user behaviour towards technology, including the adoption of AI in VR. This model I used focuses on two primary perceptions: Perceived Usefulness (PU) and Perceived Ease of Use (PEOU).

Perceived Usefulness (PU) is fundamentally the degree to which a user believes that using a specific system will enhance their performance or experience. In the context of AI-enhanced VR, this might mean believing that AI integration in VR applications can lead to more engaging and effective interactions, whether for learning, training, or entertainment purposes. Users are likely to adopt and use technology if they see a clear benefit or improvement in their tasks or experiences.

Perceived Ease of Use (PEOU) refers to the extent to which a user expects the technology to be effortless to use. If AI-powered VR systems are user-friendly, requiring minimal effort to operate and understand, they are more likely to be embraced by users. Ease of use is crucial in complex systems like VR where the additional integration of AI could potentially complicate or simplify user interactions.

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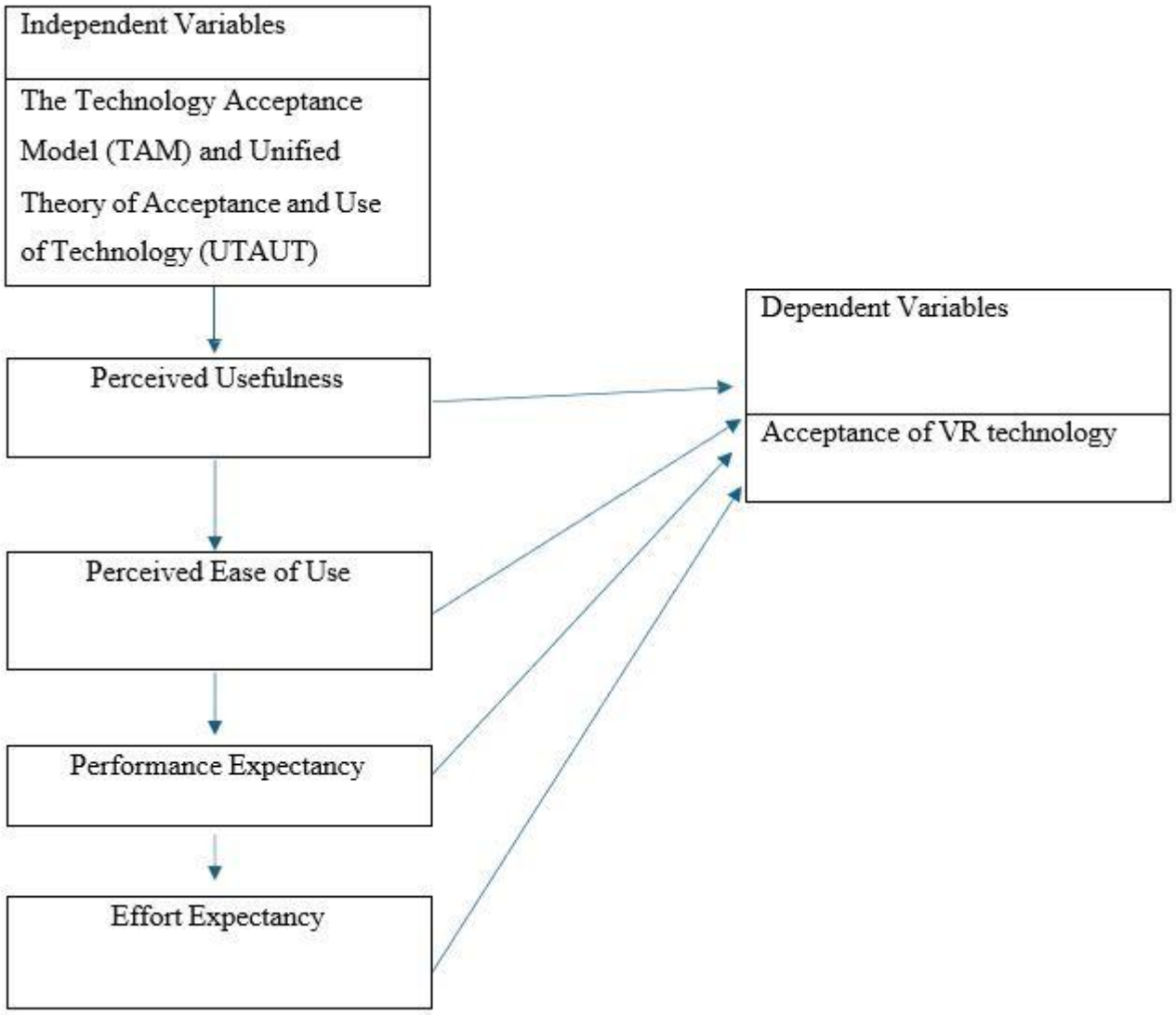
Performance Expectancy (PE) refers to the user's perception of how using technology will improve their performance or make their tasks easier. In the context of VR with AI-powered object recognition and analysis in entertainment. Users might expect that AI algorithms can enhance their VR experience by accurately recognizing and analyzing objects, leading to more immersive and interactive entertainment content.

Effort Expentancy (EE), refers to the user's perception of the ease of use and the effort required to use technology. In the context of VR with AI-powered object recognition and analysis in entertainment. Users may anticipate that AI integration will reduce the effort needed to interact with VR content. For instance, instead of complex manual controls, AI-driven gestures or voice commands can simplify interactions with the Conceptual Framework below:-



Based on the previous literature review and the conceptual framework provided, the following five research hypotheses are proposed, focused on the integration of AI in Virtual Reality (VR) and its acceptance as measured by the Technology Acceptance Model (TAM) and Unified Theory of Acceptance and Use of Technology (UTAUT):

H1: Perceived Usefulness of AI in VR has a significant positive impact toward technology users in entertainment.

H2: Perceived Ease of Use of AI in VR has a significant positive impact toward technology users in entertainment.

H3: Performance Expectancy of AI in VR has a significant positive impact toward technology users in entertainment.

H4: Effort Expectancy of AI in VR has a significant positive impact toward technology users in entertainment.

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METHODS

The study collects data using an online survey questionnaire delivered to the target group. This technique follows quantitative research principles and aims to collect data from many respondents for quantitative analysis. According to Saunder et al. (2023), the survey approach is scientific and logical, relying on earlier research and established theories to validate assumptions.

The researcher will conduct an online survey in Malacca using Google Forms. According to Saunder et al. (2023), surveys may effectively answer questions such as 'what,' 'how much,' 'who,' 'where,' and 'how many,' making them trustworthy and easy to comprehend.

The survey will use a self-administered questionnaire (SAQ) given online to respondents. The self-administered SAQ ensures data accuracy and reduces biases. According to Saunder et al. (2023), questionnaires are widely used in survey techniques owing to their ease of use, cost-effectiveness, and capacity to collect structured data from diverse respondents.

According to Saunders et al. (2023), the survey technique was used for this study because it allows researchers to collect information and data for quantitative analysis using descriptive and inferential statistics. The researcher might collect data for descriptive statistics, which is a means of summarizing data. Graphs and summaries of numerical data are often presented. In addition, the survey results may be used to generate evaluations or estimate a population using inferential statistics, a technique that uses sample information.

Second, the researcher chose the survey technique for this study because, according to Saunder et al. (2023), the data acquired via this strategy can help to link theories and give a plausible explanation for correlations between factors. The survey technique allows researchers to have more control over data collecting, leading to greater credibility and accuracy. Finally, the survey technique generates generalizable statistical results from the target population at a fair cost, making it a cost-effective and efficient way of data gathering.

Overall, the survey strategy of using an online questionnaire is appropriate for the study, providing valuable insights into customer perceptions and attitudes towards the potential.

RESULTS

Descriptive Analysis of Demographic Profiling

		Frequency	Percent
1.	Gender		
	Male	105	61.8
	Female	65	38.2
2.	Race		
	Malay	36	21.2
	Chinese	98	57.6
	Indian	27	15.9
	Others	9	5.3
3.	Age		
	16-20 years old	12	7.1
	21-25 years old	148	87.1
	26-30 years old	9	5.3
	30 years old and above	1	0.6
4.	Employment		
	Employee	12	7.1
	Unemployed	9	5.3
	Students	149	87.6
5.	Education		
	Bachelor's Degree	153	90

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	Master's Degree	5	2.9
	Ph.D Degree	1	0.6
	High School	11	6.5

n = 170

Correlations

	Perceived Usefulness	Perceived Ease of Use	Performance Expectancy	Effort Expectancy	Acceptance of VR Technology
Perceived Usefulness	1				
Perceived Ease of Use	0.689	1			
Performance Expectancy	0.688	0.705	1		
Effort Expectancy	0.639	0.732	0.767	1	
Acceptance of VR Technology	0.727	0.690	0.732	0.789	1

Independent Variables - Perceived Usefulness, Perceived Ease of Use, Performance Expectancy, Effort Expectancy

Dependent Variable - Acceptance of VR Technology.

The correlation table illustrates the relationships between variables. A higher coefficient value signifies stronger reliability and a better relationship between the correlated variables. The dependent variable (Acceptance of VR Technology) demonstrates a strong positive correlation with Perceived Usefulness ($r = 0.727$, $p < .001$), indicating that Perceived Usefulness has the strongest relationship with Acceptance of VR Technology. Similarly, Acceptance of VR Technology shows a moderate positive correlation with Perceived Ease of Use ($r = 0.690$, $p < .001$) and Performance Expectancy ($r = 0.732$, $p < .001$).

Analysis of Variance (ANOVA)

Model	Sum of Squares	df	Mean Squares	F	Significant
Regression	86.869	4	21.717	103.640	.000
Residual	34.575	165	.210		
Total	121.444	169			

a. Dependend Variable: D1
b. Predictors: (Constant)

ANOVA is used to determine whether there is a difference between the groups. However, it cannot determine which group contributes to the difference. Based on Table 4.25 above, the value of F-test result was 103.640 with a significance p-value of <.001 which is below 0.05 alpha levels. According to Saunders (2023), there will be a

difference between some of the means if the p-value is less than 0.05. Therefore, there is a statistically significant difference between dependent variable acceptance of VR technology and independent variables which are Perceived Usefulness, Perceived Ease of Use, Performance Expectancy, Effort Expectancy.

DISCUSSION

The relationship between Acceptance of VR Technology and Effort Expectancy ($r = 0.789$, $p < .001$) is the strongest among the independent variables, indicating a significant connection. The findings also show correlations among the independent variables. The strongest correlation is between Perceived Ease of Use and Effort Expectancy ($r = 0.732$, $p < .001$), followed closely by Performance Expectancy and Effort Expectancy ($r = 0.767$, $p < .001$). Meanwhile, the weakest correlation exists between Perceived Ease of Use and Perceived Usefulness ($r = 0.689$, $p < .001$).

These results suggest that all independent variables (Perceived Usefulness, Perceived Ease of Use, Performance Expectancy, and Effort Expectancy) have significant relationships with the dependent variable (Acceptance of VR Technology), with varying degrees of strength. Additionally, the correlations among independent variables indicate interdependence in their relationships.

The quality of a model's ability to predict the value of a dependent variable, such as acceptance of VR technology, is measured by the "R" statistic, which requires the description of the multiple correlation coefficient. The degree of prediction that is excellent is shown by the value of 0.715, which suggests that. The "R Square" statistic measures the amount of variation in the acceptance of VR technology variable that can be explained by Perceived Usefulness, Perceived Ease of Use, Performance Expectancy, Effort Expectancy.

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