

December 2024:Top Read Articles in Multimedia & Its Applications

**The International Journal of Multimedia & Its
Applications (IJMA)**

---ERA,WJCI Indexed---

ISSN:0975-5578(Online); 0975-5934(Print)

<https://airccse.org/journal/ijma.html>

INFORMATION HIDING USING AUDIO STEGANOGRAPHY – A SURVEY

Jayaram P¹, Ranganatha HR², Anupama HS³

^{1,2,3}Department of Computer Science and Engineering, RV College of Engineering, Bangalore, INDIA

ABSTRACT

Today's large demand of internet applications requires data to be transmitted in a secure manner. Data transmission in public communication system is not secure because of interception and improper manipulation by eavesdropper. So the attractive solution for this problem is Steganography, which is the art and science of writing hidden messages in such a way that no one, apart from the sender and intended recipient, suspects the existence of the message, a form of security through obscurity. Audio steganography is the scheme of hiding the existence of secret information by concealing it into another medium such as audio file. In this paper we mainly discuss different types of audio steganographic methods, advantages and disadvantages.

KEYWORD

Steganography, Cryptography, Audio Steganography, LSB.

Full Text: <https://aircconline.com/ijma/V3N3/3311ijma08.pdf>

Volume Link: https://airccse.org/journal/ijma_current11.html

REFERENCES

- [1] W. Bender, W. Butera, D. Gruhl, R. Hwang, F. J. Paiz, S. Pogreb, "Techniques for data hiding", IBM Systems Journal, Volume 39 , Issue 3-4, July 2000, pp. 547 – 568.
- [2] Samir Kumar Bandyopadhyay, Debnath Bhattacharyya, Poulami Das, Debashis Ganguly and Swarnendu Mukherjee, "A tutorial review on Steganography", International Conference on Contemporary Computing (IC3-2008), Noida, India, August 7-9, 2008, pp. 105-114.
- [3] Robert Krenn, "Steganography and steganalysis", An Article, January 2004.
- [4] Nedeljko Cvejić, Tapio Seppänen "Increasing the capacity of LSB-based audio steganography" FIN90014 University of Oulu, Finland, 2002.
- [5] Sajad Shirali-Shahreza, M. T. Manzuri-Shalmani "High capacity error free wavelet domain speech steganography" ICASSP 2008
- [6] Neil F. Johnson, Z. Duric and S. Jajodia. "Information Hiding Steganography and Watermarking- Attacks and Countermeasures", Kluwer Academic Publishers, 2001
- [7] F. A. P. Petitcolas, R. J. Anderson, M. G. Kuhn: "Information Hiding- A Survey", Process of IEEE, vol. 87, no. 7, pp. 1062-1078, July, 1999.
- [8] Min Wu, Bede Liu. "Multimedia Data Hiding", Springer-Verlag New York, 2003.
- [9] N. Taraghi-Delgarm, "Speech Watermarking", M.Sc. Thesis, Computer Engineering Department, Sharif University of Technology, Tehran, IRAN, May 2006.
- [10] M. Pooyan, A. Delforouzi, "LSB-based Audio Steganography Method Based on Lifting Wavelet Transform", in Proc. 7th IEEE International Symposium on Signal Processing and Information Technology (ISSPIT'07), December 2007, Egypt.
- [11] R. A. Santosa and P. Bao, "Audio-to-image wavelet transform based audio steganography," Proc. of 47th Int. Symposium ELMAR, June 2005, pp. 209- 212.
- [12] Xuping Huang, Ryota Kawashima, Norihisa Segawa, Yoshihiko Abe. "The Real-Time Steganography Based on Audio-to-Audio Data BitStream", Technical report of IEICE, ISEC, vol. 106 pp. 15-22, September 2006.
- [13] Aoki, Naofumi. "A Band Widening Technique for VoIP Speech Using Steganography Technology", Report of IEICE, SP, 106(333), pp. 31-36, 2006.
- [14] Xuping Huang, Ryota Kawashima, Norihisa Segawa, Yoshihiko Abe International Conference on Intelligent "Information Hiding and Multimedia Signal Processing" © 2008 IEEE.
- [15] A. Delforouz, Mohammad Pooyan, "Adaptive Digital Audio Steganography Based on Integer wavelet transform", IEEE Third International Conference on Intelligent Information Hiding and Multimedia Signal Processing, 2007, 26-28 Nov 2007, pp 283-286.
- [16] R. A. Santosa, P. Bao, "Audio-to-Image Wavelet Transform based Audio Steganography", 47th International Symposium ELMAR-2005, 08-10 June 2005, Zadar, Croatia, pp 209-212.
- [17] S. Shirali-Shahreza, M. T. Manzuri-Shalmani, "Adaptive Wavelet Domain Audio Steganography with High Capacity and Low Error Rate", IEEE International Conference on Information and Emerging Technologies, 2007, 06-07 July 2007 pp 1-5.
- [18] Yincheng Qi, Jianwen Fu, and Jinsha Yuan, "Wavelet domain audio steganalysis based on statistical moments of histogram", Journal of System Simulation, Vol 20, No. 7, pp. 1912-1914, April 2008.
- [19] Yin-cheng qi, liang ye, chong liu "Wavelet domain audio steganalysis for multiplicative embedding model" Proceedings of the 2009 International Conference on Wavelet Analysis and Pattern Recognition, Baoding, 12-15 July 2009.
- [20] V. Vapnik, "Statistical Learning Theory", John Wiley, 2008.
- [21] Mengyu Qiao, Andrew H. Sung, Qingzhong Liu "Feature Mining and Intelligent Computing for MP3 Steganalysis" International Joint Conference on Bioinformatics, Systems Biology and Intelligent Computing 2009.

AUTHORS

Jayaram P is currently doing his Engineering degree in R V College of Engineering Bangalore. He has published many papers in National Conferences. His areas of research are Networking, Operating Systems, Data Structures, Computer Graphics and Mobile Computing.



Ranganatha H R is currently doing his Engineering degree in R V College of Engineering Bangalore. He has published many papers in National Conferences. His areas of research are Algorithms, Distributed Systems, Network security and Business Intelligence.



Anupama H S is working as an Assistant Professor in R V College of Engg Bangalore. She did B E in S.I.T College of Engg Tumkur and M.Tech in J.N.N.C.E College Shimoga, Karnataka, India. Her research of interest are Security, Steganography, Brain Computer Interface and Virtual Keyboard.



THE CURRENT TRENDS OF AUGMENTED REALITY IN EARLY CHILDHOOD EDUCATION

Masyarah Zulhaida Masmuzidin and Nor Azah Abdul Aziz

Department of Creative Multimedia, Universiti Pendidikan Sultan Idris, Tanjung Malim, Perak Darul Ridzuan, Malaysia.

ABSTRACT

Augmented Reality has been widely used in various level of education such as higher-level education, secondary education (lower/upper secondary level), primary education, and in informal learning. However, the implementation in early childhood education is still limited.

By using library research methodology, the objective of this paper is to investigate the existing work of augmented reality in early childhood education between 2009-2018. Based on the results, it shows that the publication of augmented reality in early childhood education increased slowly within these past ten years. It has been found that the main advantage of augmented reality is to enhance motivation. Early literacy has been found to be the most used topic with sampling less than 30 children. Finally, 'Marker-based' augmented reality has been widely used with mobile devices and in terms of data collection methods, 'Test' has been used the most in this field of research.

KEYWORDS

Augmented Reality, Child Computer Interaction, Early Childhood Education, Preschool

Full Text: <https://airconline.com/ijma/V10N6/10618ijma05.pdf>

Volume Link: https://www.aircse.org/journal/ijma_current18.html

REFERENCES

- [1] Azuma,R.T.(1997).Asurveyofaugmentedreality.Presence:Teleoperators&VirtualEnvironments,6(4), pp.355-385.
- [2] Azuma,R.,Baillot,Y., Behringer,R.,Feiner, S.,Julier,S., & MacIntyre,B.(2001).Recentadvances in augmented reality. IEEE Computer Graphics & Application, 21(6), pp. 34-47.
- [3] Wu, H. K., Lee, S. W. Y., Chang, H. Y., & Liang, J. C. (2013). Current status, opportunities and challenges of augmented reality in education. Computers & education, 62, pp. 41-49.
- [4] Rambli, D. R. A., Matcha, W., & Sulaiman, S. (2013). Fun learning with AR alphabet book forpreschoolchildren. Procedia computer science, 25, pp. 211-219.
- [5] Gopalan,V.(2016).Astudyofstudents'motivationbasedoneaseofuse, engaging,enjoymentandfun using the augmented realityscience textbook. Revista de la Facultad de Ingeniería, 31(5).
- [6] Yilmaz,R.M.,Kucuk,S.,&Goktas,Y.(2017).Areaugmentedreality picturebooksmagicorrealfor preschool children aged five to six?. British Journal of Educational Technology, 48(3), pp. 824-841.
- [7] Rasalingam, R. R., Muniandy, B., & Rass, R. (2014). Exploring the application of augmented reality technology in early childhood classroom in Malaysia. Journal of Research & Method in Education (IOSR-JRME), 4(5), pp. 33-40.
- [8] Jeffri, N. F. S., & Rambli, D. R. A. (2017). Design and development of an augmented reality book and mobile application to enhance the handwriting-instruction for pre-school children. Open Journal of Social Sciences, 5(10), pp. 361.
- [9] Hsu, Y.S.,Lin,Y.H.,&Yang,B.(2017).Impactofaugmentedrealitylessonsonstudents'STEM interest. Research and Practice in TechnologyEnhanced Learning, 12(1), pp. 2.
- [10] Bacca, J., Baldiris, S., Fabregat, R., & Graf, S. (2015). Mobile augmented reality in vocational education and training. Procedia Computer Science, 75, pp. 49-58.

AUTHORS

Masyarah Zulhaida Masmuzidin obtained her MSc in Creative Media Technology with Computer Animation and Special Effects from University of Bradford, United Kingdom. Currently, she is a PhD student at Faculty of Art Computing and Creative Industry, Universiti Pendidikan Sultan Idris, Malaysia. Her research interest includes Interactive Multimedia, Child Computer Interaction, Virtual Reality and Augmented Reality.



Nor Azah Abdul Aziz is an Associate Professor at Faculty of Art Computing and Creative Industry, Universiti Pendidikan Sultan Idris, Malaysia. Her research interest includes Gestural Interface Design, Child Computer Interaction, Multimedia Application Development, Islamic Spiritual Psychology, Information Technology, Internet/Web Filtering, Internet & Society.



SELECTION SORTING ALGORITHM VISUALIZATION USING FLASH

Hadi Sutopo

Department of Informatics, Universitas Persada Indonesia YAI, Jakarta, Indonesia hadi@topazart.info

ABSTRACT

This paper is intended to develop an algorithm visualization, particularly selection sorting for an Algorithm and Programming course. Algorithm visualization technology graphically illustrates how algorithms work. This visualization can be used to explain how all data move to the proper position in order to be sorted in a display computer for education. This research consists of 6 steps which are concept, design, obtaining content material, assembly, testing, and distribution. During the testing step, the application is run and checked to confirm that it performs exactly what the author has intended and the students can learn selection sorting algorithm by studying the visualization. Subjects of the research were students at Department of Informatics Universitas Persada Indonesia YAI for implementation of the learning. The data were analysed using the analytic descriptive method and interpreted in a narrative way based on the research findings. The algorithm visualization indicates that students increase their motivation and ability to program variety of sorting in programming language they learn.

KEYWORDS

Multimedia, Algorithm, Sorting, Flash movie, ActionScript

Full Text: <https://aircconline.com/ijma/V3N1/3111ijma03.pdf>

Volume Link: https://www.airccse.org/journal/ijma_current12.html

REFERENCES

- [1] Semiawan, Conny R, (2009) *Landasan Pembelajaran dalam Perkembangan Manusia*, Jakarta: Center for Human Capacity Development.
- [2] Sfenrianto, (2009) "A Model of Adaptive E-Learning System Based on Student's Motivation", *Proceedings from ICCIT-09: International Conference on Creative Communication and Innovative Technology*, 2009. Tangerang: CCIT Journal.
- [3] Sedgewick, Robert, (2001) *Algorithms in C++*, Third Edition, Massachusetts: Addison-Wesley
- [4] Tenenbaum M, Aaron & Augenstein, Moshe J, (1981) *Data Structures Using Pascal*, Englewoods Cliffs, Prentice Hall.
- [5] Hearn, Donald, and Pauline Baker, (1996) *Computer Graphics C Version*, 2nd edition. Upper Saddle River, NJ: Prentice Hall International, Inc.
- [6] Vaughan, Tay, (2006) *Multimedia Making it Work*, Yogyakarta: Andi Publisher.
- [7] Anleigh, Prabath K & Thakar, Kiran, (1997) *Multimedia Systems Design*, Upper Saddle River: Prentice Hall.
- [8] Bhatnager, Gaurav, Sikha Metha and Sugata Mitra, (2001) *Introduction to Multimedia Systems*, London: Academic Press.
- [9] Luther, Arc C, (1994) *Authoring Interactive Multimedia*. Boston: AP Professional.
- [10] Sutopo, Ariesto H, (2003) *Multimedia Interaktif dengan Flash*. Yogyakarta: Graha Ilmu.
- [11] Ypenburg, Derrick, (2009) *Action Script 3.0*, Berkeley, CA: Peachpit Press.
- [12] Franklin, Derek & Jobe Makar, (2002) *Macromedia Flash MX Action Scripting Advanced Training from the Source*, Berkeley, CA: Macromedia Press.
- [13] Sutopo, Ariesto H, (2003) *Integrasi Flash dengan ASP*, Jakarta: Elex Media Komputindo.

AUTHORS

Hadi Sutopo was born in Cilacap, Indonesia on April 15, 1945. He is Doctor of Education in Educational Technology of the Jakarta State University, graduated in November 2009. In 1998 he earned Master of Information Systems at Post Graduate Program Gunadarma University, Jakarta. In 1995 he graduated from the Universitas Persada Indonesia YAI. Jakarta, majoring in Informatics.

Hadi is currently a lecturer of Multimedia at the Universitas Persada Indonesia YAI and some other universities in Jakarta, Indonesia since 1998. He wrote many books on multimedia and information technology. The books are *Pemrograman Berorientasi Objek dengan Java* (Yogyakarta, Indonesia: Graha Ilmu, 1995), *Desain Buku dengan Adobe InDesign* Jakarta, Indonesia: Elex Media Komputindo, 2006), and *Pemrograman Flash dengan PHP dan MySQL* (Yogyakarta, Indonesia: Graha Ilmu, 2007). Current interest research is information technology especially multimedia.

Dr. Hadi Sutopo, MMSI is a member of Indonesian Association of Educational Technology (IPTPI) and Association of Education and Communication Technology (AECT). He works in editorial team of Educational Technology Journal and Multimedia Journal in Jakarta, Indonesia.

THE IMPACT OF VR GRAPHICAL USER INTERFACE ON OCULUS TOUCH CONTROLLER AND OCULUS RIFT

Natchaphak Meeusahand Bennapa Pattanapipat

Multimedia Technology, Faculty of Mass Communication Technology, Rajamangala University of Technology Thanyaburi, Thailand

ABSTRACT

It is undeniably true that Virtual Reality (VR) has continuously been developed since 1800s and still have been produced till today. However, very few studies have attempted to study on the design of Virtual Reality Graphical User Interface (VR-GUI) that effectively empowers users to interact and immerse in a simulated world, via hardware and software with ease. Therefore, the aims of this research are to compare four different types of VR GUI Controller designs including (2D, 2D animation, 3D, and 3D animation) and to determine UI response time of the Oculus Touch Controller and compare the results with UI response time of Oculus Rift to determine what VR GUI is appropriate for which ages. 168 participants were purposely selected, aged from 12 to 17, 18 to 33, and 34 to 45. The experiment results showed that VR GUI had a significant impact on UI response time resulted from different types of VR GUI controllers. Last but not least, analysis of VR GUI controller user data had suggested that VR GUI developers should design appropriate VR GUI controllers that match all age groups in order for them to experience a fully immersive, perceptually real environment as quickly and efficiently as possible.

KEYWORDS

VR GUI, Oculus Touch Controller, Oculus Rift, Virtual Reality, Generation, Interactive. Full

Text: <https://aircconline.com/ijma/V13N6/13621ijma03.pdf>

Volume Link: https://airccse.org/journal/ijma_current21.html

REFERENCES

- [1] Zuckerberg, M. (2015) The future of connection. Presented at Facebook F8', Facebook's Developer conference, 25 March, 2015. Available at Internet: <https://bit.ly/3CJqhcC> [2021-02-11]
- [2] Dorabjee, R., Bown, O., Sarkar, S., & Tomitsch, M. (2015). Back to the future: identifying interface trends from the past, present and future in immersive applications. In Proceedings of the Annual Meeting of the Australian Special Interest Group for Computer Human Interaction (pp. 540-544).
- [3] Bowman, D.A. (2013). 3D user interfaces. Bruno, F., & Muzzupappa, M. (2010). Product interface design: A participatory approach based on virtual reality. *International journal of human-computer studies*, 68(5), 254-269.
- [4] Norman, D.A. (2010). Natural user interfaces are not natural interactions, 17(3), 6-10.
- [5] Fröjdman, S. (2016). User experience guidelines for design of virtual reality graphical user interfaces controlled by head orientation input. Bachelor Degree Project in Cognitive Science, University of Skövde, Sweden (pp. 58).
- [6] Molina, J. P., González, P., Lozano, M. D., Montero, F., & López-Jaquero, V. (2003). Bridging the gap: developing 2D and 3D user interfaces with the IDEAS methodology. In *International Workshop on Design, Specification, and Verification of Interactive Systems*. Springer, Berlin, Heidelberg, (pp.303-315)
- [7] Nielsen, J. (1995) Ten Usability heuristics. Nielsen Norman Group [website], January 1, 1995. Available at Internet: <https://bit.ly/3jDwQ8d> [2021-02-11]
- [8] Bowman, D.A., Coquillart, S., (2008) 3D user interfaces: new directions and perspectives. *IEEE Computer Graphics and Applications*, 28(6), 20-36.
- [9] Seibert, J., & Shafer, D.M. (2018). Control mapping in virtual reality: effects on spatial presence and controller naturalness. *Virtual Reality*, 22(1), 79-88.
- [10] Bruno, F., & Muzzupappa, M. (2010). Product interface design: A participatory approach based on virtual reality. *International journal of human-computer studies*, 68(5), 254-269.
- [11] Salomoni, P., Prandi, C., Rocchetti, M., Casanova, L., & Marchetti, L. (2016, January). Assessing the efficacy of a diegetic game interface with Oculus Rift. In *2016 13th IEEE Annual Consumer Communications & Networking Conference (CCNC)* (pp. 387-392). IEEE.
- [12] Sauzón, H., N'Kaoua, B., Arvind Pala, P., Taillade, M., & Guitton, P. (2016). Age and active navigation effects on episodic memory: a virtual reality study. *British Journal of Psychology*, 107(1), 72-94.
- [13] Plancher, G., Gyselinck, V., Nicolas, S., & Piolino, P. (2010). Age effect on components of episodic memory and feature binding: A virtual reality study. *Neuropsychology*, 24(3), 379.
- [14] Adams, H., Narasimham, G., Rieser, J., Creem-Regehr, S., Stefanucci, J., & Bodenheimer, B. (2018). Locomotive recalibration and prism adaptation of children and teens in immersive virtual environments. *IEEE transactions on visualization and computer graphics*, 24(4), 1408-1417.
- [15] Narasimham, G., Adams, H., Rieser, J., & Bodenheimer, B. (2020). Encoding Height: Egocentric Spatial Memory of Adults and Teens in a Virtual Stairwell. In *ACM Symposium on Applied Perception 2020* (pp. 1-8).
- [16] Björling, E. A., Cicero, R., Sankar, A., & Sekar, A. (2019). Thought Disposal: Co-Designing a virtual interaction to reduce stress in teens. In *Proceedings of the 18th ACM International Conference on Interaction Design and Children* (pp. 562-567).
- [17] Optale, G., Urgesi, C., Busato, V., Marin, S., Piron, L., Priftis, K., ... & Bordin, A. (2010). Controlling memory impairment in elderly adults using virtual reality memory training: a randomized controlled pilot study. *Neurorehabilitation and neural repair*, 24(4), 348-357.
- [18] Hou, W. J., & Chen, X. L. (2021). Comparison of Eye-Based and Controller-Based Selection in Virtual Reality. *International Journal of Human-Computer Interaction*, 37(5), 484-495.
- [19] Shum, L. C., Valdés, B. A., & Van der Loos, H. M. (2019). Determining the accuracy of oculus touch controllers for motor rehabilitation applications using quantifiable upper limb kinematics: Validation study. *JMIR Biomedical Engineering*, 4(1), e12291.
- [20] Jost, T. A., Nelson, B., & Rylander, J. (2021). Quantitative analysis of the Oculus Rift S in controlled movement. *Disability and Rehabilitation: Assistive Technology*, 16(6), 632-636.
- [21] Otte, K., Kayser, B., Mansow-Model, S., Verrel, J., Paul, F., Brandt, A. U., & Schmitz-Hübsch, T. (2016). Accuracy and reliability of the kinect version 2 for clinical measurement of motor function. *PloS one*, 11(11), e0166532.
- [22] Borrego, A., Latorre, J., Alcañiz, M., & Llorens, R. (2018). Comparison of Oculus Rift and HTC Vive: feasibility for virtual reality-based exploration, navigation, exergaming, and rehabilitation. *Games for health journal*, 7(3), 151-156.

- [23] Suznjevic, M., Mandurov, M., & Matijasevic, M. (2017, May). Performance and QoE assessment of HTC Vive and Oculus Rift for pick-and-place tasks in VR. In 2017 Ninth international conference on quality of multimedia experience (QoMEX) (pp. 1-3). IEEE.
- [24] Fisher, R. A. (1992). Statistical methods for research workers. In *Breakthroughs in statistics* Springer, New York, NY. (pp.66-70).
- [25] Williams, L. J., & Abdi, H. (2010). Fisher's least significant difference (LSD) test. *Encyclopedia of research design*, 218, 840-853.
- [26] Allcoat, D., & von Mühlelen, A. (2018). Learning in virtual reality: Effects on performance, emotion and engagement. *Research in Learning Technology*, 26.
- [27] Bhagat, K. K., Liou, W. K., & Chang, C. Y. (2016). A cost-effective interactive 3D virtual reality system applied to military live firing training. *Virtual Reality*, 20(2), 127-140.
- [28] de Bruin, E. D., Schoene, D., Pichierri, G., & Smith, S. T. (2010). Use of virtual reality technique for the training of motor control in the elderly. *Zeitschrift für Gerontologie and Geriatrie*, 43(4), 229- 234.

AN ALTERNATIVE GREEN SCREEN KEYING METHOD FOR FILM VISUAL EFFECTS

JinZhi

Department of Creative Professions & Digital Arts, University of Greenwich, United Kingdom

ABSTRACT

This study focuses on a greenscreen keying method developed especially for film visual effects. There are a series of ways of using existing tools for creating mattes from green or blue screen plates. However, it is still a time-consuming process, and the results vary especially when it comes to retaining tiny details, such as hair and fur. This paper introduces an alternative concept and method for retaining edge details of characters on a greenscreen plate, also, a number of connected mathematical equations are explored. At the end of this study, a simplified process of applying this method in real productions is also tested.

KEYWORDS

Digital Compositing, Green Screen Keying, Visual Effects

Full Text: <https://airconline.com/ijma/V7N2/7215ijma01.pdf>

Volume Link: https://aircse.org/journal/ijma_current15.html

REFERENCES

- [1] Richard, J (1994) "RKO Film Grosses: 1931-1951", Historical Journal of Film Radio and Television 14, 1, pp55.
- [2] GORBACHEV, B.K (1961). Tekhnika kombinirovannykh 'emok. Moscow, 2nd ed.
- [3] Snider., David., Glenn K., Ken C., and Michael M (1993) Digital Moving-Picture Exchange: File Format and Calibration, SMPTE Journal, pp712-714.
- [4] Mike.S (2011). The Art of Digital Color. Fxguide
- [5] Mark, C.V., Craig, B (2002). The Invisible Art: The Legend of Movie Matte Painting. Chronicle Books, pp33.
- [6] Livingstone, M (2002) The First Stages of Processing Color and Luminance: Where and What. Vision and Art: The Biology of Seeing. New York: Harry N. Abrams, pp46-67.
- [7] Chrles, P (2003). Digital Video and HDTV: Algorithms and Interfaces. Morgan-Kaufmann. 24, pp291-292.
- [8] Larry, G., and Eugene, E (2007). GPU Gems 3. Chapter 24.
- [9] Lee, L (2010). Professional Digital Compositing. Wiley Publishing, Inc., Indianapolis, pp47-51.
- [10] Hazewinkel, M (2001). Absolute value, Encyclopedia of Mathematics, Springer

AUTHORS

Dr Jin Zhi has a very wide higher education background in traditional art, design and digital moving images, film production as well as film visual effects and 3DCGI. Jin is currently working at Creative Professions & Digital Arts, University of Greenwich. In the past 10 years, Jin worked in various VFX studios including The Moving Picture, London and Cinesite Kodak Visual Effects. Meanwhile, Dr Jin also worked as a visiting lecturer in a number of universities in the UK as well as South Korea such as University of Westminster, London and Konkuk University in Seoul, South Korea. As a film VFX Compositor, Jin's visual effects works are included in the following commercial feature films: Prometheus (2012), Wrath of the Titans (2012), John Carter (2012), Harry Potter and the Deathly Hallows: Part 2 (2012). Jin's expertise and research interests are widely covered in different areas in film & television post-production, especially film digital compositing, film & TV visual effects productions, creating 3D CG elements for feature films as well as digital moving image design, etc. In addition, Dr Jin has been certified as a Nuke Trainer by the Foundry UK in 2015.



THE DEVELOPMENT OF A DIGITAL STORYBOOK AND AN AUGMENTED REALITY (AR)-BASED PROVERBS APPLICATION

Jamilah Hamid¹, Nor Hasbiah Ubaidullah¹ and Ahmad Yasir Bahador²

¹Faculty of Arts, Computing & Creative Industry, Sultan Idris Education University, Malaysia

²Sekolah Menengah Methodist, Tg Malim, Perak, Malaysia

ABSTRACT

Learning Malay proverbs is very important to sustain the rich heritage of the Malay civilization among young generations. However, pilot study and literature review show that students face problems in understanding proverbs when learning using conventional method. Thus, this paper discusses the development of a digital storybook to help the learning of selected Malay proverbs under the unity theme using Augmented Reality (AR) technology. The application development was divided into two parts; development of the AR-based proverbs application and the development of a digital story. For the first part, the application was developed based on the combination of waterfall methodology, learning theory principles and AR application development guidelines. For the second part, the development is relied on the digital story development guidelines. This application development can serve as important guidelines for the developers to develop suitable applications using AR technology to help students learn a range of important learning concepts.

KEYWORDS

Augmented reality, digital storybook, learning theory, Malay proverbs, mobile application. Full

Text: <https://aircconline.com/ijma/V10N6/10618ijma12.pdf>

Volume Link: https://airccse.org/journal/ijma_current18.html

REFERENCES

- [1] The Statistics Portal. (2017). Retrieved August 17, 2017, from <https://www.statista.com/topics/1002/mobile-app-usage/>
- [2] Syahar, A. (2016). Pengguna telefon pintar cecah 11 juta. Retrieved August 17, 2017, from <http://www.utusan.com.my/bisnes/korporat/pengguna-telefon-pintar-cecah-11-juta-1.181716>.
- [3] Mariah, A. (2016). 10 trend penggunaan aplikasi mudah alih di Malaysia. Retrieved August 17, 2017, from <http://www.astroawani.com/berita-teknologi/10-trend-penggunaan-aplikasi-mudah-alih-di-malaysia-122355>
- [4] Mehdipour, Y., & Zerehkafi, H. (2013). Mobile learning for education: Benefits and challenges. *International Journal of Computational*, 3(6), 93–101 (251–259). <https://doi.org/10.1080/87567555.2011.604802>
- [5] Ma, M., Fallavollita, P., Seelbach, I. N. A., Heide, A. M. V., Euler, E., Waschke, J., & Navab, N. (2016). Personalized augmented reality for anatomy education. *Clinical Anatomy*, 453, 446–453. <https://doi.org/10.1002/ca.22675>
- [6] Londei, R., Esposito, M., Diotte, B., Weidert, S., Euler, E., Thaller, P., Fallavollita, P. (2015). Intraoperative augmented reality in distal locking. *International Journal of Computer Assisted Radiology and Surgery*, 1395–1403. <https://doi.org/10.1007/s11548-015-1169-2>
- [7] Antonioli, M., Blake, C., & Sparks, K. (2014). Augmented reality applications in education. *The Journal of Technology Studies*, (2009), 96–107.
- [8] Nazatul-Aini, A. M., & Nooraidah, K. H. (2014). Mobile learning application based on augmented reality for science subject: Isains. *ARPN Journal of Engineering and Applied Sciences*, 9(9), 1455–1460.
- [9] Lu, S., & Liu, Y. (2015). Integrating augmented reality technology to enhance children's learning in marine education. *Environmental Education Research*, 4622. <https://doi.org/10.1080/13504622.2014.911247>
- [10] Redondo, E., Riera, A. S., & Fonseca, D. (2015). Geo-located teaching using handheld augmented reality: Good practices to improve the motivation and qualifications of architecture students. *Universal Access Inf Soc*, 14, 363–374. <https://doi.org/10.1007/s10209-014-0362-3>
- [11] Yilmaz, R. M., Kucuk, S., & Goktas, Y. (2016). Are augmented reality picture books magic or real for preschool children aged five to six?. *British Journal of Educational Technology*. <https://doi.org/10.1111/bjet.12452>
- [12] Radu, I. (2014). Augmented reality in education: A meta-review and cross-media analysis. *Pers Ubiquit Comput*, (18), 1533–1543. <https://doi.org/10.1007/s00779-013-0747-y>
- [13] Koutromanos, G., Sofos, A., & Avraamidou, L. (2015). The use of augmented reality games in education: A review of the literature. *Educational Media International*, 52(4), 254–271. <https://doi.org/10.1080/09523987.2015.1125988>
- [14] Santos, M. E. C., Lübke, W. A., Taketomi, T., Yamamoto, G., Rodrigo, M. M. T., Sandor, C., & Kato, H. (2016). Augmented reality as multimedia: The case for situated vocabulary learning. *Research and Practice in Technology Enhanced Learning*, 11(4), 1–23. <https://doi.org/10.1186/s41039-016-0028-2>.
- [15] Mohd Mahzan, A., Noor Azam, A. R., Noraziah, M. A., & Abdul Razq, A. (2015). Mesej perpaduan dalam buku teks Bahasa Melayu Tingkatan 4 dan 5: Analisis terhadap Bahasa Melayu (The social unity message on the form 4 and 5 Malay language textbooks: Analysis Malay proverbs). *Jurnal Pendidikan Bahasa Melayu - JPBM (Malay Language Education Journal MyLEJ)*, 5(Mei), 44–52.
- [16] Ahmad Mahmood, M., Zaitul Azma, Z. H., Nor Azuwan, Y., & Norizan, C. S. (2011). Pengetahuan makna peribahasa dalam kalangan pelajar sekolah menengah. *Jurnal Linguistik*, 13, 1–16.
- [17] Johan, A. (2010). Pembelajaran peribahasa dalam kalangan murid sekolah rendah. *Perkongsian Profesional Bagi Guru-Guru Permulaan*. Singapore: Ministry of Education, Singapore. Retrieved from <http://malaylanguagecentre.moe.edu.sg/qq/slot/u181/KhazanahIlmu/PerkongsianProfesional/MLCSFinal-65-81.pdf>
- [18] Hasmidar, H., & Jafizah, J. (2016). The interpretation of proverbs and their relation to thinking skills: An analysis based on relevance theory. *Jurnal Bahasa*, 16(1), 94–119.
- [19] Robin, B. R. (2016). The power of digital storytelling to support teaching and learning. *Digital Education Review*, (30), 17–29.
- [20] Yuksel-arslan, P., Yildirim, S., & Robin, B. R. (2016). A phenomenological study: teachers' experiences of using digital storytelling in early childhood education. *Educational Studies*, 42(5), 427–445. <https://doi.org/10.1080/03055698.2016.1195717>
- [21] Grant, N. S., & Bolin, B. L. (2016). Digital storytelling: A method for engaging students and increasing cultural competency. *The Journal of Effective Teaching*, 16(3), 44–61.
- [22] Mardian Shah, O., Solehah, M., & Beseknorliana, R. (2016). *Buku Teks Bahasa Malaysia Tingkatan 1*. Kuala Lumpur: Dewan Bahasa dan Pustaka..

- [23] Yilmaz, K. (2011). The cognitive perspective on learning: Its the cognitive perspective on learning: Its theoretical underpinnings and implications for classroom practices. *The Clearing House: A Journal of Educational Strategies, Issues and Ideas*, 8655. <https://doi.org/10.1080/00098655.2011.568989>
- [24] Bower, M., Howe, C., McCreddie, N., Robinson, A., & Grover, D. (2014). Augmented Reality in education – cases , places and potentials. *Educational Media International*, 51(1), 1–15. <https://doi.org/10.1080/09523987.2014.889400>
- [25] Endsley, T. C., Sprehn, K. A., Brill, R. M., Ryan, K. J., Vincent, E. C., & Martin, J. M. (2017). Augmented reality design heuristics: Designing for dynamic interactions. In *Proceedings of the Human Factors and Ergonomics Society 2017 Annual Meeting* (pp. 2100–2104). <https://doi.org/10.1177/1541931213602007>
- [26] Basir, N. (2012). Perpaduan etnik menerusi penggunaan bahasa melayu. Kangar, Perlis. Retrieved from <https://www.researchgate.net/publication/269223543%0APERPADUAN>.

AUTHORS

Dr. Jamilah Hamid is a Senior Lecturer in Faculty of Art, Computing and Creative Industry, Sultan Idris Education University. She holds a Bachelor of Science in Education (Hons.) majoring in Mathematics and Master of Science (Information Technology). She obtained her PhD in Internet and Web Computing from Sultan Idris Education University, Malaysia. She has been teaching in high education institutions since 1991 in several subjects such as Programming, Methodology in Courseware Development, Educational Technology and Teaching Methodology. Her research interests are on Virtual Reality, Augmented Reality, Educational Technology and Educational Software.



Dr. Nor Hasbiah Ubaidullah is working as an Associate Professor at Universiti Pendidikan Sultan Idris. She received a degree in Computer Science from Universiti Kebangsaan Malaysia and Master of Science in Information System from University of Salford. She obtained her PhD degree in Information Technology from Universiti Kebangsaan Malaysia. Her research areas include Courseware Engineering, DSS, Learning Disability Children, Systems/ Product Development, Programming C++ and JAVA.



Ahmad Yasir bin Bahador is a secondary school teacher at SMK Methodist. He holds a certificate in education majoring in Pengajian Melayu from Kota Bharu Teaching Collage. He obtained a bachelor degree in IT Education and Master degree in Multimedia Education from Universiti Pendidikan Sultan Idris, Malaysia. He has been teaching in schools since 1997 in several subjects such as Bahasa Melayu (Malay Language), Kemahiran Hidup (Life Skills), Literasi Komputer (Computer Literacy) and Asas Sains Komputer (Basic Computer Science). He has 12 years' experience in teaching Form 1 Bahasa Melayu. His research interests are on Educational Technology and Educational Software.



THE RESULTS OF THE BLENDED LEARNING ACTIVITIES COURSE OF INNOVATION AND INFORMATION TECHNOLOGY FOR COMMUNICATION AND LEARNING

Thanatcha Rattanaphant and Senawee Roekmongkol

Major of Digital Technology for Education, Faculty of Education Rajabhat Nakhon Si Thammarat University, Nakhon Si Thammarat, Thailand

ABSTRACT

The objectives of this research were: 1) to find the effectiveness of the blended learning management activity package 2) to compare the learning achievement 3) to study memory retention and 4) to study the satisfaction with the blended learning activities. The research sample consisted of 301 st year students enrolled in the Innovation and Information Technology for Communication and Learning course in the 2nd semester of the academic year 2020 in the Major of General Science, Faculty of Education, Rajabhat Nakhon Si Thammarat University. The research tools were: 1) a blended learning management activity package, and 2) an online questionnaire on the satisfaction of the learners with the blended learning activities. The statistics used in the data analysis were mean, S. D. and hypothesis testing using t-test Dependent. 1) The developed efficiency was $80.58/87.67$, which was the efficiency according to the specified criteria $80/80$. 2) The statistically significant comparison of the learning achievement after receiving the learning management was higher than before the learning management at the .05 level. 3) The study of memory retention after 2 weeks of learning management was not significantly different at the .05 level and 4) The overall of the satisfaction blended learning activities were at the highest level.

KEYWORDS

Blended Learning Activities, Memory Retention, Satisfaction

Full Text: <https://airconline.com/ijma/V14N1/14122ijma02.pdf>

Volume Link: https://aircse.org/journal/ijma_current22.html

REFERENCES

- [1] Allen. I. E. and Seaman. J. (2007). Growing by Degrees: Online education in the United States, The Sloan Consortium. [Online] Available from:
http://www.sloanc.org/publications/survey/pdf/growing_by_degrees.pdf. [2020, April, 4].
- [2] Nor M. H., Nadia A. A. Z., Rasyidi J., and Noor A. Z. M. N.. (2021). Need Analysis: Portable WebSever Development Kits for Teaching and Learning. [Online] Available from:
<https://airconline.com/ijma/V13N3/13321ijma01.pdf>. [2022, February, 19].
- [3] Center for Media Literacy. (2008). Literacy for the 21st century: An overview & orientation guide to media literacy education (2 nd ed.). Center for Media Literacy.
- [4] Bachelor of Education. (2562). Course of Innovation and Information Technology for Communication and Learning. Faculty of Education, Rajabhat Nakhon Si Thammarat University, pp. 8.
- [5] MonchaiT. (2002). Design and development of courseware for computer-assisted instruction. Bangkok: King Mongkut's Institute of Technology North Bangkok, pp. 136-146.
- [6] Kornphan T. et al. (2561). Developing Blended Lessons for Developing Communication Skills for Students Sergeant at Naval Chumphon School. Journal of Humanities and Social Sciences Chulachomkiao Royal Military Academy. Year 8 (2564), pp. 11-24.
- [7] RawiphonC. (2021). Development of Web Application for Packing Design. [Online] Available from:
<https://airconline.com/ijma/V13N5/13521ijma01.pdf>. [2022, January, 15].
- [8] Tawee W. and Nuansri C. (2012). The Development of Computer-Assisted Instruction on Parallel Lines for SecondarySchool Students 2. Journal of Graduate Studies. Rajabhat Nakhon Sawan University, pp. 69-84.
- [9] Alongkorn U. (2017). Effects of collaborative, blended learning on the ability to work in groups, subjects, occupations and technology 4 of Mathayomsuksa 5 students (Master of Education Thesis). Silpakorn University, pp. 80-84.

AUTHORS

Firstauthor:Ms.ThanatchaRattanaphant1

E-mail : thanatcha_rat@nstru.ac.th

Occupation : Lecturer

Workplace:MajorofDigitalTechnologyforEducation, FacultyofEducation Rajabhat Nakhon Si Thammarat University, Nakhon Si Thammarat, Thailand

EducationalBackground:Ph.D.(ComputerEducation),KingMongkut'sUniversityof Technology North Bangkok



Correspondingauthor:Mr.SenaweeRoekmongkol2

E-mail : senawee_roe@nstru.ac.th

Occupation:Lecturer

Workplace : Major of Digital Technologyfor Education, Facultyof Education Rajabhat Nakhon Si Thammarat University, Nakhon Si Thammarat, Thailand

EducationalBackground:M.Ed(EducationTechnology),KasetsartUniversity



GAMIFICATION ELEMENTS AND THEIR IMPACTS ON TEACHING AND LEARNING – A REVIEW

**Mohd Hishamuddin Abdul Rahman, Ismail @ Ismail Yusuf Panessai, Noor Anida Zaria
Mohd Noor and Nor Syazwani Mat Salleh
Department of Computing, Faculty of Art, Computing & Creative Industry, Universiti
Pendidikan Sultan Idris, Tanjung Malim, Perak, Malaysia**

ABSTRACT

This paper discusses the results of a literature review to identify the elements of gamification in learning that have been applied in previous studies and their impacts on student learning, with only taking into account the related studies within the last three years (2016 to 2018). This is done to determine the most effective and suitable elements of gamification to be applied in our study and at the same time to identify research gaps that need to be fulfilled in future researches. The results of this review show that gamification has positive impact on student learning particularly in their engagement and achievement. Furthermore, points, leaderboard and digital badge are the most applied gamification elements in the studies. The findings will be used as a guide for designing a gamified collaborative learning activities in the 3-dimensional virtual world that will be carried out later.

KEYWORDS

Gamification, Game-based Learning, Virtual World

Full Text: <https://aircconline.com/ijma/V10N6/10618ijma04.pdf>

Volume Link: https://www.airccse.org/journal/ijma_current18.html

REFERENCES

- [1] Dicheva, D., Dichev, C., Agre, G., & Angelova, G. (2015). Gamification in education: A systematic mapping study. *Journal of Educational Technology & Society*, 18(3), 9.
- [2] Vlachopoulos, D., & Makri, A. (2017). The effect of games and simulations on higher education: a systematic literature review. *International Journal of Educational Technology in Higher Education*, 14(1), 22.
- [3] Google Trend (2017). Game-based learning. Retrieved from <https://trends.google.com/trends/explore?date=today%205-y&q=gamebased%20learning>.
- [4] Hoe, T. W. (2015). *Gamifikasi dalam pendidikan: Pembelajaran berbasis permainan*. Tanjung Malim: Universiti Pendidikan Sultan Idris.
- [5] Tsay, C. H. H., Kofinas, A., & Luo, J. (2018). Enhancing student learning experience with technology-mediated gamification: An empirical study. *Computers & Education*, 121, 1-17.
- [6] Alsawaier, R. S. (2018). The effect of gamification on motivation and engagement. *The International Journal of Information and Learning Technology*, 35(1), 56-79.
- [7] Chan, K. Y. G., Tan, S. L., Hew, K. F. T., Koh, B. G., Lim, L. S., & Yong, J. C. (2017). Knowledge for games, games for knowledge: designing a digital roll-and-move board game for a law of torts class. *Research and Practice in Technology Enhanced Learning*, 12(1), 7.
- [8] Sepehr, S., & Head, M. (2013, October). Competition as an element of gamification for learning: an exploratory longitudinal investigation. In *Proceedings of the First International Conference on Gameful Design, Research, and Applications* (pp. 2-9). ACM.
- [9] Szegletes, L., Koles, M., & Forstner, B. (2015). Socio-cognitive gamification: general framework for educational games. *Journal on Multimodal User Interfaces*, 9(4), 395-401.
- [10] Alexiou, A., & Schippers, M. C. (2018). Digital game elements, user experience and learning: A conceptual framework. *Education and Information Technologies*, 1-23.
- [11] Cózar-Gutiérrez, R., & Sáez-López, J. M. (2016). Game-based learning and gamification in initial teacher training in the social sciences: an experiment with Minecraft Edu. *International Journal of Educational Technology in Higher Education*, 13(1), 2.
- [12] González, C. S., Gómez, N., Navarro, V., Cairós, M., Quirce, C., Toledo, P., & Marrero-Gordillo, N. (2016). Learning healthy lifestyles through active videogames, motor games and the gamification of educational activities. *Computers in Human Behavior*, 55, 529-551.
- [13] Hew, K. F., Huang, B., Chu, K. W. S., & Chiu, D. K. (2016). Engaging Asian students through game mechanics: Findings from two experiment studies. *Computers & Education*, 92, 221-236.
- [14] Pesare, E., Roselli, T., Corriero, N., & Rossano, V. (2016). Game-based learning and gamification to promote engagement and motivation in medical learning contexts. *Smart Learning Environments*, 3(1), 5.
- [15] Spires, H. A., & Lester, J. C. (2016). Game-based learning: creating a multidisciplinary community of inquiry. *On the Horizon*, 24(1), 88-93.

AUTHORS

Dr. Mohd Hishamuddin Abdul Rahman is a senior lecturer at the Faculty of Art, Computing & Creative Industry, Universiti Pendidikan Sultan Idris (UPSI). His research interests are towards educational technology, multimedia, virtual learning environment, game-based learning and gamification, virtual and augmented reality and also new media in teaching and learning.

Dr. Ismail @ Ismail Yusuf Panessai is a senior lecturer at the Faculty of Art, Computing & Creative Industry, Universiti Pendidikan Sultan Idris (UPSI). His research interests are towards Artificial Intelligence, Artificial Intelligence in education, VR and Control System.

Dr. Noor Anida Zaria Binti Mohd Noor is a senior lecturer at the Faculty of Art, Computing & Creative Industry, Universiti Pendidikan Sultan Idris (UPSI). Her research interests are towards Information Technology, Knowledge Management, Knowledge Integration and Project Management.

Dr. Nor Syazwani Binti Mat Salleh is a senior lecturer at the Faculty of Art, Computing & Creative Industry, Universiti Pendidikan Sultan Idris (UPSI). Her research interests are towards ICT in Education, Art & Design, Graphic Design and Personalized Learning.

AN EVALUATION OF THE USE OF AUDIO GUIDANCE IN AUGMENTED REALITY SYSTEMS IMPLEMENTED AT SITES OF CULTURAL HERITAGE

Benjamin Wilson, Joshua Hull and Damian Schofield

Department of Computer Science, State University of New York, Oswego, New York, 13126, USA

ABSTRACT

Recently, museums and historic sites have begun reaching out beyond their traditional audience groups, using more innovative digital display technology to find and attract a new audience. Virtual, mixed, and Augmented Reality (AR) technologies are becoming more ubiquitous in our society and “virtual history” exhibits are starting to be available to the public. There are numerous studies focusing on AR, however a scant amount of research is being done at historical sites. An initial experiment used repeated measures (ANOVA) to compare and rank three different types of AR devices used at a site of cultural heritage. A further experiment was then undertaken to observe participants using two different AR devices with and without sound to determine if which device used or the presence of sound impact the usability of the device, or the user’s satisfaction/preference of specific devices. Several surveys, including demographic and usability surveys, were provided in order to collect a range of user data. A two-way repeated measures (ANOVA) were used to analyze the quantitative data gathered. No significant effects were observed based on the quantitative data provided by the surveys, indicating that all devices were equally usable and satisfactory, and that sound did not have a significant impact in this instance. However, the qualitative data indicated that users may prefer using AR technology on a smartphone device and preferred to use this device paired with sound.

KEYWORDS

Augmented Reality, Audio Guide, Cultural Heritage, Human Computer Interaction (HCI), Usability

FullText: <https://airconline.com/ijma/V14N2/14222ijma01.pdf>

VolumeLink: https://aircse.org/journal/ijma_current22.html

REFERENCES

- [1] C. Yoon (2018) "Assumptions that led to the failure of Google Glass", NYC-Design.
- [2] P. A. Rauschnabel (2018) "Virtually enhancing the real world with holograms: An exploration of expected gratifications of using augmented reality smart glasses", *Psychology & Marketing*, 35(8), 557-572.
- [3] D. Schofield, T. Johnson, D. Hufnagel, P. Chapagain, S. Colletta, and P. Lear (2021) "Augmenting cultural experience: Evaluating the use of augmented reality technology to enhance the visitor experience at a historic site", *Journal of Studies in Social Sciences and Humanities* 7 (2) 129-145
- [4] D. Ivancic, D. Schofield, and L. Dethridge (2013) "The effects of perspective and presentation: User experience in a virtual art gallery", *International Journal of Computer Research*, 20(1) 53-77.
- [5] S. Sharples, S. Cobb, A. Moody, and J. R. Wilson (2008) "Virtual reality induced symptoms and effects (VRISE): Comparison of head mounted display (HMD)", desktop and projection display systems. *Displays*, 29(2) 58-69.
- [6] Y. A. A. Pizarro, A. A. De Salles, S. Severo, J. L. Garzón, and S. M. R. Bueno (2014) "Specific Absorption Rate (SAR) in the head of Google glasses and Bluetooth users", In *IEEE Latin-America Conference on Communications (LATINCOM)*, 1-6.
- [7] D. Wagner, T. Pintaric, F. Ledermann, and D. Schmalstieg (2005) "Towards massively multi-user augmented reality on handheld devices", In *International Conference on Pervasive Computing*, Springer, Berlin, Heidelberg, 208-219.
- [8] P. Walsh (2020) "Innovative Technology Is The Future Of Education", *Forbes*, July.
- [9] P. Vate-U-Lan, (2012, July). An augmented reality 3d pop-up book: the development of a multimedia project for English language teaching. In *IEEE International Conference on Multimedia and Expo (2012)* 890-895.
- [10] J. L. Soler, J. Ferreira, M. Contero, and M. Alcañiz (2017) "The power of sight: using eye tracking to assess learning experience in virtual reality environments", In *Proceedings of INTED2017*, 8684- 8689.
- [11] W. S. Khor, B. Baker, K. Amin, A. Chan, K. Patel, and J. Wong (2016) "Augmented and virtual reality in surgery - the digital surgical environment: applications, limitations and legal pitfalls", *Annals of Translational Medicine*, 4(23).
- [12] J. Carmigniani, B. Furht, M. Anisetti, P. Ceravolo, E. Damiani, and M. Ivkovic (2011) "Augmented reality technologies, systems and applications. *Multimedia Tools and Applications*", 51(1) 341-377.
- [13] T. P. Caudell, and D. W. Mizell (1992) "Augmented reality: an application of heads-up display technology to manual manufacturing processes", In *Proceedings of the Twenty-Fifth Hawaii International Conference on System Sciences*, IEEE, Vol. 2 659-669.
- [14] Q. M. Bui, T. N. Le, V. T. Nguyen, M. T. Tran, and A. D. Duong (2012) "Applying fast planar object detection in multimedia augmentation for products with mobile devices", In *4th International Conference on Intelligent Human-Machine Systems and Cybernetics*, IEEE, Vol. 2 292-297.
- [15] B. B. Bederson (1995) "Audio augmented reality: a prototype automated tour guide", In *Conference Companion on Human Factors in Computing Systems*, 210-211.
- [16] R. T. Azuma (1997) "A survey of augmented reality. *Presence: Teleoperators and Virtual Environments*", 6(4) 355-385.
- [17] S. Feiner, B. MacIntyre, T. Höllerer, and A. Webster (1997) "A touring machine: Prototyping 3D mobile augmented reality systems for exploring the urban environment", *Personal Technologies*, 1(4) 208-217.
- [18] G. Reitmayr, and D. Schmalstieg (2021) "Mobile collaborative augmented reality", In *Proceedings IEEE and ACM International Symposium on Augmented Reality*, 114-123.
- [19] H. Kaufmann, and D. Schmalstieg (2002) "Mathematics and geometry education with collaborative augmented reality", In *ACM SIGGRAPH 2002 Conference Abstracts and Applications*, 37-41.
- [20] M. Mohring, C. Lessig, and O. Bimber (2004) "Video see-through AR on consumer cell-phones", In *Third IEEE and ACM International Symposium on Mixed and Augmented Reality*, 252-253.
- [21] A. Henrysson, M. Billinghurst, and M. Ollila (2005) "Face to face collaborative AR on mobile phones", In *Fourth IEEE and ACM International Symposium on Mixed and Augmented Reality*, 80-89.
- [22] R. M. Yilmaz, and Y. Goktas, Y. (2017) "Using augmented reality technology in storytelling activities: examining elementary students' narrative skill and creativity", *Virtual Reality*, 21(2) 75-89.
- [23] T. Chandrasekera, and S. Y. Yoon (2018) "Augmented Reality, Virtual Reality and Their Effect on Learning Style in the Creative Design Process", *Design and Technology Education*, 23(1).
- [24] A. Ruiz-Ariza, R. A. Casuso, S. Suarez-Manzano, and E. J. Martínez-López (2018) "Effect of augmented reality game Pokémon GO on cognitive performance and emotional intelligence in adolescent youth", *Computers and Education*, 116 49-63.
- [25] J. M. Harley, E. G. Poitras, A. Jarrell, M. C. Duffy, and S. P. Lajoie, S. P. (2016) "Comparing virtual and location-based augmented reality mobile learning: emotions and learning outcomes", *Educational*

Technology Research and Development, 64(3), 359-388.

[26] C. Suso-Ribera, J. Fernández-Álvarez, A. García-Palacios, H. G. Hoffman, J. Bretón-López, R. M. Banos, and C. Botella (2019) "Virtual reality, augmented reality, and in vivo exposure therapy: a preliminary comparison of treatment efficacy in small animal phobia", *Cyberpsychology, Behavior, and Social Networking*, 22(1) 31-38.

[27] C. F. Tsai, S. C. Yeh, Y. Huang, Z. Wu, J. Cui, and L. Zheng (2018) "The effect of augmented reality and virtual reality on inducing anxiety for exposure therapy: a comparison using heart rate variability", *Journal of Healthcare Engineering*, 1-8.

[28] D. Mouraux, E. Brassinne, S. Sobczak, A. Nonclercq, N. Warzée, P. S. Sizer, and B. Penelle (2019) "3D augmented reality mirror visual feedback therapy applied to the treatment of persistent, unilateral upper extremity neuropathic pain: a preliminary study", *Journal of Manual & Manipulative Therapy*, 25(3), 137-143.

[29] P. A. Rauschnabel, R. Felix, and C. Hinsch (2019) "Augmented reality marketing: How mobile AR apps can improve brands through inspiration", *Journal of Retailing and Consumer Services*, 49, 43-53.

[30] T. Hilken, K. de Ruyter, M. Chylinski, D. Mahr, and D. I. Keeling (2017) "Augmenting the eye of the beholder: exploring the strategic potential of augmented reality to enhance online service experiences", *Journal of the Academy of Marketing Science*, 45(6), 884-905.

[31] R. Yung, and C. Khoo-Lattimore (2019) "New realities: a systematic literature review on virtual reality and augmented reality in tourism research", *Current Issues in Tourism*, 22(17) 2056-2081.

[32] D. I. Han, M. C. Dieck, and T. Jung, T (2018) "User experience model for augmented reality applications in urban heritage tourism", *Journal of Heritage Tourism*, 13(1), 46-61.

[33] C. D. Kounavis, A. E. Kasimati, and E. D. Zamani (2012) "Enhancing the Tourism Experience through Mobile Augmented Reality: Challenges and Prospects", *International Journal of Engineering Business Management*, 4, 10.

[34] A. Tomiuc (2012) "Navigating Culture. Enhancing Visitor Museum Experience through Mobile Technologies. From Smartphone to Google Glass", *Journal of Media Research-Revista de Studii Media*, 7(3:20) 33-46.

[35] T. Jung, M. C. Dieck, H. Lee, and N. Chung, Effects of virtual reality and augmented reality on visitor experiences in museum. *Information and Communication Technologies in Tourism*, (2016) 621-635.

[36] C. Edwards (2013) "Better than Reality?", *Engineering and Technology*, 8(4) 28-31.

[37] K. D. Johnson, J. C. Díaz, and R. B. Pickering (2012) "Virtual Tours for Museum Exhibits. Proceedings of Electronic Visualisation and the Arts Conference", (EVA 2012), London, UK, 100-106.

[38] D. Tschirtz and S. J. Gibbs (1991) "Virtual Museums and Virtual Realities", In proceedings of the International Conference on Hypermedia and Interactivity in Museums, 17-25.

[39] C. Lin-Hendel (2009) "System and method for constructing and displaying active virtual reality cyber malls, show rooms, galleries, stores, museums, and objects within", (United States Patent No. US7574381B1).

[40] S. A. Yoon and J. Wang (2014) "Making the invisible visible in science museums through augmented reality devices", *TechTrends*, 58(1) 49-55.

[41] A. Damala, P. Cubaud, A. Bationo, P. Houlier, and I. Marchal (2008) "Bridging the gap between the digital and the physical: design and evaluation of a mobile augmented reality guide for the museum visit", *Proceedings of the 3rd International Conference on Digital Interactive Media in Entertainment and Arts*, ACM, 120 - 127.

[42] S. Sylaiou, A. Karoulis, Y. Stavropoulos, and P. Patias, (2008) "Presence-Centered Assessment of Virtual Museums' Technologies", *DESIDOC Journal of Library and Information Technology*, 28(4), 55-62.

[43] M. T. Yang and W. C. Liao, W. C. (2014) "Computer-assisted culture learning in an online augmented reality environment based on free-hand gesture interaction" *IEEE Transactions on Learning Technologies*, 7(2) 107-117.

[44] N. Ghouaiel, S. Garbaya, J. M. Cieutat, and J. P. Jessel (2017) "Mobile Augmented Reality in Museums: Towards Enhancing Visitor's Learning Experience", *International Journal of Virtual Reality*, 17(1) 21-31.

[45] M. Ding (2017) "Augmented reality in museums, Museums & augmented reality—A collection of essays from the arts management and technology laboratory", 1-15.

[46] M. C. T. Dieck, T. Jung and D. Han (2016) "Mapping requirements for the wearable smart glasses augmented reality museum application", *Journal of Hospitality and Tourism Technology*, 7(3) 230-253.

[47] P. A. Rauschnabel (2018) "Virtually enhancing the real world with holograms: An exploration of expected gratifications of using augmented reality smart glasses", *Psychology and Marketing*, 35(8) 557-572.

[48] National Historic Landmarks Program (U.S. National Park Service). (2018, August 29). Retrieved July 8, 2020, from <https://www.nps.gov/orgs/1582/index.htm>

[49] B. K. Seo, K. Kim, and J. I. Park (2010) "Augmented reality-based on-site tour guide: a study in

- Gyeongbokgung”, In Proceedings of Asian Conference on Computer Vision, Springer, Berlin, Heidelberg 276-285.
- [50] R.E. Bell, Fort Ontario, New York. On Point, 22(4) (2017) 46-49.
- [51] NRIS (National Register Information System), (2010) National Register of Historic Places. National Park Service.
- [52] F. Tschew, and D. Buhalis (2016) “Augmented reality at cultural heritage sites”, Information and Communication Technologies in Tourism, 607-619.
- [53] T. Gjørseter, Affordances in Mobile Augmented Reality Applications. International Journal of Interactive Mobile Technologies, 8(4) (2014) 45-55.
- [54] E. Cranmer, and T. Jung (2014) “Augmented reality (AR): Business models in urban cultural heritage tourist destinations”, Proceedings of APacCHRIE Conference, Malaysia, 21-24.
- [55] J. R. Lewis (1995) “IBM computer usability satisfaction questionnaires: psychometric evaluation and instructions for use”, International Journal of Human-Computer Interaction, 7(1) 57-78.
- [56] N. Singh, S. Srivastava, and N. Sinha (2017) “Consumer preference and satisfaction of M-wallets: a study on North Indian consumers”, International Journal of Bank Marketing.
- [57] A. Poushineh, and A. Z. Vasquez-Parraga (2017) “Discernible impact of augmented reality on retail customer's experience, satisfaction and willingness to buy”, Journal of Retailing and Consumer Services, 34 229-234.
- [58] U. C. Pendit, S. B. Zaibon, and J. A. Bakar (2014) “Mobile augmented reality for enjoyable informal learning in cultural heritage site”, International Journal of Computer Applications, 92(14) 19-26.
- [59] A. Härmä, J. Jakka, M. Tikander, M. Karjalainen, T. Lokki, J. Hiipakka, and G. Lorho, (2004) “Augmented reality audio for mobile and wearable appliances”, Journal of the Audio Engineering Society, 52(6) 618-639.
- [60] S. H. Halili, (2019) “Technological advancements in education” 4.0. The Online Journal of Distance Education and e-Learning, 7(1) 63-69.

AUTHORS

Benjamin Wilson recently completed a masters degree in Human-Computer Interaction from the State University of New York at Oswego.

Joshua Hull recently completed a masters degree in Human-Computer Interaction from the State University of New York at Oswego.

Damian Schofield is a full professor and director of the Human-Computer Interaction masters program at the State University of New York at Oswego.

TRANSMISSION OF SUCCESSFUL ROUTE ERROR MESSAGE (RERR) IN ROUTING AWARE MULTIPLE DESCRIPTION VIDEO CODING OVER MOBILE ADHOC NETWORK

Kinjal Shah, Gagan Dua, Dharmendar Sharma, Priyanka Mishra, Nitin Rakesh

**Department of Computer Science & Engineering, Jaypee University, Wazirpur, Dist. Solan (H.P)
kinjal.93@gmail.com, d.sharma000@gmail.com, dua.gagan@live.in, mishrapriyanka6@gmail.com, nitin.rakesh@gmail.com**

ABSTRACT

Video transmission over mobile ad-hoc networks is becoming important as these networks become more widely used in the wireless networks. We propose a routing-aware multiple description video coding approach to support video transmission over mobile ad-hoc networks with single and multiple path transport. We build a model to estimate the packet loss probability of each packet transmitted over the network based on the standard ad-hoc routing messages and network parameters without losing the RERR message. We then calculate the frame loss probability in order to eliminate error without any loss of data.

KEYWORDS

Network Protocols, Wireless Network, Mobile Network, Virus, Worms & Trojan Full

Text: <https://airconline.com/ijma/V3N3/3311ijma05.pdf>

Volume Link: https://aircse.org/journal/ijma_current11.html

REFERENCES

- [1]. RoutingAware Multiple Description VideoCodingover Mobile Ad-hoc Networks, Yiting Liao, JerryD Gibbson, IEEE Transactions on Multimedia, Vol. 13, no. 1 February2011.
- [2]. Y. Wang, A. R. Reibman, and S. Lin, "Multiple description coding for video delivery," Proc. IEEE, vol. 93, no. 1, pp. 57–70, Jan. 2005.
- [3]. J. G. Apostolopoulos, "Reliable video communication over lossy packet networks using multiple state encoding and path diversity," SPIE Proc. Vis. Commun. Image Process. vol. 4310, no. 1, pp. 392–409, 2001. [4]. N. Gogate, D. M. Chung, S. S. Panwar, Y. Wang, F. N. Commun, and P. River, "Supporting image and video applications in a multihop radio environment using path diversity and multiple description coding," IEEE Trans. Circuits Syst. Video Technol., vol. 12, no. 9, pp. 777–792, Sep. 2002.
- [5]. S. Mao, S. Lin, S. S. Panwar, Y. Wang, and E. Celebi, "Video transport over ad hoc networks: Multistream coding with multipath transport," IEEE J. Select. Areas Commun., vol. 21, no. 10, pp. 1721–1737, 2003.
- [6]. B. A. Heng, J. G. Apostolopoulos, and J. S. Lim, "End-to-end rate distortion optimized MD mode selection for multiple description video coding," EURASIP J. Appl. Signal Process., 2006.
- [7]. V. A. Vaishampayan and S. John, "Balanced interframe multiple description video compression," in Proc. Int. Conf. Image Processing, 1999, vol. 3, pp. 812–816.
- [8]. T. Nguyen and A. Zakhor, "Matching pursuits based multiple description video coding for lossy environments," in Proc. Int. Conf. Image Processing, Sep. 2003, vol. 1, pp. 1–57–60.
- [9]. Y.-C. Lee, Y. Altunbasak, and R. M. Mersereau, "A drift-free motion-compensated predictive encoding technique for multiple description coding," in Proc. Int. Conf. Multimedia and Expo., Jul. 2003, vol. 3, pp. III–581–584.
- [10]. A. C. Begen, Y. Altunbasak, and O. Ergun, "Multi-path selection for multiple description encoded video streaming," in Proc. IEEE Int. Conf. Communications, May 2003, vol. 3, pp. 1583–1589.
- [11]. S. Mao, Y. T. Hou, X. Cheng, H. D. Sherali, S. F. Midkiff, and Y. Q. Zhang, "On routing for multiple description video over wireless ad hoc networks," IEEE Trans. Multimedia, vol. 8, no. 5, pp. 1063–1074, 2006.
- [12]. S. Kompella, S. Mao, Y. T. Hou, and H. D. Sherali, "Path selection and rate allocation for video streaming in multihop wireless networks," in Proc. Military Communication Conf., Oct. 2006, pp. 1–7.
- [13]. S. Murthy, P. Hegde, V. Parameswaran, B. Li, and A. Sen, "Improved path selection algorithms for multipath video streaming in wireless ad-hoc networks," in Proc. Military Communications Conf., 2007, pp. 1–7.
- [14]. S. Lin, S. Mao, Y. Wang, and S. Panwar, "A reference picture selection scheme for video transmission over ad-hoc networks using multiple paths," in Proc. IEEE Int. Conf. Multimedia Expo., Aug. 2001, pp. 96–99.
- [15]. Y. J. Liang, E. Setton, and B. Girod, "Channel-adaptive video streaming using packet path diversity and rate-distortion optimized reference picture selection," in Proc. IEEE Workshop Multimedia Signal Processing, Dec. 2002, pp. 420–423.
- [16]. J. Hu, S. Choudhury, and J. D. Gibson, "Assessment of delivered AVC/H.264 video quality over 802.11a WLANs with multipath fading," in Proc. 1st Multimedia Communications Workshop, 2006.
- [17]. J. Hu, S. Choudhury, and J. Gibson, "Video capacity of WLANs with a multiuser perceptual quality constraint," IEEE Trans. Multimedia, vol. 10, no. 8, pp. 1465–1478, Dec. 2008.
- [18]. Y. Liao and J. D. Gibson, "Refined error concealment for multiple state video coding over ad hoc networks," in Proc. 42nd Asilomar Conf. Signals, Systems and Computers, Oct. 2008, pp. 2243–2247.
- [19]. A. Nasipuri and S. R. Das, "On-demand multipath routing for mobile ad hoc networks," in Proc. 8th Int. Conf. Computer Communications and Networks, 1999, pp. 64–70.
- [20]. S. J. Lee and M. Gerla, "Split multipath routing with maximally disjoint paths in ad hoc networks," in Proc. IEEE Int. Conf. Communications, 2001, vol. 10, pp. 3201–3205.
- [21]. M. K. Marina and S. R. Das, "On-demand multipath distance vector routing in ad hoc networks," in Proc. 9th Int. Conf. Network Protocols, Nov. 2001, pp. 14–23.
- [22]. Z. Ye, S. V. Krishnamurthy, and S. K. Tripathi, "A framework for reliable routing in mobile ad hoc networks," in Proc. 22nd Annu. Joint Conf. IEEE Computer and Communications, 2003, vol. 1, pp. 270–280.
- [23]. D. B. Johnson and D. A. Maltz, "Dynamic source routing in ad hoc wireless networks," in Mobile Computing, T. Imielinski and H. F. Korth, Eds. New York: Springer, 1996, vol. 353, pp. 153–181.
- [24]. S. Mueller, R. P. Tsang, and D. Ghosal, "Multipath routing in mobile ad hoc networks: Issues and challenges," in Performance Tools and Applications to Networked Systems. New York: Springer, 2004, vol. 2965, pp. 209–234.

- [25]. Y. Liao and J. D. Gibson, "Routing-aware multiple description video coding over wireless ad-hoc networks using multiple paths," in Proc. Int. Conf. Image Processing (ICIP), Sep. 2010.
- [26]. IEEE Standard Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications, IEEE Std. 802.11-2007 (Revision of IEEE Std. 802.11-1999), 2007.
- [27]. Y. J. Liang, J. G. Apostolopoulos, and B. Girod, "Analysis of packet loss for compressed video: Effect of burst losses and correlation between error frames," IEEE Trans. Circuits Syst. Video Technol., vol. 18, no. 7, pp. 861–874, Jul. 2008

AUTHORS

Kinjal Shah received his B.E degree in Computer Engineering from Arvindbhai.D.Patel Institute of Technology, New Vallabh Vidyanagar, Distt. Anand in 2009. He is currently pursuing MTECH degree in Computer Science & Engineering at Jaypee University of Information Technology, Wagnaghat, Solan-173215. His research interest includes Cloud Computing, Cryptography & Network Security, Multimedia Data Transmission in ad-hoc networks.

Gagan Dua received his B.E. degree in Computer Engineering from Shri Krishan Institute of Engineering & Technology, Kurukshetra in 2009. He completed his three years diploma in Computer Engineering from Seth Jai Parkash Polytechnic, Damla (Yamunanagar, Haryana). Currently he is pursuing MTECH degree in Computer Engineering at Jaypee University of Information Technology, Wagnaghat, Solan-173215. His areas of interest are multimedia data communication & microprocessor.

Dharmendar Sharma received his B.E degree in Information Technology from Ajay Kumar Garg Engineering College, Ghaziabad in 2009. Currently he is pursuing MTECH degree in Computer Science & Engineering at Jaypee University of Information Technology, Wagnaghat, Solan-173215. His area of interests are data warehousing & data Mining, data communication & networking.

Priyanka Mishra received her B.E degree in Electronics & Communication Engineering from BBS College of Engineering & Technology, Allahabad in 2009. Currently she is pursuing MTECH degree in Electronics & Communication Engineering at Jaypee University of Information Technology, Wagnaghat, Solan-173215. Her area of interests are data communication & networking.

Nitin Rakesh is Sr. Lecturer in the Department of Computer Science and Engineering & Information Technology, Jaypee University of Information Technology (JUIT), Wagnaghat, Solan-173215, Himachal Pradesh, India. In 2004, he received the Bachelor's Degree in Information Technology and Master's Degree in Computer Science and Engineering in year 2007. Currently he is pursuing his doctorate in Computer Science and Engineering and his topic of research is parallel and distributed systems. He is a member of IEEE, IAENG and is actively involved in research publication. His research interest includes Interconnection Networks & Architecture, Fault-tolerance & Reliability, Networks-on-Chip, Systems-on-Chip, and Networks-in-Packages, Network Algorithms, Parallel Algorithms, Fraud Detection. Currently he is working on Efficient Parallel Algorithms for advanced parallel architectures.