

Documents

Hariyanto, D.^a, Rafiq, A.A.^b, Gunawan, T.S.^c, Quynh, N.V.^d

Exploring the research trends and development of augmented reality and virtual reality in ASEAN countries: a bibliometric study

(2024) *International Journal of Electrical and Computer Engineering*, 14 (4), pp. 4430-4444.

DOI: 10.11591/ijece.v14i4.pp4430-4444

^a Department of Electrical Engineering Education, Faculty of Engineering, Universitas Negeri Yogyakarta, Yogyakarta, Indonesia

^b Electronic Engineering Department, Politeknik Negeri Cilacap, Cilacap, Indonesia

^c Department of Electrical and Computer Engineering, International Islamic University Malaysia, Kuala Lumpur, Malaysia

^d Faculty of Mechatronics and Electronics, Lac Hong University, Dong Nai, Viet Nam

Abstract

This review of Association of Southeast Asian Nations (ASEAN) augmented reality (AR) and virtual reality (VR) studies uses bibliometric analysis and VOSviewer mapping. This study looks at an extensive set of Scopus articles from reliable sources to determine who contributes to ASEAN AR and VR research, the themes, how people work together, and how people cite each other. A study of bibliographies shows that the number of ASEAN AR and VR research articles has grown significantly since 2010. It also talks about important ASEAN study institutions, authors, and countries. The study themes are shown visually on VOSviewer mapping, showing how AR and VR can be used in healthcare, travel, gaming, and business. Co-authorship and reference networks shed light on how people work together on research projects and how ideas move within and outside of ASEAN. This organized review of ASEAN AR and VR research helps researchers, policymakers, and business stakeholders understand the current situation, find research gaps, and work together. The results can change research, resource use, and policy changes to encourage the growth and use of AR and VR technologies in ASEAN. It can lead to more innovation, economic development, and positive social effects. © 2024 Institute of Advanced Engineering and Science. All rights reserved.

Author Keywords

ASEAN; Augmented reality; Bibliometric analysis; Virtual reality; VOSviewer

References

- (2024) *ASEAN Digital Masterplan 2025*, ASEAN Publication
- Julian, H. L. C., Chung, T., Wang, Y.
Adoption of Metaverse in South East Asia: Vietnam, Indonesia, Malaysia
(2023) *Strategies and Opportunities for Technology in the Metaverse World, IGI Global*, pp. 196-234.
- Yaqoob, I., Salah, K., Jayaraman, R., Omar, M.
Metaverse applications in smart cities: enabling technologies, opportunities, challenges, and future directions
(2023) *Internet of Things*,
- Elmqaddem, N.
Augmented reality and virtual reality in education. Myth or reality?
(2019) *International journal of emerging technologies in learning*, 14 (3).
- yue Qiu, X., Chiu, C. K., Zhao, L. L., Sun, C. F., jie Chen, S.
Trends in VR/AR technology-supporting language learning from 2008 to 2019: a research perspective
(2021) *Interactive Learning Environments*, pp. 1-24.
- Arici, F., Yildirim, P., Caliklar, Ş., Yilmaz, R. M.
Research trends in the use of augmented reality in science education: content and

- bibliometric mapping analysis**
(2019) *Computers and Education*, 142.
- Bourhim, E. M., Cherkaoui, A.
Efficacy of virtual reality for studying people's pre-evacuation behavior under fire
(2020) *International Journal of Human Computer Studies*, 142.
 - Nevelsteen, K. J. L.
Virtual world, defined from a technological perspective and applied to video games, mixed reality, and the Metaverse
(2018) *Computer Animation and Virtual Worlds*, 29 (1), pp. 1-36.
 - C\ualin, R.-A.
Virtual reality, augmented reality and mixed reality-trends in pedagogy
(2018) *Social Sciences and Education Research Review*, 5 (1), pp. 169-179.
 - Malik, H. R., Nawaz, N. A., Al-Zghoul, M. B.
Impact of augmented reality and virtual reality in the transformation of virtual customer relationship management sector
(2020) *2020 IEEE 7th International Conference on Engineering Technologies and Applied Sciences (ICETAS)*, pp. 1-5.
 - Christopoulos, A., Conrad, M., Shukla, M.
Increasing student engagement through virtual interactions: How?
(2018) *Virtual Reality*, 22 (4), pp. 353-369.
 - Okechukwu, M., Udoka, F.
Understanding virtual reality technology: advances and applications
(2011) *Advances in Computer Science and Engineering*,
 - Fitria, T. N.
Augmented reality (AR) and virtual reality (VR) technology in education: media of teaching and learning: a review
(2023) *International Journal of Computer and Information System (IJCIS)*, 4 (1), pp. 14-25.
 - Delgado, J. M. D., Oyedele, L., Demian, P., Beach, T.
A research agenda for augmented and virtual reality in architecture, engineering and construction
(2020) *Advanced Engineering Informatics*, 45.
 - Zeng, J.-Y., Xing, Y., Jin, C.-H.
The impact of VR/AR-Based consumers' brand experience on consumer-brand relationships
(2023) *Sustainability*, 15 (9).
 - Baroroh, D. K., Agarwal, A.
Immersive technologies in Indonesia faces" new normal" COVID-19
(2022) *International Journal of Technology*, 13 (3), pp. 633-642.
 - Trends, G.
2040: A more contested world
(2021) *The National Intelligence Council*,
 - Zhao, X., Ren, Y., Cheah, K. S. L.
Leading virtual reality (VR) and augmented reality (AR) in education: bibliometric and content analysis from the web of science (2018-2022)
(2023) *SAGE Open*, 13 (3).
 - Abd El-Latif, A. A., Maleh, Y., El-Affendi, M. A., Ahmad, S.
(2023) *Cybersecurity Management in Education Technologies: Risks and*

Countermeasures for Advancements in E-learning,
CRC Press

- Ironsi, C. S.
Investigating the use of virtual reality to improve speaking skills: insights from students and teachers
(2023) *Smart Learning Environments*, 10 (1).
- (2012) *Memorandum of understanding on the ASEAN cyber University project*,
ASEAN Cyber University Project
- van Eck, N. J., Waltman, L.
Software survey: VOSviewer, a computer program for bibliometric mapping
(2010) *Scientometrics*, 84 (2), pp. 523-538.
Aug
- Qin, Y., Xu, Z., Wang, X., Škare, M.
Green energy adoption and its determinants: a bibliometric analysis
(2022) *Renewable and Sustainable Energy Reviews*, 153.
- Muhammad, U. A.
Bibliometric analysis of local wisdom-based learning: direction for future history education research
(2022) *International Journal of Evaluation and Research in Education*, 11 (4), pp. 2209-2222.
- Masduki, N. A., Mahfar, M., Senin, A. A.
A bibliometric analysis of the graduate employability research trends
(2022) *International Journal of Evaluation and Research in Education*, 11 (1), pp. 172-181.
- Ariyani, Y. D., Wilujeng, I., Dwiningrum, S. I. A.
Bibliometric analysis of SCAMPER strategy over the past 20 years
(2022) *International Journal of Evaluation and Research in Education*, 11 (4), pp. 1930-1938.
- Suprpto, N.
Research trend on TPACK through bibliometric analysis (2015-2019)
(2021) *International Journal of Evaluation and Research in Education*, 10 (4), pp. 1375-1385.
- Christ-Ribeiro, A., Chiattoni, L. M., Mafaldo, C. R. F., Badiale-Furlong, E., de Souza-Soares, L. A.
Fermented rice-bran by *Saccharomyces cerevisiae*: Nutritious ingredient in the formulation of gluten-free cookies
Food Bioscience, 40, p. 2021.
- Zyoud, S. H., Zyoud, A. H.
Visualization and mapping of knowledge and science landscapes in expert systems with applications journal: a 30 years' bibliometric analysis
(2021) *Sage Open*, 11 (2).
- Rodríguez-Rojas, A., Baeder, D. Y., Johnston, P., Regoes, R. R., Rolff, J.
Bacteria primed by antimicrobial peptides develop tolerance and persist
(2021) *PLoS Pathogens*, 17 (3), pp. 1-30.
- Guo, Y., Huang, Z., Guo, J., Li, H., Guo, X., Nkeli, M. J.
Bibliometric analysis on smart cities research
(2019) *Sustainability*, 11 (13), p. 3606.
Art

- Lulewicz-Sas, A.
Corporate social responsibility in the light of management science - bibliometric analysis
(2017) *Procedia Engineering*, 182, pp. 412-417.
- Gall, Gall, Borg
Situated ethics in educational research society for educational studies
(2007) *British Journal of Educational Studies*, 49 (3), pp. 362-365.
- Nassaji, H.
Qualitative and descriptive research: data type versus data analysis
(2015) *Language teaching research*, 19 (2), pp. 129-132.
Sage Publications Sage UK: London, England
- Groves, A.
Beyond Excel: how to start cleaning data with OpenRefine
(2016) *Multimedia Information and Technology*, 42 (2), pp. 18-22.
- Tillman, R. K.
The Code4Lib journal – extracting, augmenting, and updating metadata in fedora 3 and 4 using a local openrefine reconciliation service
(2016) *Code4Lib Journal*, (31), pp. 1-12.
- Méndez, E., Ribeiro, C., David, G., Lopes, J. C., Crestani, F.
Digital libraries for open knowledge
(2018) *22nd International Conference on Theory and Practice of Digital Libraries, TPD L 2018*, pp. 3-15.
- Skaf, L., Buonocore, E., Dumontet, S., Capone, R., Franzese, P. P.
Applying network analysis to explore the global scientific literature on food security
(2020) *Ecological Informatics*, 56.
- Perianes-Rodriguez, A., Waltman, L., van Eck, N. J.
Constructing bibliometric networks: a comparison between full and fractional counting
(2016) *Journal of Informetrics*, 10 (4), pp. 1178-1195.
- Waltman, L., van Eck, N. J.
Field-normalized citation impact indicators and the choice of an appropriate counting method
(2015) *Journal of Informetrics*, 9 (4), pp. 872-894.
- Waltman, L.
A review of the literature on citation impact indicators
(2016) *Journal of Informetrics*, 10 (2), pp. 365-391.
- Bezerra, J.
A worldwide bibliometric and network analysis of work-based learning research
(2020) *Higher Education, Skills and Work-based Learning*, 11 (3), pp. 601-615.
- Fonseca, E.
The nanograv nine-year data set: mass and geometric measurements of binary millisecond pulsars
(2016) *The Astrophysical Journal*, 832 (2).
- Nee, A. Y. C., Ong, S. K., Chryssolouris, G., Mourtzis, D.
CIRP annals - manufacturing technology augmented reality applications in design and manufacturing
(2012) *CIRP Annals - Manufacturing Technology*, 61 (2), pp. 657-679.

- Ai-Lim Lee, E., Wong, K. W., Fung, C. C.
How does desktop virtual reality enhance learning outcomes? A structural equation modeling approach
(2010) *Computers and Education*, 55 (4), pp. 1424-1442.
- Ong, X. W. S. K., Nee, A. Y. C.
A comprehensive survey of augmented reality assembly research
(2015) *Advances in Manufacturing*,
December 2016
- Ong, S. K., Yuan, M. L., Nee, A. Y. C.
Augmented reality applications in manufacturing: a survey
(2008) *International Journal of Production Research*, 46 (10), pp. 2707-2742.
- Lin, T., Duh, H. B., Li, N., Wang, H., Tsai, C.
Computers & education an investigation of learners' collaborative knowledge construction performances and behavior patterns in an augmented reality simulation system
(2013) *Computers & Education*, 68, pp. 314-321.
- Saidin, N. F., Halim, N. D. A., Yahaya, N.
A review of research on augmented reality in education: advantages and applications
(2015) *International education studies*, 8 (13), pp. 1-8.
- Park, J.-S.
All-Glass, large metalens at visible wavelength using deep- ultraviolet projection lithography
(2019) *Nano Letters*, 19 (12), pp. 8673-8682.
- Li, J. R., Khoo, L. P., Tor, S. B.
(2003) *Desktop virtual reality for maintenance training: an object oriented prototype system (V-REALISM)*, 52, pp. 109-125.
- Chong, J. W. S., Ong, S. K., Nee, A. Y. C., Youcef-youmi, K.
(2009) *Robotics and computer-integrated manufacturing robot programming using augmented reality: an interactive method for planning collision-free paths*, 25, pp. 689-701.
- Santos, M. E. C.
Augmented reality as multimedia: the case for situated vocabulary learning
(2016) *Research and Practice in Technology Enhanced Learning*,

Correspondence Address

Rafiq A.A.; Electronic Engineering Department, Dr., Soetomo St. No.1, Karangcengis, Sidakaya, Central Java, Indonesia;
email: aar@pnc.ac.id

Publisher: Institute of Advanced Engineering and Science

ISSN: 20888708

Language of Original Document: English

Abbreviated Source Title: Int. J. Electr. Comput. Eng.

2-s2.0-85195208267

Document Type: Article

Publication Stage: Final

Source: Scopus