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PENGEMBANGAN *VIRTUAL JOYSTICK* PADA *GAME VIRTUAL BIOTOPE* MENGGUNAKAN METODE *DESIGN THINKING*

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diajukan untuk memenuhi sebagian syarat untuk memperoleh gelar Sarjana Komputer Program Studi Rekayasa Perangkat Lunak

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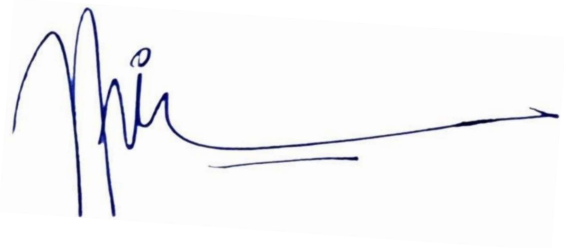

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PENGEMBANGAN *VIRTUAL JOYSTICK* PADA *GAME VIRTUAL BIOTOPE* MENGGUNAKAN METODE *DESIGN THINKING*

ABSTRAK

Virtual Biotope adalah sebuah *serious game* bergenre *mobile* 3D yang memiliki tujuan untuk meningkatkan kesadaran mengenai keberadaan Kampung Blekok beserta burung-burung yang berada di sana. *Game* tersebut memiliki tantangan keterbatasan ruang layar pada orientasi *portrait* dimana penelitian ini bertujuan untuk merancang dan mengevaluasi desain *virtual joystick* yang cocok untuk *game* jenis tersebut. *Virtual joystick* dikembangkan dengan metode *design thinking* untuk mengidentifikasi permasalahan dan menghasilkan solusi melalui iterasi pengembangan. Melalui tahap *design thinking*, akan dihasilkan desain *floating joystick* yang sudah dikembangkan kembali dan *fixed joystick* sebagai desain pembanding yang didapatkan dari solusi alternatif pada masalah *virtual joystick* di *game Virtual Biotope*. Kedua desain tersebut akan dievaluasi kelayakannya kepada 11 partisipan. Evaluasi kelayakan dilakukan berdasarkan aspek *usability* seperti kenyamanan *(comfort)*, kelelahan *(fatigue)*, kemudahan belajar *(ease of learning)*, dan kepuasan pengguna *(satisfaction)*. Standar ISO 9241-411 digunakan untuk menilai kenyamanan dan kelelahan, sedangkan kuisioner *Usefulness, Satisfaction, Ease of Use* (USE) mengukur kemudahan belajar dan kepuasan. Temuan menunjukkan bahwa kedua desain virtual joystick memiliki nilai yang cukup tinggi pada aspek-aspek tersebut, tanpa perbedaan signifikan di antara keduanya dengan perolehan nilai tiap aspek *fixed joystick* banding *floating joystick*: 4,09 banding 4,16 untuk aspek *general*, 4,09 banding 4,22 untuk aspek *fatigue,* 4,07 banding 4,36 untuk aspek *ease of learning,* dan 3,85 banding 4,00 untuk aspek *satisfaction.* Dari penelitian ini, *design thinking* dapat menghasilkan solusi pada permasalahan *virtual joystick* untuk *game* 3D berorientasi *portrait* melalui *fixed joystick* dan *floating joystick* yang diterima dengan baik oleh pengguna dan terbukti bahwa rekomendasi *floating joystick* dapat digunakan pada *game Virtual Biotope.*

Kata Kunci: ***Virtual Joystick*, *Design Thinking*, *Mobile Game*, *Usability*, *Human Conputer Interaction (HCI)***

DEVELOPMENT OF VIRTUAL JOYSTICK IN VIRTUAL BIOTOPE GAME USING DESIGN THINKING METHOD

ABSTRACT

"Virtual Biotope" is a mobile 3D serious game that aims to raise awareness about the existence of Kampung Blekok and its birds. The game faces challenges due to limited screen space in a portrait-orientation. This research is focused on designing and evaluating a suitable virtual joystick for this game. Design thinking is used as a method to identifying issues and generating solutions through iterative development. Through the design thinking process, floating joystick is re-developed for Virtual Biotope, and fixed joystick is used as comparison, derived from alternative solutions of virtual joystick issues in "Virtual Biotope". Both designs are evaluated by 11 participants based on usability aspects such as comfort, fatigue, ease of learning, and satisfaction. ISO 9241-411 standards are used to assess comfort and fatigue, while the Usefulness, Satisfaction, Ease of Use (USE) questionnaire measures ease of learning and satisfaction. The findings indicate that both virtual joystick designs have relatively high scores across these aspects, with no significant difference between the two. The scores for each aspect are as follows for fixed joystick versus floating joystick: 4.09 vs. 4.16 for the general aspect, 4.09 vs. 4.22 for fatigue, 4.07 vs. 4.36 for ease of learning, and 3.85 vs. 4.00 for satisfaction. From this research, it can be concluded that design thinking can provide solutions to virtual joystick issues for portrait-oriented 3D games, utilizing both fixed and floating joystick designs. These solutions were well-received by users, and the recommendation of the floating joystick design for "Virtual Biotope" has been proven effective.

Keywords: Virtual Joystick*, *Design Thinking*, *Mobile Game*, *Usability*, *Human Computer Interaction (HCI)

DAFTAR ISI

DAFTAR PUSTAKA

Baldauf, M., Fröhlich, P., Adegeye, F., dan Suette, S. (2015). Investigating on-screen gamepad designs for smartphone-controlled video games. *ACM Transactions on Multimedia Computing, Communications and Applications*, *12*. Volume 12, Issue 1s. Article No.: 22, Hal. 1–21.

Bonnie RJ, Stroud C, Breiner H, editors. (2015). Investing in the Health and Well-Being of Young Adults. Washington (DC): National Academies Press (US); 2015 Jan 27. 1, Introduction.

Bromley, S. (2022). *How many players do I need for a playtest*. Games User Research. Diakses 1 Agustus 2023

Budiu, R. (2023). *Between-subjects vs. within-subjects study design*. Nielsen Norman Group. Diakses 10 Agustus 2023

Difrancisco-Donoghue, J., Balentine, J., Schmidt, G., dan Zwibel, H. (2019). Managing the health of the eSport athlete: An integrated health management model. *BMJ Open Sport and Exercise Medicine*, Volume *5,* Issue 1.

Gabriel Ferreira Alves, Emerson Vitor Souza, Daniela Gorski Trevisan, Anselmo Antunes Montenegro, Luciana Cardoso de Castro Salgado, et al.. Applying Design Thinking for Prototyping a Game Controller. 17th International Conference on Entertainment Computing (ICEC), Sep 2018, Poznan, Poland. Hal.16-27.

Gao, M., Kortum, P., & Oswald, F. (2018). Psychometric evaluation of the USE (usefulness, satisfaction, and ease of use) questionnaire for reliability and validity. *Proceedings of the Human Factors and Ergonomics Society*, Vol. 3, Hal. 1414–1418.

Ghozali, Imam. (2016). Aplikasi Analisis Multivarate dengan Program IBM SPSS 23, edisi delapan. Semarang : Badan Penerbit Universitas Diponegoro.

Hutauruk, D. M. (2023). *Prospek Industri game di Indonesia diperkirakan akan terus meningkat*. kontan.co.id. Diakses 1 Agustus 2023

I. S. Asyifa, J. Mahfud dan T. Matsumaru. (2017), "Measuring performance of aerial projection of 3D Hologram Object (3DHO)," 2017 IEEE International Conference on Robotics and Biomimetics (ROBIO), Macau, Macao, 2017, pp. 2081-2086.

IGI Global. (2020). *What is 3D games*. IGI Global. Diakses 31 Juli 2023

Impey, S. (2020). *Mobile VS desktop UI: Key differences in design*. GameAnalytics. Diakses 6 Agustus 2023

Iqbal, D. (2020). Melindungi Generasi Terakhir Blekok di Kampung Rancabayawak. Mongabay.id. Diakses 31 Juli 2023

ISO (International Organization for Standardization). (2022). ISO 9241-411:2012: Ergonomics of human-system interaction -- Part 411: Evaluation methods for the design of physical input device. Geneva, Switzerland: Author.

Juan, A. A., Loch, B., Daradoumis, T., dan Ventura, S. (2017). Games and simulation in higher education. *International Journal of Educational Technology in Higher Education*, *14*, 37.

Kirriemuir, J. dan McFarlane, A.E. (2004). Literature Review in Games and Learning. Bristol: Futurelab. Diakses 31 Juli 2023

Lee, Y. S., & Smith-Jackson, T. L. (2004). Effects of Screen Orientation and Margin on Reading with a Handheld Computer. Proceedings of the Human Factors and Ergonomics Society Annual Meeting, Vol. 48, Issue 6, Hal. 946–950.

Lund, Arnold M. 2001. Measuring Usability with the USE Questionnaire. Usability and User Experiance, STC Community. (Online). Usability Interface, Vol. 8, no. 2, Hal. 3-6.

Marmet, S., Wicki, M., Dupuis, M., Baggio, S., Dufour, M., Gatineau, C., Gmel, G., & Studer, J. (2023). Associations of binge gaming (5 or more consecutive hours played) with gaming disorder and mental health in young men. *Journal of Behavioral Addictions*.

Masaki Oshita dan Hirotaka Ishikawa. (2012). Gamepad vs. touchscreen: a comparison of action selection interfaces in computer games. In Proceedings of the Workshop at SIGGRAPH Asia (WASA '12). Association for Computing Machinery, New York, NY, USA, Hal. 27–31.

MasterClass. (2021) "Guide to Video Game Genres: 10 Popular Video Game Types". Diakses 31 Juli 2023

Motley, J. (2023). Best portrait mode mobile games in June 2023. MobileBytesGG. Diakses 31 Juli 2023

N, H. (2023). *Design thinking: Pengertian, Tahapan, Dan Contoh penerapannya*. Gramedia Literasi. Diakses 1 Agustus 2023

Nielsen, Jakob, dan Landauer, Thomas K. (1993) "A mathematical model of the finding of usability problems," Proceedings of ACM INTERCHI'93 Conference (Amsterdam, The Netherlands, 24-29 April 1993), Hal. 206-213.

Pirker, J., Pojer, M., Holzinger, A., dan Gütl, C. (2017). Gesture-based interactions in video games with the leap motion controller. In *Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)* (Vol. 10271, Hal. 620–633). Springer Verlag.

Pluralsight. (2017). *Character, controls, camera: The 3cs of game development*. Pluralsight. Diakses 31 Juli 2023

Razali, N. H., Ali, N. N. N., Safiyuddin, S. K., dan Khalid, F. (2022). Design Thinking Approaches in Education and Their Challenges: A Systematic Literature Review. *Creative Education*, Vol. 13, Issue 07, Hal. 2289–2299.

Smith, R. C., Iversen, O. S., dan Hjorth, M. (2015). Design thinking for digital fabrication in education. International Journal of Child-Computer Interaction, Vol. 5, Hal. 20–28.

Sugiyono. (2021). Metode Penelitian Kuantitatif, Kualitatif, dan R&D. Bandung : Alfabeta.

Swarnadwitya, A. (2020). *Design thinking: Pengertian, Tahapan Dan Contoh penerapannya.* School of Information Systems. Diakses 31 Juli 2023

Torok, L., Eisemann, E., Trevisan, D., Montenegro, A., dan Clua, E. (2018). PadCorrect - Correcting user input on a virtual gamepad. *Proceedings - Graphics Interface*, *2018-May*, Hal. 49–56.

Turaga, C. K. (2022). "The Fundamentals of 3C Game Design". Indigo Game Startup Incubation (IGSI) Specially Super Talk 2022 (SSR). Diakses 31 Juli

2023
Yesodha, K. K. R. K., Narasimhan, V., Li, Y., & Craig, B. (2018). Ergonomic evaluation of videogame controllers. *Advances in Intelligent Systems and Computing*, Series 607, 384–391.
Zaman, L., Natapov, D., dan Teather, R. J. (2010). Touchscreens vs. traditional controllers in handheld gaming. *Future Play 2010: Research, Play, Share - International Academic Conference on the Future of Game Design and Technology*, Hal. 183–190.