

Sustainable Practices in Electronics Engineering: Inclusion of Virtual Reality in Product Testing

Universidad Tecnológica Nacional

Facultad Regional Paraná

STUDENTS:

- ◆ DANDEU JUAN IGNACIO – Electronics Engineering student
- ◆ RODRIGUEZ FACUNDO – Electronics Emgineering student

CLASS:

- ◆ English II, Electronics Engineering
- ◆ Academic Year: 2022



This work is an EFL students project. The pictures in this presentation are only used for educational purposes. If there is any copyright conflict, they will be immediately removed.

Map of the Presentation

- ◆ Product testing process in electronics engineering
 - Production limitations
 - Good testing advantages

- ◆ The inclusion of VR in the product testing process
 - The implementation of virtual reality (VR)
 - Physical prototypes and virtual prototypes

- ◆ Advantages and disadvantages of the VR uses in the electronics industry



PRODUCT TESTING IN ELECTRONICS ENGINEERING

- ◇ It takes more time to test than to manufacture the product.
- ◇ Several test prototypes are made.
- ◇ There are advantages and disadvantages of a test.
 - Product testing is important as the product is very expensive to manufacture, generally time consuming, and in some cases physically dangerous to handle. For this reason, it is necessary to include virtual reality in product testing.



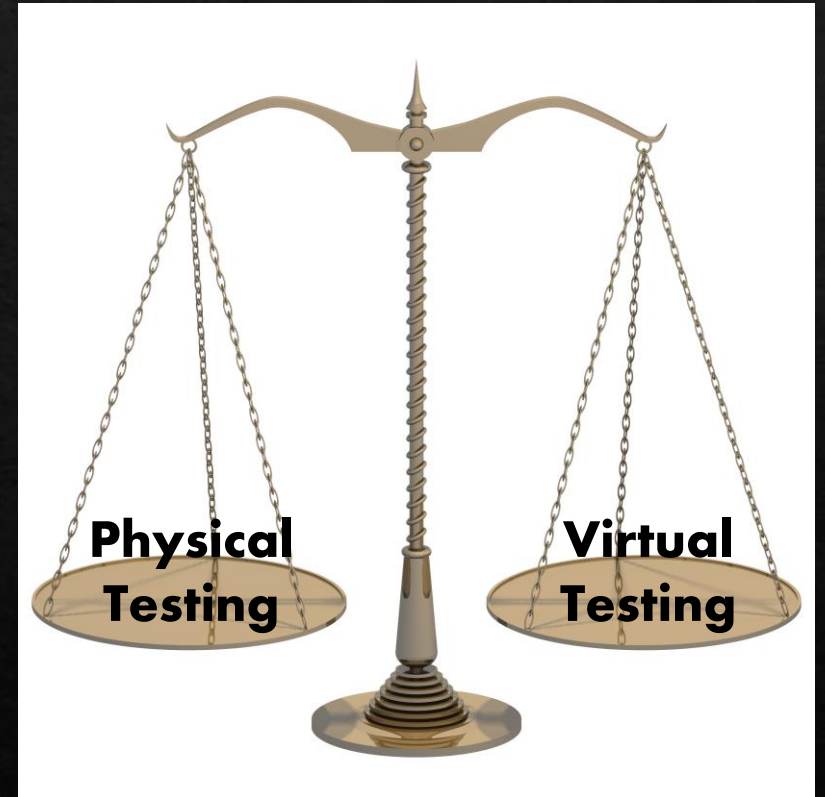
INCLUSION OF VR IN PRODUCT TESTING

- ◆ VR is a high-quality computer-user interface that involves simulation in real-time and interactions through multiple sensory channels.
- ◆ Prototype or mockup:
 - Prototypes can be classified according to the way they are generated:
 - Physical prototypes
 - Virtual prototypes (VP)
- ◆ Physical prototypes are expensive and hard to produce.



Advantages and disadvantages of the VR uses in the electronics industry

- ◇ VR technologies are more interactive and easier than using physical objects
- ◇ VR reduces the time and cost in product development cycle
- ◇ Sometimes a physical prototype is preferable to a VP
- ◇ VR systems are not free from problems and limitations



CONCLUSION

VR in product testing leads to better quality products, good brand value for companies and high customer satisfaction.

Virtual prototypes are more cost-effective.

The inclusion of VR in product testing may therefore represent a sustainable practice in Electronics Engineering

REFERENCES

1. National Academy of Engineering, *NAE Grand Challenges for Engineering*, USA, Washington, 2017. Accessed: May 20, 2022. [Online]. Available: <http://www.engineeringchallenges.org/File.aspx?id=11574&v=34765dff>
2. F. Bruno, A. Agostino, F. Cosco. Mixed prototyping environment with different video tracking techniques. Presented at the Conf. IMProVe 2011 [Online]. Available: https://www.researchgate.net/publication/234836132_Mixed_prototyping_environment_with_different_video_tracking_techniques
3. C. Falcao, M. Soares. (2013). Application of virtual reality technologies in consumer product usability. Presented at the Int. Conf. Design, User Experience, and Usability. [Online]. Available: https://www.researchgate.net/publication/256546296_Application_of_Virtual_Reality_Technologies_in_Consumer_Product_Usability
4. C. Falcao, M. Soares. “Usabilidade de Produtos de Consumo: uma análise dos conceitos, métodos e aplicações,” *Estudos em Design*, vol. 21, no. 2, pp.1-26, 2013. [Online]. Available: https://www.researchgate.net/publication/260407719_Usabilidade_de_Produtos_de_Consumo_uma_analise_dos_conceitos_metodos_e_aplicacoes Usability of Consumer Products an analyzes of concepts methods and applications
5. Burdea, G. *Virtual Reality Technology*, 2nd ed. New Brunswick: John Wiley and Sons Ltd, 2003.
6. M. Bordegoni, F. Ferrise, J. Lizaranzu. The use of interactive Virtual Prototypes for products specification in the concept design phase. Presented at the IEEE Virtual Reality Conf. 2011 [Online]. Available: https://www.researchgate.net/publication/221402810_The_use_of_interactive_Virtual_Prototypes_for_products_specification_in_the_concept_design_phase
7. A. Jimeno, A. Puerta. (2007). “State of the art of the virtual reality applied to design and manufacturing processes,” *The Int. Journal of Advanced Manufacturing Technology*, vol. 33, pp. 866–874, doi:10.1007/s00170-006-0534-2. [Online]. Available: https://www.researchgate.net/publication/39440194_State_of_the_art_of_the_virtual_reality_applied_to_design_and_manufacturing_processes
8. F. Gomes Faust, L. Roepke, T. Catecati, F. Araujo, G. Amir. (2011). Implementacao da Realidade Aumentada na avaliação da usabilidade de produtos eletronicos. Presented at the Conf. Int. de Pesquisa em Design, Lisboa, Portugal. [Online]. Available: https://www.researchgate.net/publication/315008775_IMPLEMENTACAO_DA_REALIDADE_AUMENTADA_NA_AVALIACAO_DA_USABILIDADE_EM_PRODUTOS_ELETRONICOS
9. D. Dinka, J. Lundberg. “Identity and role-A qualitative case study of cooperative scenario building”. *Int. J. of Human-Computer Studies*. October. 2006. Accessed: Dec. 4, 2022. doi: 10.1016/j.ijhcs.2006.06.003. [Online]. Available: https://www.researchgate.net/publication/220107890_Identity_and_role-A_qualitative_case_study_of_cooperative_scenario_building
10. A. Bolder, S. M. Grünvogel, E. Angelescu. (2018). Comparison of the usability of a car infotainment system in a mixed reality environment and in a real car. Presented at the 24th ACM Symposium [Online]. Available: https://www.researchgate.net/publication/329255904_Comparison_of_the_usability_of_a_car_infotainment_system_in_a_mixed_reality_environment_and_in_a_real_car

11. Y. Zhong, H. C. Liaw, W. Ma, B. Shirinzadeh. (2005). A Constraint-Based Methodology for Product Design with Virtual Reality. Presented at the TENCON Conf. [Online]. Available: https://www.researchgate.net/publication/224280849_Assembly_Modelling_Through_Constraint-based_Manipulations_in_A_Virtual_Reality_Environment
12. M. Bergamasco, A. Frisoli, A. Gucciardino, S. Marchese. (2002) “Haptic Interfaces for Virtual Prototyping,” in *Proceeding of Symposium on Reduction of Military Vehicle Acquisition Time and Cost through Advanced Modelling and Virtual Simulation*, Paris, France. [Online]. Available: https://www.researchgate.net/publication/258012152_Haptic_Modeling_for_Virtual_Design_and_Prototyping
13. S. Metag, S. Husung, H. Kromker, C. Weber. (2008). User-centered Design of Virtual Models in Product Development. Presented at the Conf. Int. Scientific Colloquium. [Online]. Available https://www.researchgate.net/publication/357182560_User-centered_Design_of_Virtual_Models_in_Product_Development
14. F. Bruno, M. Muzzupappa. “Product interface design: A participatory approach based on virtual reality”. *Int. J. of Human-Computer Studies*. May.2010. Accessed: Dec. 13, 2022. Doi: 10.1016/j.ijhcs.2009.12.004. [Online]. Available: https://www.researchgate.net/publication/223525085_Product_interface_design_A_participatory_approach_based_on_virtual_reality
15. G. C. Burdea. (2000). Haptics Issues in Virtual Environments. Presented at the Conf. Proceedings of Computer Graphics International [Online]. Available: <https://ieeexplore.ieee.org/document/852345>



- DANDEU JUAN IGNACIO – Electronics engineering student
 - RODRIGUEZ FACUNDO – Electronics engineering student
- Universidad Tecnológica Nacional, Facultad Regional Paraná
Inglés II – 2022