

EMPOWERING USER KNOWLEDGE IN OPEN INNOVATION: CRAFTING A WEARABLE DEVICE FOR PARKINSON'S DISEASE PATIENTS

ROBERTA DUTRA DE ANDRADE

UNIVERSIDADE FEDERAL DO CEARÁ (UFC)

MARCELO MARTINS DA SILVA

PONTIFÍCIA UNIVERSIDADE CATÓLICA DO RIO DE JANEIRO (PUC-RIO)

RAYSA GEAQUINTO ROCHA

UNIVERSITY OF ESSEX

Agradecimento à orgão de fomento:

This research was funded by the NECE—Research Center in Business Sciences funded by the Multiannual Funding Program of R&D Centers of FCT—Fundação para a Ciência e Tecnologia, Portugal, under grant UIDB/04630/2020. This research is also supported by a grant sponsored by FCT, under grant 2022.14694.BD.

EMPOWERING USER KNOWLEDGE IN OPEN INNOVATION: CRAFTING A WEARABLE DEVICE FOR PARKINSON'S DISEASE PATIENTS

Introdução

Safeguarding sustainable development is a crucial objective of the United Nations, essential for promoting well-being and healthcare through continuous health monitoring. However, the tracking of health parameters remains inadequate in many developing countries, despite its accessibility. The wearable health device market has grown substantially due to technological advancements and the increasing use of remote devices.

Problema de Pesquisa e Objetivo

The critical research question was "How to foster the acceptance and continuous integration of wearable devices into the daily routine of end-users?". The main objectives were to develop a wearable device capable of assisting people with motor disabilities in daily activities and to introduce patients and carers to the prototype development process to provide valuable insights into their needs, enabling developers to adapt processes and meet demands.

Fundamentação Teórica

Parkinson's affects the neurons that control voluntary movements, leading to tremors that significantly impact patients' quality of life. Wearable devices have gained traction in the healthcare industry, with monitoring capabilities proving useful in reducing caregiver expenses, improving patient well-being management, preventing unnecessary hospitalisations, and ensuring early care for those in need. However, relatively few studies explore the development of wearable devices tailored explicitly to Parkinson's patients' needs. When users are engaged, they provide valuable insights.

Metodologia

Ethnography and action research combined before and concurrently with product development. Machine learning was employed to process patient data to predict disease progression and assist healthcare professionals in monitoring their patients. The social research approach, involving researchers immersing themselves in patients' routines, fostered an environment that facilitated the participation of patients in the development of the device. A longitudinal study was conducted over seven years with twelve individuals afflicted with Parkinsonism in diverse stages of the disease.

Análise dos Resultados

We created a framework to display how motivation, factors, and stages of device development determine whether a device will be incorporated into a user's life. User motivation is crucial. The device's purpose and usability are essential for added value and successful integration into daily life. The findings of this study suggest that involving patients in developing new products had a significant impact on redesigning processes and organisations and on humanising wearable healthcare devices, particularly those that directly affect users' quality of life and autonomy.

Conclusão

A novel automatic stabilisation system for utensils using sensors to collect and process handling information (e.g., vertical and horizontal inclinations) was developed. The system employs motors to stabilise the utensils. The PID control algorithm effectively met the proposed objective of correcting involuntary movements by the user and maintaining the correct orientation during use.

Referências Bibliográficas

Al Dahdah, M. (2022). Between Philanthropy and Big Business: The Rise of mHealth in the Global Health Market. *Development and Change*, 53(2), 376-395.

Bersch, R. (2017). Introdução à Tecnologia Assistiva. Bovolenta, T. M., & Felício, A. C. (2016). Parkinson's patients in the Brazilian Public Health Policy context. In *Einstein* (Sao Paulo, Brazil) (Vol. 14, Issue 3, pp. 7-9).

Castellani, S. et al. (2009). Designing Technology as an Embedded Resource for Troubleshooting. *Computer Supported Cooperative Work - The Journal of Collaborative and Work Practices*, 18(2-3), pp. 199-227.