Factors and key criteria of an obstacles detection for people with disabilities

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Alarood, Ala Abdulsalam [a, b] ; Ibrahim, Adamu Abubakar [c]

[a] College of Computer Science and Engineering, University of Jeddah, Jeddah, Saudi Arabia

Abstract

People with disabilities, specifically, those that are having a problem associated with sight or hearing, which falls under the categories of blind and deaf, require technological assistance to move freely. The technological area that is concerned with “Obstacle Detection and Feedback System” can be utilised to address the specific issues of dealing with the abovementioned problems. The growing demand for improved obstacle detection methods has pushed major developments in assistive technologies for people with visual impairments. The information needed and interrelationships among important criteria impacting the efficacy of obstacle detection systems are investigated in this work using the Decision-Making Trial and Evaluation Laboratory (DEMATEL) approach. Nine critical criteria, including Safety (SF), Accuracy of Detection (AD), Response Time (RT), Ease of Use (EU), Portability (PT), Battery Life (BL), Environmental Adaptability (EA), Cost (CT) and Durability (DD), are used. Data was collected from 21 expert participants through structured questionnaires, and the influence of each criterion was analysed using a total relation matrix. The most influential criteria identified were SF with a total influence score of 42.07, AD (41.08), RT (41.01) and Ease of EU

(40.83). Factors such as BL (37.51) and CT (38.54) were found to be dependent on improvements in primary criteria. This study provides a structured decision-making framework to enhance obstacle detection systems by prioritising safety, real-time response and usability. The findings offer practical insights for developing AI-driven assistive technologies, ensuring improved accessibility, efficiency and integration into smart city environments.

Author keywords

detecting objects; Disability aid; feedback mechanisms; obstacle detection; real-time operation

Indexed keywords

MeSH

Adult; Female; Humans; Male; Middle Aged; Persons with Disabilities; Reaction Time; Self-Help Devices; Surveys and Questionnaires

EMTREE medical terms

adult; disabled person; female; human; male; middle aged; questionnaire; reaction time; rehabilitation; self help device

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Corresponding authors

Corresponding author	A.A. Alarood
Affiliation	College of Computer Science and Engineering, University of Jeddah, Jeddah, 21959, Saudi Arabia
Email address	aasoleman@uj.edu.sa

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