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Visual and optometric issues with smart glasses in Industry 4.0 working environment

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ABSTRACT

Smart glasses are a kind of Head Mounted Display (HMD) with great potential in Industry 4.0 working environments, where shop floor workers must be supplied with critical information in a timely, accessible and safe manner to be as productive as possible. Smart glasses collect data from a wireless network and project it on a tiny screen before the user's eye. Despite several benefits, such as hands-free access to computer-generated info, routeing to storage locations, eliminating the need to carry handheld scanners or written documents, there are also possible problems evidenced from the literature. HMD can cause headaches, pressure in the eyes, problems with focusing and difficulties with text reading. To study the addressed problems, a research was performed together with Ophthalmologists from Maribor Healthcare Centre. The effects of using Vuzix M300 Smart glasses on users' comfort during order picking activities were researched in a testing warehouse environment at the Faculty of Mechanical Engineering, Maribor. The testing period lasts four hours. Several ophthalmologic tests (visual acuity, contrast sensitivity, visual field testing and colour test) were performed before and after use of smart glasses. Results show that there are some statistically significant differences before and after use of smart glasses in users' visual acuity and, surprisingly, a high percentage of scotomas in the right eye (where the projection of smart glasses was performed) after use of smart glasses that cannot be overlooked.

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Izvirni znanstveni članek

Vpliv uporabe pametnih očal v delovnem okolju Industrije 4.0 na vid uporabnika

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POVZETEK

Pametna očala so vrsta naglavnega prikazovalnika (Head Mounted Display – HMD), ki ima velik uporabni potencial v različnih delovnih okoljih. Delujejo tako, da podatke, ki jih dobijo iz Wi-fi omrežja projicirajo na majhen zaslon pred očmi uporabnika. Kljub temu, da je znanih veliko prednosti uporabe pametnih očal, predvsem gre izpostaviti prostoročni način dela z brezžično povezavo do računalnika, odpade tudi prenašanje različnih skenerjev ali papirnatih dokumentov, je iz obstoječe literature možno zaslediti tudi nekaj težav povezanih z uporabo pametnih očal. Uporaba HMD naprav lahko povzroča glavobole, pritisk v očeh, probleme pri fokusiranju in težave pri branju besedila. Da bi preučili tovrstne težave, smo skupaj z okulisti iz Mariborskega zdravstvenega doma izvedli raziskavo. Učinke uporabe pametnih očal Vuzix M300 na udobje uporabnika med delom komisioniranja smo preučevali v testnem skladišču, ki smo ga postavili na Fakulteti za strojništvo Maribor. Perioda testiranja očal je trajala štiri ure. Pred in po uporabi pametnih očal smo izvedli več oftalmoloških testov, kot so pregled vidne ostrine, kontrastna senzitivnost, test vidnega polja in barvni test. Rezultati raziskave kažejo, da obstaja nekaj statistično pomembnih razlik med rezultati testov vidne ostrine, ki smo jih izvedli pred in po uporabi pametnih očal. Prav tako je bilo v desnem očesu (kjer je bila projekcija s pametnimi očali) po uporabi očal prisotnih večje število skotomov (temne lise na vidnem polju), kar je lahko resna težava za uporabnika in je ne bi smeli spregledati.

PODATKI O ČLANKU

Ključne besede:
Naglavni prikazovalnik;
Pametna očala;
Industrija 4.0;
Skladišče;
Ročni komisionirni sistem

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