

論文 / 著書情報
Article / Book Information

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Title(English)	Facilitating enhanced concept generation at early design phase through mixed reality and user-centric approach
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scenario. To improve the impact of immersive-experience design tool, the need to identify hidden design metrics was established and an exploratory study was conducted to present a framework to generate relations among different design characteristics: device, user or environment. The framework is presented through implementation in the field of assistive technology, that addressed the issues with communication among caregivers and wheelchair users. Strong correlations among caregivers and wheelchair user's daily activity and communication behaviour were observed and the design needs for improved experience were inferred. The implementation of the MR tool with these identified design metrics is left for future research.

Secondly, the thesis establishing requirements for mixed-reality based design tool that lets end-users perform creative design tasks, enabling them to be active participants in the design process to co-create with designers. This design tool implementation is evaluated empirically through a Furniture Arrangement usage scenario for providing a high level of control along with a high level of immersion to the end-users. It showed positive effects on design activity and satisfaction for the end-users when they actively performed the design tasks as compared to when the designer performed the design task based on the end-user's instructions. Based on this work, further research was conducted to improve the mode of interaction with the concept of the designed prototype for the end-users, in the form of gesture-based interactions vs physical interactions. The implementation was tested with an interactive use case of Intelligent Lamp scenario. The results indicated gesture-based interaction with the virtual prototype were as effective as the touch-based physical prototypes, indicating a balance of these two to be effective for the implemented MR design tool.

Thirdly, the thesis investigated the effectiveness of MR based approach to enhance the design experience for designers facing technical barriers to quickly implement, create and experience their concept ideas. This problem is significant when functional aspects of design are dominant e.g. interactive product behaviour. Here, the MR design tool was adapted to create concept solutions for interactive-product behaviours, by supporting and encouraging designers to ideate, create and revise their concept-solutions, allowing them to experience their creation. The empirical study comparing the paper-based storyboard approach and proposed MR based approach was implemented. The analysis showed the diversifying effect on ideas generated in terms of sensory exploration. It resulted in more ideas getting converted to interactive behaviours, showing lesser abandoning of ideas and ease of creation.

Diversifying effect on types of revision being performed were also observed as participants were motivated to experience their creations and revise more often. Resultingly, improvement in the creativity of the generated solutions using MR design tool was observed, and the participant rated the MR implementation to be innovative and appealing.

Overall, this thesis assesses the impact of the implemented design methods on respective generated outcomes, giving insights on what metrics to consider while designing new tools/methods for the early-design phase targeting the needs, the designers and the end-users. It also highlights the limitations that can be addressed to improve the experience of early-stage designing.

備考：論文要旨は、和文 2000 字と英文 300 語を 1 部ずつ提出するか、もしくは英文 800 語を 1 部提出してください。

Note : Thesis Summary should be submitted in either a copy of 2000 Japanese Characters and 300 Words (English) or 1copy of 800 Words (English).

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