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A Study on the Effect of Design Factors of Slim Keyboard's Tactile Feedback

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Abstract : With the rapid development of computer technology, the design of computers and keyboards moves towards a trend of slimness. The change of mobile input devices directly influences users' behavior. Although multi-touch applications allow entering texts through a virtual keyboard, the performance, feedback, and comfortableness of the technology is inferior to traditional keyboard, and while manufacturers launch mobile touch keyboards and projection keyboards, the performance has not been satisfying. Therefore, this study discussed the design factors of slim pressure-sensitive keyboards. The factors were evaluated with an objective (accuracy and speed) and a subjective evaluation (operability, recognition, feedback, and difficulty) depending on the shape (circle, rectangle, and L-shaped), thickness (flat, 3mm, and 6mm), and force (35±10g, 60±10g, and 85±10g) of the keyboard. Moreover, MANOVA and Taguchi methods (regarding signal-to-noise ratios) were conducted to find the optimal level of each design factor. The research participants, by their typing speed (30 words/ minute), were divided in two groups. Considering the multitude of variables and levels, the experiments were implemented using the fractional factorial design. A representative model of the research samples were established for input task testing. The findings of this study showed that participants with low typing speed primarily relied on vision to recognize the keys, and those with high typing speed relied on tactile feedback that was affected by the thickness and force of the keys. In the objective and subjective evaluation, a combination of keyboard design factors that might result in higher performance and satisfaction was identified (L-shaped, 3mm, and 60±10g) as the optimal combination. The learning curve was analyzed to make a comparison with a traditional standard keyboard to investigate the influence of user experience on keyboard operation. The research results indicated the optimal combination provided input performance to inferior to a standard keyboard. The results could serve as a reference for the development of related products in industry and for applying comprehensively to touch devices and input interfaces which are interacted with people.

Keywords : input performance, mobile device, slim keyboard, tactile feedback
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