Step Away From That Desk: Exertion Interfaces in the Workplace

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Abstract
With the goal of requiring physical effort from the user, exertion interfaces are quite different from typical interfaces that seek to *minimize* the effort required to complete a task. In this position paper we describe our two primary motivations for researching and developing exertion interfaces for the workplace, discuss our recent and ongoing work, and outline issues we would like to discuss with others working in this area.

Keywords
Exertion, physical interfaces, exercise, RSI, ergonomics

ACM Classification Keywords
H5.2 User Interfaces: Input devices and strategies

Introduction
Ever get the feeling you have been spending too many hours hunched over your computer at work? Do you keep meaning to get to the gym, but never quite make it? Do your wrists hurt after a long day of typing? As an alternative to traditional keyboards and mice, we have been exploring ways to use gross motor movements, for example kicking your feet or waving your arms, as input mechanisms for workplace PC's. Our work on this type of interface seeks to improve both fitness and ergonomics in the workplace.


Figure 1: Using StepMail

The Step User Interfaces project (StepUI) ([1],[2]), was motivated primarily by rising obesity rates and the difficulty people found trying to make time for exercise. We sought to take tasks people already perform and make them more physically demanding. StepUI uses a dance pad, consisting of six large buttons available at the user's feet, as an input device. By stepping and jumping the user can read, delete and file email using the StepMail application or sort photos using the StepPhoto application. While not a substitute for aerobic exercise, the StepUI applications allow people to get out of their chairs and burn some extra calories, while still getting real work accomplished. Figure 1 illustrates StepUI in action, and [1] describes our initial experimental studies of StepUI.

The dance pad made a convenient off-the-shelf input device to begin our explorations. We have now begun to explore additional sensor options, such as accelerometers worn around the ankles, which provide better comfort, convenience, and flexibility than a large dance pad. We are extending our StepUI applications to make use of this new sensor, and are exploring the advantages and disadvantages of various devices in terms of both exertion level and adoption by users.

In addition, we are exploring the use of exertion interfaces for enhancing workplace ergonomics. We are specifically aiming to allow users to continue working while taking breaks from typing. The benefits of typing breaks are well documented in the ergonomics literature ([4],[5]), and several software packages currently provide reminders about typing breaks. As a larger proportion of the population spends more time using a keyboard and mouse, the impact of improved ergonomic habits on public health will be increasingly significant. By allowing people to continue working using gross movements of their feet or arms, we believe that people will be less likely to skip recommended typing breaks and more likely to stretch and vary posture throughout the work day. While this type of exertion is not as sweat-inducing as other exertion interfaces (e.g. [3]), the applications we are developing share the same primary goal of encouraging body movement.

Areas of interest for the workshop

Sensors: We have been exploring a range of sensors for detecting gross motor activitiy, including the dance pad or other floor-based sensors, hand-held or foot-mounted accelerometers, and infrared movement sensors. We hope to share our initial experiences and learn from others about the sensors with which they are experimenting.

Evaluation: Traditional interfaces are often evaluated for speed and accuracy, which are typically not appropriate for exertion interfaces. For StepMail and StepPhoto we looked at exertion, level of enjoyment, and intent to use. We would like to discuss with others the most appropriate efficacy measures for exertion interfaces, and to establish standard approaches and metrics.

Social Implications: The social implications of using exertion interfaces in the workplace need to be carefully considered. We have seen with StepUI a fine line between encouraging exertion and causing people to be embarrassed in front of co-workers. We hope to discuss considerations around the context of use with others.

Conclusion

Interfaces that promote and support physical activity offer an exciting opportunity to build applications that have a positive impact on people's daily lives. We find this research area incredibly compelling and would appreciate the opportunity to interact with others building exertion interfaces.

References

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