Initial Coursework Proposal

Group Project 8

Introduction

In the increasingly electronic world, we find ourselves spending a lot of time – both work and rest – in front of electronic devices. While computers are the most popular, sitting all day long in front of them can seriously affect the user's health. Thus, we seek to address the user's interaction with them. This project proposes a tangible, interactive device that leverages the Pomodoro Technique, ergonomic design, and psycho-physiological insights to combat digital distractions and promote a healthy work environment. It encourages the user to:

- Maintain proper posture while at the computer.
- Take regular timed breaks away from the computer.
- Limit distractions from smartphones and other work-related interruptions.
- Engage with fellow people in appropriate time windows.

Related work

The foundation of this project lies in the synthesis of research from productivity techniques, ergonomics, and tangible user interfaces. The Pomodoro Technique, known for its effectiveness in enhancing focus and productivity, is complemented by ergonomic research advocating for the importance of posture in health and productivity. The tangible user interface domain, especially as explored in HCI research, provides insights into creating devices that bridge the gap between digital tasks and physical interaction.

Approach

To address the need for enhanced productivity in the face of digital distractions, our device combines several key features informed by the Pomodoro Technique and ergonomic research. The design is centered around a tangible user interface that encourages physical interaction, promoting both mental focus and physical well-being. Here are the detailed components and functionalities:

Servo Spine for Posture Correction:

Utilising ergonomic research that links posture to productivity and health (Peper & Lin, 2012), the device will include a servo-controlled mechanism designed to gently remind users to adjust their posture, ensuring an ergonomic working position.

Customisable Time Setting Sliders:

Three sliders will allow users to personalise their work and break intervals according to the Pomodoro Technique (Cirillo, 2006).
These intervals will be:
1. Deep Work Blocks,
2. Short Break Periods,
3. and Long Break Periods.

Settings will be displayed on an LCD screen for real-time feedback.

Start Timer Button and LED Indicator:

A button will initiate the countdown for work/break cycles, with an LED light indicating the session status: red for work periods and green for breaks, reinforcing the time management principles of the Pomodoro Technique.

Servo-Locked Box for Phone Storage:

To minimise digital distractions, the device will feature a compartment that locks away smartphones during work periods. This physical barrier leverages psychological insights into habit formation and distraction management, encouraging users to engage in deep work without the temptation of their devices.

Alert System for Time Block Changes:

Audio and visual alerts will notify users of transitions between work and break periods, ensuring adherence to the scheduled productivity regimen without the need to constantly check a clock or device.

RFID and Pressure Sensor Integration:

To detect the presence of the smartphone in the lockbox, a combination of RFID and pressure sensors will be used. Additionally, an RFID tag carried by the user will help monitor adherence to scheduled deep work periods by detecting when the user is at their workstation.

The implementation strategy involves utilising Arduino for basic device control, given its extensive support and flexibility for hardware projects. Phidgets will be employed for the tangible user interface components, offering an intuitive and user-friendly interaction model. A Raspberry Pi will manage more complex processing tasks and communications, such as sensor data analysis and possibly integrating with digital calendars or productivity apps for a holistic approach to time management.

Programming will be event-driven, allowing for responsive and interactive user experiences. The combination of these technologies and methodologies will result in a device that not only enhances productivity through structured work periods but also promotes healthful work habits through posture correction.

Evaluation

The proposed system will enhance user posture and thus productivity. It will also limit phone- and social-related work distractions by batching them into the user's breaks.

- System testing will occur during the design phase with sensor and part specifications. Here we will test compatibility, potential bottlenecks, and appropriateness of the proposed parts.
- Development tests will be on code with any hardware they directly refer to / manipulate.
- User testing will be done alongside every modular component of the system that has passed previous tests. The user studies will focus on productivity metrics and subjective well-being. Participants will engage with the device over a set period, with their productivity levels, posture improvements, and overall satisfaction being measured. This real-world application and feedback will guide iterative design improvements.

Discussion

The proposed device represents a novel integration of time management strategies with ergonomic design, facilitated through tangible user interfaces. Its development not only contributes to the academic discourse on productivity and ergonomics but also has practical implications for individuals seeking to enhance their work efficiency and health in the digital age. Furthermore, the learnings from this proposed system can create new categories of assistive and accessible technologies for example for the disabled, etc. Future work on our system can include:

- Exploring adaptive algorithms for personalized productivity strategies and broader applications in various work environments.
- Exploring wearable sensors with more real-time data e.g., heartrate, muscle activity, etc. These can be combined with posture to give more appropriate alerts, break lengths, and even exercise /stretching recommendations.
- Building the system into a responsive workstation that adjusts to the user and their needs. If the user needs to keep working e.g., toward a deadline, the system can adjust to monitoring a work-while-standing posture.

References

1. Cirillo, F. (2006). The Pomodoro Technique (The Pomodoro).
2. Ishii, H., & Ullmer, B. (1997). Tangible bits: towards seamless interfaces between people, bits and atoms. In Proceedings of the ACM SIGCHI Conference on Human Factors in Computing Systems (pp. 234-241).
3. Peper, E., & Lin, I.-M. (2012). Increase or decrease depression: How body postures influence your energy level. Biofeedback, 40(3), 125-130.