

A Framework for Interactive Mindfulness Meditation Using Attention-Regulation Process

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ABSTRACT

We are often overwhelmed by everyday stressors. Mindfulness meditation can help slow things down and bring one's attention into the present moment. Given the prevalence of smartphones, mindfulness-based mobile applications (MBMAs) have received much attention. Current MBMAs mainly use the guided meditation method which may not be always effective, e.g., users may not be able to follow the pace of instructions and they need a private environment. This paper presents a framework for interactive MBMAs which allows users to self-regulate their attention according to their abilities and conditions. The framework is described by an *Attention-Regulation Process* and has two components: (1) *Relaxation Response* and (2) *Attention Restoration Theory*. The framework is validated by our experiment. It also informs future development for interactive meditation and has broad implications for designing mindfulness and well-being.

ACM Classification Keywords

H.5.m. Information Interfaces and Presentation (e.g. HCI): Miscellaneous.

Author Keywords

Framework; mindfulness; meditation; interactivity; attention-regulation process; mobile applications; relaxation response; attention restoration theory.

INTRODUCTION

As our world becomes increasingly fast-paced, we occasionally need to disconnect and refresh ourselves. Mindfulness meditation is a helpful technique which can bring one's attention back to the present moment [19]. Mindfulness practice [47] is defined as a “family of self-regulation practices that focus on training attention in order to bring mental processes



Figure 1. Technology-mediated attention-regulation process [15, 16]. Technology detects the current state of the user's attention and provides real-time feedback to support self-regulation. Our work provides a framework which shows how technology can detect human attention without the use of dedicated sensors, and what kind of feedback can effectively support attention-regulation process.

under greater voluntary control and thereby foster general mental well-being and development and/or specific capacities such as calm, clarity and concentration.” The benefits of mindfulness practice have been confirmed as enhancement of human well-being [28], increased attention span [18], stress reduction [38], and improved cognitive abilities [7]. On the more qualitative side, literature shows its effectiveness on empathy, compassion, altruism [25], enlightenment [34], and spiritual health [46]. Given the prevalence of smartphones [9], there are a lot of opportunities for mindfulness-based mobile applications (MBMAs).

However, current MBMAs mainly use the *guided meditation* method [31, 49] which follows the tradition of users following instructions from a meditation teacher. Nevertheless, this technique may not always be effective considering that users should be able to follow the pace of instructions. Furthermore, participation requires a dedicated private environment [37, 48]. Given these limitations, researchers have been exploring *attention-regulation process* [15, 16] which describes a cycle of self-regulation supported by technology-mediated detection and feedback mechanisms (see Figure 1). However, this approach also suffers from the need of dedicated accessories (e.g., respiration sensors, EEG).

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Framework Mindfulness Meditation

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