



SleepHill: Designing an Incrementally Bouncing Pillow as a Comfortable Wake-Up Approach

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Abstract. Healthy sleep is crucial to individuals' health and wellbeing, whereas healthfully waking up from the sleep cycle can significantly improve the sleep quality. Among technologies used as sleep alarms, haptic feedback has been widely adopted to serve as an effective wake-up alarm, yet how it can comfortably wake users up is underexplored. This paper presents a design study of SleepHill, an inflatable sleep pillow that can incrementally bounce its body and softly tilt its surface to create a gentle yet efficient haptic alarm for comfortable wake-up. We prototyped SleepHill and conducted a pilot user study to preliminarily understand the resulted user experiences. Our findings revealed that the wake-up process facilitated by SleepHill allowed participants to be gently awakened without being frightened. Also, we learned that the usage of SleepHill could produce improved sleep and wake-up experiences due to its incremental haptic feedback mechanism. Based on this project, we discuss implications for the future development of embedded tangible interaction design for improving the sleep circle with enriched wake-up experiences.

Keywords: Interactive sleep pillow · Wake-up experience · Inflation-based haptic feedback

1 Introduction

Sleep plays an essential role in the overall health and wellbeing [1] and can significantly impact individuals' mental health [2], as well as supports the self-reliance of human bodies [3]. Particularly, interventions that support people to wake up healthfully from the sleep cycle has been identified one of the contributors to improved sleep quality. Empirical studies have shown that the improper disruption or deprivation of sleep can produce detrimental effects on mood and negatively influence people's cognitive performance during the daytime [4].

Many researchers have investigated using different modalities as health interventions to interrupt users from sleep. For instance, Lee et al. [5] examined the effect of music for sleep induction and wake-up and found certain types of pop songs with lyrics are helpful

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