

The Remindful Bracelet

Sophia Brueckner
MIT Media Lab
sophia@media.mit.edu

ABSTRACT

Mindfulness, the practice of being aware of the present moment, has been shown to improve focus, willpower, and both mental and physical health. However, adopting the habit of mindfulness is a difficult barrier to overcome for many. As a solution, this paper outlines *The Remindful Bracelet*, a device intended to augment mindfulness by giving meaningful cues throughout the day to remind the user to reflect on the current moment.

Author Keywords

Haptics; mindfulness; intelligence augmentation; wearable computing; reminder systems.

ACM Classification Keywords

H.5.2 Haptic I/O; Prototyping; Interaction styles

INTRODUCTION

Mindfulness is the state of being aware in the present moment as well as taking a *non-evaluative* and *non-judgmental* approach to your inner experience. Though rooted in Buddhist meditation, a mindfulness practice can be completely secular, and all you need is to gently but deliberately devote your full awareness to the current moment. Meditation, in particular mindfulness meditation, has increasingly become of interest in various research fields like medicine, neuroscience, and psychology for its beneficial effects on both mental and physical health. Unfortunately, like making or breaking any habit, adopting mindfulness can be challenging for new practitioners keeping many from its benefits. Traditionally, mindfulness meditation does not incorporate the use of artifacts or devices. However, any technological interface mediates our experiences by increasing our awareness of some things and diminishing our awareness of others. Can this mediation be harnessed positively to enhance our awareness of ourselves and augment mindfulness? I propose creating a device, *The Remindful Bracelet*, that boosts the user's self-awareness and thus increases the likelihood of someone new to mindfulness being able to fully adopt it.

MINDFULNESS

Recent research demonstrates the benefits of even a short mindfulness practice for those that have never meditated before. After an 8-week training program in mindfulness-based stress reduction (MBSR, developed by Dr. Jon Kabat-Zinn at the University of Massachusetts Medical School), brain scans showed significant increases in left-sided anterior activation, a pattern associated with positive affect in new meditators. In addition, the same study

showed significantly increased antibody titers to the influenza vaccine in meditators over non-meditators [1].

Another study done by researchers at Harvard and MIT also looked at subjects undergoing the 8-week MBSR program and examined alpha rhythms in the brain, known to play a role in focus and being able to disregard irrelevant sensory information. After just 8 weeks, brain scans showed increased alpha waves in meditators when asked to do tasks requiring spatial attention. This study suggests that mindfulness meditation not only improves attention and focus, but also may be very helpful for those coping with chronic pain or illness [4]. Many other studies have also found that mindfulness meditation helps with stress, blood pressure, depression, relationships, and more both in the short-term and long-term.

BACKGROUND

Douglas Englebart defined a conceptual framework for augmenting human intellect. He wrote, "By 'augmenting human intellect' we mean increasing the capability of a man to approach a complex problem situation, to gain comprehension to suit his particular needs, and to derive solutions to problems. Increased capability in this respect is taken to mean a mixture of the following: more-rapid comprehension, better comprehension, the possibility of gaining a useful degree of comprehension in a situation that previously was too complex, speedier solutions, better solutions, and the possibility of finding solutions to problems that before seemed insoluble," [3]. Awareness of self, comprehension of the current moment, is the core of mindfulness practice. Thus, any device that helps guide the user's awareness to the present moment is augmenting mindfulness. Even a simple device that provides cues to the user to prompt self-reflection is an augmentation of the mindfulness process.

While the benefits of mindfulness meditation are many, establishing such a practice as habit can be a difficult barrier to overcome. To change habits and reach goals we need to remember our intentions at the right time. While tools exist to help with remembering and achieving goals, most of these are evaluative and tend to encourage judgment, which counteracts the core values of mindfulness. Notes, visualizations, inspirational images, logging tools, point systems are all easy to ignore when your attention is elsewhere and not easy to take with you. Other more conspicuous methods, like calendar reminders and alarms can feel judgmental and cross over to becoming intrusive. Wearables like the *Fitbit Flex*, require

the user to take their attention away from what they are doing to look at the device or at logs to see their progress, which detracts from being in the present moment. In addition, general research suggests that systems using rewards or punishment to motivate are shown to not less as effective in the long run for learning and adopting new behavior. Once the system is gone, the person's behavior tends to go back to the way it was before [2]. Satisfaction over achieving the goal is also lessened using punishment and reward systems because the accomplishment feels less authentic. Honing intrinsic motivation through a mindfulness meditation practice is supposedly one of the best ways to train for awareness, focused attention, and willpower, but currently no artifacts exist to augment mindfulness in particular.

RELATED WORK

Some related devices have been developed for meditation, therapy, and being mindful of eating habits, physical activity, etc.:



Figure 1. Noumic Device

Noumic Device

Noumic Device is a hand-held biofeedback machine that uses galvanic skin response to monitor changes in mental state during meditation to output light and sound. Because galvanic skin response shows altered states of consciousness achieved during meditation, the device is supposed to serve as a tool to guide meditation.



Figure 2. EmoBracelet and EmoBowl

EmoBracelet and EmoBowl

EmoBracelet and *EmoBowl* are devices designed by Philips intended for day traders. The devices also measure galvanic skin response, and the lights on the devices become brighter and redder when emotions flare to encourage investors to take a breather before making important financial decisions.



Figure 3. Cool Me Down

Cool Me Down

Cool Me Down is an MIT Media Lab project designed for use in mental therapy. A flexible wrap is placed on the arm, and the user is able to self-administer “soothing sensory grounding treatment” by adjusting whether the wrap is hot or cold with a push-button [5].

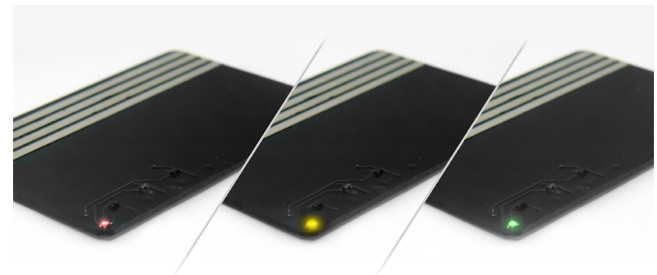


Figure 4. SpendTrend



Figure 5. Fork ReflectOn

ReflectOns

ReflectOns are another MIT Media Lab project created for self-awareness. One of the *ReflectOns*, the *SpendTrend*, is a credit card which encourages the user to reflect on his spending habits through colored lights built into the card. Similarly, a modified fork provides haptic feedback to the user based on how fast the user is eating to help the user to be mindful about eating habits.



Figure 8. Jawbone UP

Fitbit Flex, Nike Fuel, and Jawbone UP

Fitbit Flex, *Nike Fuel*, and *Jawbone UP* are wristbands that track your steps, distance traveled, calories burned, active minutes, and quality of sleep, which are synced with your smartphone through Bluetooth. *Fitbit Flex* and *Nike Fuel* also use lights on the band to indicate how close you are to your personal goals.

Also related, gentle squeezing mechanisms have been shown to have therapeutic effects in various projects:



Figure 6. Fitbit Flex



Figure 7. Nike Fuel



Figure 9. Like-A-Hug

Like-A-Hug

Like-A-Hug is a wearable vest that allows for hugs to be given through Facebook. The vest inflates when friends 'Like' a photo, video, or status update on the wearer's wall. Hugs can also be sent back to the original sender by squeezing the vest and deflating it.



Figure 10. Squeeze Me

Squeeze Me

Squeeze Me is a vest that simulates therapeutic holding that has been found to be particularly helpful to the autistic. Users press a button to inflate or deflate the vest [5].



Figure 11. Squeeze Chair

The Squeeze Chair

The *Squeeze Chair* is a collaboration between artist Wendy Jacob and animal scientist Temple Grandin. The chair is based on Grandin's squeeze machine, which she developed to calm her anxiety and sensitivity to her surroundings due

to her autism. The chairs are intended for anyone to use, not just those coping with autism.

IMPLEMENTATION

I propose to build a subtle, wearable device, *The Remindful Bracelet*, that provides gentle reminders throughout the day. Instead of using lights and sound, which are disruptive and distract you from what you are doing, I will use warmth and a gentle squeeze mechanism as a notification to be mindful. On the interior of the bracelet is a flexible circuit that becomes comfortably warm when triggered. In addition, a mechanism (likely using inflatables) hugs the user's wrist.

Embedded within the bracelet is a sensor to measure galvanic skin response, which indicates emotional arousal. Galvanic skin response can show whether you are excited or stressed but it has trouble distinguishing between the two. Though for other applications this can be a problem, mindfulness requires a non-judgmental approach and this would actually be a benefit for this application. In response to strong emotions, positive or negative, the bracelet would become warm and give the user's wrist a gentle hug to remind the user to be aware of her actions and mental state. During times of low emotional arousal, the bracelet would be triggered randomly because being mindful is just as critical during times of boredom or relaxation.



Figure 12. Remindful Bracelet

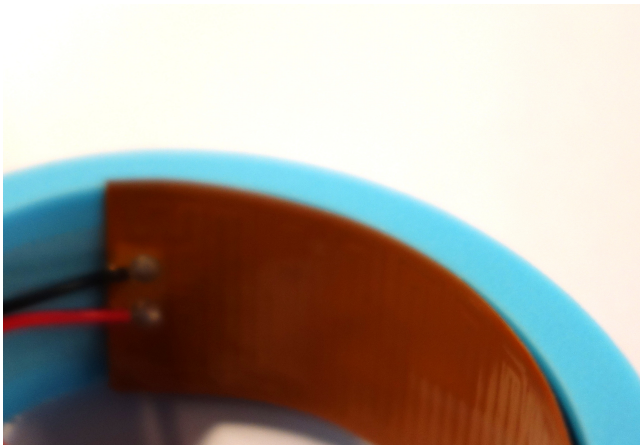


Figure 13. Flexible heat sensor inside the bracelet.

Device	Non-evaluative	Imperceptible	Wearable	Just-in-time
Noumic Device	Yes	No	No	Yes
EmoBracelet and EmoBowl	No	No	Yes	Yes
Cool Me Down	Yes	Yes	Yes	No
ReflectOns	No	No	No	Yes
Fitbit Flex	No	No	Yes	Yes
Nike Fuel	No	No	Yes	Yes
Jawbone UP	No	Yes	Yes	No
Remindful Bracelet	Yes	Yes	Yes	Yes

Table 1. A comparison of related devices with *The Remindful Bracelet*.

The Remindful Bracelet differs from the devices mentioned previously because it gives non-evaluative but meaningful feedback in such a way that is imperceptible to anyone but the user. I hypothesize that this combination of features will be the most effective in augmenting a mindfulness practice.

FUTURE WORK

In the future of this research, some areas still need further investigation:

- What is the best way to construct user studies?
- What is the minimum amount of features needed to have a positive effect on mindfulness?
- Can the device be used for other purposes besides mindfulness?
- With time, can the bracelet work so subtly that it triggers mindfulness even if the user isn't fully aware of the physical signal?
- In addition to helping people new to mindfulness, can the device enhance the practices of experienced meditators?

CONCLUSION

A mindfulness practice can improve focus, happiness, and overall health, but it can be hard to begin. Through the use of this device, I hope to demonstrate that I can increase the likelihood of adopting mindfulness and thus change behavior, habits, and thought patterns.

REFERENCES

1. Davidson, R.J., Kabat-Zinn, J., Shumacher, J., Rosenkranz, M., Muller, D., Santorelli, S.F., Urbanowski, F., Harrington, A., Bonus, K., Sheridan, J.F. Alterations in brain and immune function produced by mindfulness meditation.
2. Deci, E., Koestner, R., Ryan, R. Extrinsic Rewards and Intrinsic Motivation in Education: Reconsidered Once Again. *Review of Educational Research*, Spring 2001, Vol. 71, No. 1, 1-27.
3. Englebart, Douglas. Augmenting Human Intellect: A Conceptual Framework. http://sloan.stanford.edu/mousesite/EngelbartPapers/B5_F18_ConceptFrameworkInd.html
4. Kerr, C.E., Jones, S.R., Wan, Q., Pritchett, D.L., Wasserman, R.H., Wexler, A., Villaneuva, J.J., Shaw, J.R., Lazar, S.W., Kaptchuk, T.J., Litternberg, R., Hamalainen, M.S., Moore, C.I. Effects of mindfulness meditation training on anticipatory alpha modulation in primary somatosensory cortex.
5. Vaucelle, C., Bonanni, L., and Ishii, H. Design of Haptic Interfaces for Therapy.