Calm Station: An Interactive Perpetual Desk Object that Reduces Digital Distractions

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Abstract
In this work, we present *Calm Station,* an interactive desk object which generates dynamic motions of a metal marble on a wooden tray. Calm Station is designed to convey daily notifications with abstract, poetic movements. It allows users to remain focused while doing desk work, reading, or relaxing by transferring distracting notifications, including updates and messages. We showcase how Calm Station can be serve as a perpetual toy intended to provide pleasure and calm while reducing digital distractions.

Author Keywords
Ambient devices; notification; distraction; desk object; perpetual toy

ACM Classification Keywords
H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous;

Introduction and Background
Despite Mark Weiser's vision on future everyday technology promised the aspect of calm and comfort [6], we are increasingly overloaded by incoming notifications including updates, subscriptions, social media activities, and emails [1].

Figure 2: The examples of perpetual toys available in Amazon. TOOGOO®, LE Newton's Cradle (top), Sunnytech, Steel Balance Toy Weightlifter (middle), Anddas, Spinning Top (bottom).

The advance in the ubiquity of technology has also brought us cognitive burdens. A notable burden placed on users is a digital distraction that arises from messages and alerts trying to get our attention. Biskjaer describes the present as "hectic, chaotic space in which various digital technologies compete for the attention [1]." Moreover, studies have shown that notifications on smartphones could cause inattention and hyperactivity [5]. A recent study also suggests that merely receiving a push notification is as distracting as responding to a text message or a phone call [2].

Given this increase in digital distractions, an early work such as scope [2] proposed a glanceable notification center on a desktop that unify notification from multiple information sources. In addition, various types of 'Do Not Disturb' features on a smartphone are available to help ensure digital freedom through digital constraints, including silencing calls and switching off all or a certain types of alerts and notifications [1]. However, such distraction management occurs in a digital space. Consequently, this approach does not completely fulfill the desire of minimizing interruptions while not missing crucial information.

In contrast to previous approaches, we attempt to tackle the digital distraction problem by transmitting digital notifications to movements of a physical object at work. Inspired by early work in ambient displays such Jeremijenko's LiveWire [9] and Ishii's ambientRoom [3], we express digital information through ambient actuation in order to move it in the periphery of our attention.

Thus, we propose a concept that has properties of perpetual motions in the desk objects presented in figure 2. The perpetual toys, known as office toy or executive toy, are designed to provide decoration or pleasure, relieve stress or inspire creativity [7]. Studies show that such perpetual objects' visual input that is repetitive and rhythmic have a calming effect. For instance, an exploratory study of 'Fidget Widget' that playful and mindless interaction properties help users gain in focus, creativity and calm [4].

Calm Station

Inspired by the calming and focusing effect of the perpetual office toy, we propose a desk object called Calm Station to ensure freedom from digital distraction caused by smartphone notifications. Calm Station is an ambient fixture that displays the user's smartphone notification data as movement of a metal marble on a wooden tray. We wanted Calm Station not to look like a traditional electronic product. Thus, we used natural material such as bamboo. All electrical parts for actuating the marble were concealed beneath the tray.

Concept

Calm Station is an interactive desk object that can be used in situations when people want to break free from smartphone notifications, such as while at work, reading a book, exercising yoga (see figure 3). When a user enters the place where the calm station is being installed, the user's smartphone is automatically paired with Calm Station through Bluetooth communication. Once connected, the smartphone becomes silence and all notifications are transferred to the Calm Station. Calm Station consists of a wooden tray and a metal marble which motions are related to the perceived importance and urgency of notifications specified in Figure 4.

Figure 3: Calm Station Installed in a reading desk (top) and a coffee table (bottom).

Mode	Movement	Type of Notification	Example	Perceived Importance
Idle	Click-tick	No notification	-	-
Update	Funnel	Notifications that does not target the user as a specific recipient	Services updates, news, promotions, subscription updates	low
Poke	Pendulum	Notifications of messages or activities related to the user	SNS activities related to the user. Twitter's direct mention, Facebook's tagging, mention, reply	Moderate
Call from a Starred Person	Wriggle	Notifications of directed messages or calls from an important sender	Calls, messages, emails from marked a sender as important	Critical

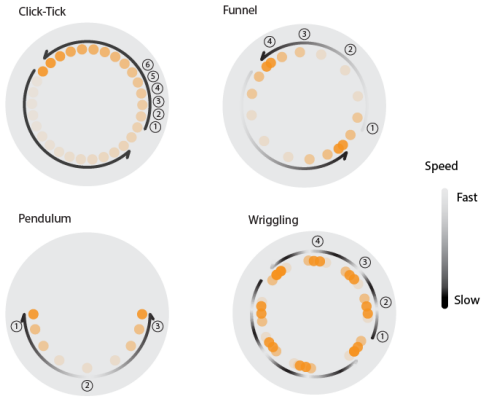

Figure 4: The four types of marble notification (left) and movement (right).

Design of Marble Movement

We examined engaging, but not too much distracting movements that could provide positive effect on one's focus and calm. Inspired by motions in physics, we proposed four different marble movement: click-tick, Pendulum, Funnel, and Wiggling. These four movements are designed to enable pleasing notification without distracting the user.

We mapped the four types of marble movement to the four types of notifications classified by perceived importance and urgency; 1) Idle state when there is no new notification, 2) update mode of system alerts or general service notifications, 3) Poke mode of alerting a direct message sent to the user, and 4) call from a starred person mode when a person marked as important awaits the user's response such as email from a colleague marked as important. Click-tick movement is a default mode when there is no incoming notification. The motion imitates a clock's second hand motion. The movements become funnel if the user receives a general 'update' that neither targets a recipient nor requires a response. The notable example of the notification is an update of a user's YouTube subscribed channel. The speed of the marble movement is proportional to the amount of notifications. 'Poke' is a mode represented by a pendulum movement when social media friends mention, tag, or direct the user. Depending on the amount of the notifications accumulated, the cycle of the pendulum increases proportionally. Marble wriggles when it receives 'call' from a starred person to help the users recognize important message that often requires immediate action.

Implementation

Calm Station consists of a Bamboo material wooden plate part and a lower main body part made by laser cutting. The lower part contains a computing part and an actuation part for operation. For the actuation part,

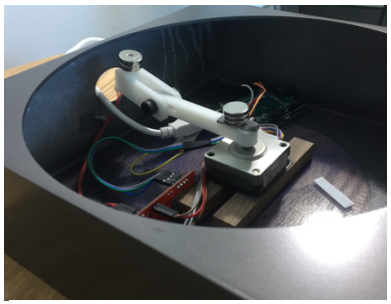

Figure 5: Custom designed adjustable magnetic arm.

we have produced a 3D printed arm with adjustable length and angle to accommodate the proper position of the magnet (figure 5). The basic principle of operation of the product is to rotate the NE odium magnet using the Arduino and stepper motor driver. The implementation of the acceleration movement through the stepper motor was an important element of the interaction expression. AccelStepper library [8] was used to express the motion of the pendulum to express the motion like the actual desk toy. SNS and email notification are received and processed by Temboo API, a platform that enables connecting hardware with social media applications.

Future work

In this work, we propose a novel way to convey digital information through motions of a perpetual desk object. Our future work includes specifying interactions and conducting user research in the field to examine whether Calm Station can provide pleasing experience while reducing digital distractions.

Video link

https://youtu.be/gCBQhNUlmzo

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Reference

1. Michael Mose Biskjaer, Peter Dalsgaard, and Kim Halskov. 2016. Taking action on distraction. interactions 23, 6 (October 2016), 48-53.
2. Maarten Van Dantzich, Daniel Robbins, Eric Horvitz, and Mary Czerwinski. 2002. Scope: Providing awareness of multiple notifications at a glance. Proceedings of the Working Conference on Advanced Visual Interfaces: 267–281.
3. Hiroshi Ishii, Craig Wisneski, Scott Brave, Andrew Dahley, Matt Gorbet, Brygg Ullmer, and Paul Yarin. 1998. ambientROOM: integrating ambient media with architectural space. In CHI 98 Conference Summary on Human Factors in Computing Systems (CHI '98). ACM, New York, NY, USA, 173-174. 173–174.
4. Michael Karlesky and Katherine Isbister. 2014. Designing for the physical margins of digital workspaces: fidget widgets in support of productivity and creativity. In Proceedings of the 8th International Conference on Tangible, Embedded and Embodied Interaction (TEI '14). ACM, New York, NY, USA, 13-20.
5. Kostadin Kushlev, Jason Proulx, and Elizabeth W. Dunn. 2016. "Silence Your Phones": Smartphone Notifications Increase Inattention and Hyperactivity Symptoms. In Proceedings of the 2016 CHI Conference on Human Factors in Computing Systems (CHI '16). ACM, New York, NY, USA, 1011-1020.
6. Mark Weiser and John Seely Brown. 1996. The coming age of calm technolgy. Beyond Calculation: 75–85.
7. The New York Times, "Designing Distraction: Executive Toys". Retrieved March 20 2017 from https://www.nytimes.com/2015/02/05/garden/designing-distraction-executive-toys.html
8. Mike McCauley, AccelStepper. Retrived March 20 2017 from http://www.airspayce.com/mikem/arduino/AccelStepper/
9. Natalie Jeremijenko. 1995. Live Wire (Dangling String). (1995).