Proverbial Wallet: Tangible Interface for Financial Awareness

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ABSTRACT
We propose a tangible interface concept for communicating personal financial information in an ambient and relevant manner. The concept is embodied in a set of wallets that provide the user with haptic feedback about personal financial metrics. We describe how such feedback can inform purchasing decisions and improve general financial awareness.

Author Keywords
Tangible user interface, haptic feedback, personal financial data, ambient awareness

ACM Classification Keywords
H.5.2 User Interfaces: Haptic I/O.

INTRODUCTION
In our consumer culture, there is a disconnection between financial decisions and consequences. Most of us are not diligent about balancing our checkbook or watching our account balances. When we purchase a product, we don't know whether we're spending beyond our means. With credit cards and online banking, our idea of money has become abstract, and the transaction experience does not reflect the amount of money involved [5, 3].

The proposed concept explores context-appropriate feedback on personal financial data in order to augment our knowledge with a "financial sense." It brings physicality to the invisible assets we retain or trade for goods, to produce a more accurate model of transactions [2].

DEVICE DESCRIPTION
The Proverbial Wallet concepts are wallets with embedded actuators and control circuits. Haptic feedback provides ambient awareness of the user's account balances and transactions.

We wanted to imbue dumb objects with intelligence, rather than creating a consumer electronics device. B.J. Fogg describes the principle of *kairos* as "finding the opportune moment to present your message." [1] The Proverbial Wallet uses this principle in an attempt to guide the user toward responsible decisions, by delivering the appropriate message at the appropriate time. Haptic actuators are used to connect intangible virtual transactions to the user's physical world. At the same time they provide a private channel of communication for sensitive data.

Figure 1. "Mother Bear" opposing force generated by user opening the wallet.

Figure 2. "Mother Bear" wallet with hinge resistance.

TYPES OF HAPTIC FEEDBACK
The primary function of this concept is to explore metrics of financial sense, and forms of haptic feedback that communicate these metrics. The Proverbial Wallet does not prevent the user from spending money, but instead provides subtle ambient information in an appropriate context.

Much as Dunne and Raby's Compass Table and Nipple Chair bring ignored electromagnetic fields to life through objects that provoke emotional responses [4], these concepts use feedback that gives character to financial

information. It is intended that the struggling and twitching of the wallets inform a similar user response. We describe three types of feedback, using animal characteristics to illustrate the wallet behaviors.

Mother Bear

The wallet protects the money within it, making it difficult to open when you need to be thrifty. The resistance increases as a given budget threshold is approached. This behavior promotes saving to weather out financial winters.

At its heart, this concept uses a passive circuit with a small gearbox and a DC motor acting as a hinge (Fig. 2). When the motor is shorted, the hinge offers more resistance, making the wallet harder to open or close. The motor itself does not require power as opening the wallet produces a counter electromotive force that opposes the motion.

Peacock

The wallet appears to grow and shrink to reflect the user's account balance. The effect is that the user will feel a subtle tightness or looseness in your pocket that persists until your account balance changes. This promotes a sense of general financial health and can encourage users to save money.

This concept uses a servo embedded in a wallet, which rotates its arm from parallel to perpendicular to the wallet surface (Fig. 3).
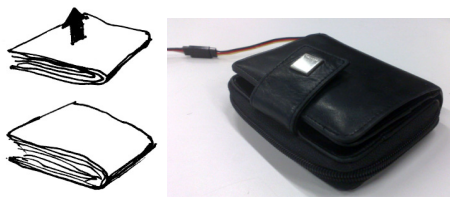

Figure 3. "Peacock" wallet, illustrated flat and puffed out.

Bumblebee

The wallet buzzes whenever the bank processes a credit card transaction from the user's account. This encourages a conscious, de-virtualized connection between handing over a credit card and hard-earned money being harvested from the bank. A buzzing that doesn't have an associated purchase also alerts the user to fraud, or when a borrowed card is being used.

This concept uses an eccentric motor in a wallet pocket to generate vibration feedback (Fig. 4). The intensity of the vibration correlates to the amount of the transaction, but is generally less than that of a cell phone, since it is informational rather than requesting urgent action.

CONCLUSION AND FUTURE WORK

The current version of the wallet is an illustrative concept to explore different types of haptic feedback.
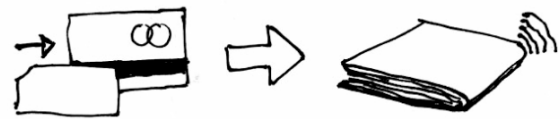

Figure 4. "Bumblebee" wallet: Concept sketch and photo of wallet with Bluetooth/vibration circuit removed.

Approximately 50 people tried the prototypes during a three-day open house and gave very positive feedback. As the wallets currently require a connection to a nearby computer, it was not feasible to conduct field tests. The major obstacles to creating a more portable form are power consumption and communication. While the current hardware uses little power, it still requires batteries and therefore charging, which limits its usage. A future version of this concept could integrate all three haptic feedback types into a smaller package, which allows retrofitting any wallet. A cell phone application could retrieve the user's personal account information and preferences, and transmit the desired response to the wallet via Bluetooth. Such a prototype would allow a long-term field study to investigate whether the haptic feedback wallets would have a lasting effect on the users, or gradually get ignored.

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