Embedding Behavior Modification Strategies into a Consumer Electronic Device [Video]

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ABSTRACT
We are exploring how ubiquitous computing devices can drive proactive health applications that deliver behavior modification techniques in ways that are timely, tailored, subtle, and even fun. In this video we present a prototype system called *ViTo* that is intended to help users watch less TV and become more active. *ViTo* shows how a suite of behavior change strategies can be integrated into the user interface of a single device, leveraging the convenience and context awareness of mobile technologies.

Keywords
HCI, ubiquitous computing, persuasive technology, behavior modification, physical activity, health, TV, remote control, PDA.

1. THE PROBLEM
The average American watches over 4 hours of television each day [1]. As time spent in sedentary media consumption increases, the amount daily physical activity one incurs typically decreases. This is an unsettling fact of life for many people. For example, nearly 50% of Americans feel they presently watch too much television and would like to reduce the amount they watch [2]. Unfortunately, few people succeed in watching less TV and becoming more active in spite of accumulating evidence of a correlation between sedentary behavior and medical disorders such as obesity and Type 2 diabetes [3].

2. AN OPPORTUNITY
Prior TV and exercise interventions like public awareness campaigns are largely ineffective because they fail to provide the support system necessary to sustain a change in lifestyle. As an alternative, we are investigating the use of ubiquitous computing technology to provide ongoing assistance and motivation as users attempt to adopt healthier patterns of living.

This video describes a prototype system built to explore how behavior modification strategies can be embedded into a consumer electronic device. We call the system *ViTo* (Figure 1). *ViTo* demonstrates how context-sensitive motivational content can be delivered to the user without interrupting the flow of daily activities.

Our first goal in creating this technology was to determine the times and places where the decisions that impact the target activities occur. Because television viewing and sedentary behavior are so closely linked, we identified the remote control as the optimal point of intervention.

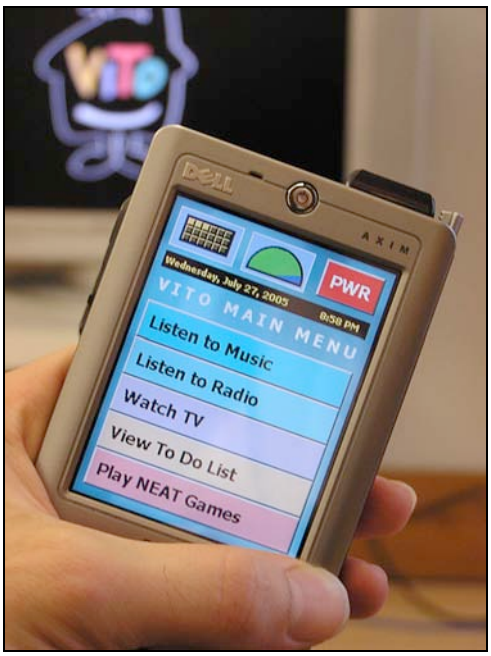

Figure 1. *ViTo* handheld interface

Most living rooms already have two or more remote controls, many of which are difficult to use. The general sense of frustration associated with these devices opens a key design opportunity for our intervention: to improve over existing remote controls in order to create a device that users might wish to adopt for the long term. We analyzed traditional and so-called "universal" remotes, and set out to develop a better alternative though the application of principles like simplicity, convenience, convergence, and ease of use to provide a positive user experience. By positioning *ViTo* first and foremost as a better remote control, we hope to produce a device that users would continue to value even if their initial behavior-change motivation wanes.

ViTo offers value to the user by eliminating multiple existing remote controls and offering a unified graphical interface for watching TV or movies and listening to music or radio. The prototype communicates wirelessly with multiple media devices to create a seamless interaction experience.

In producing a device that an individual may want to use regularly when watching television, we create an opportunity for the delivery of tailored, context-sensitive messages precisely when the user is making decisions that impact sedentary behavior. The *ViTo* remote control can therefore be thought of as a platform for the delivery of scientifically grounded behavior modification techniques. As the user interacts with *ViTo*, he or she is exposed to occasional and recurring design elements that integrate these strategies. Because the persuasive elements are timely and tailored, they can often be subtle and delivered quickly, without negatively impacting the usability of the remote.

3. BEHAVIOR MODIFICATION

The final *ViTo* prototype incorporated more than 20 persuasive strategies designed to motivate behavior change [4]. This video highlights a selection of these as follows:

1. **Value integration.** Delivering persuasive strategies within an application that otherwise provides value to the user increases the likelihood the technology will be adopted.
2. **Disrupting habitual behavior.** Bad habits can be eliminated if the conditions that enable them are removed or avoided.
3. **Suggestion.** People can be biased toward a specific course of action through even very subtle prompts and cues.
4. **Encouraging incompatible behavior.** Engaging an individual in activities that inhibit an unwanted behavior can be effective in deterring the target behavior.
5. **Consistency**. The desire to demonstrate consistency between what we say and do is a basic trait that can be used to help people adhere to their stated goals.
6. **Self-monitoring.** People who are motivated to change their behavior can do so more effectively when they are able to evaluate progress toward outcome goals.
7. **Goal setting.** Setting concrete, achievable goals promotes behavior change by orienting the individual toward a definable outcome.
8. **Proximal feedback.** Feedback that occurs during or immediately after an activity has the greatest impact on behavior change.
9. **Operant conditioning.** Desirable behaviors can be increased in frequency and intensity by pairing them with rewarding stimuli.
10. **Intrinsic motivation.** Incorporating elements of challenge, curiosity, and control into an activity can help sustain a participant's interest.

In this video we illustrate how these strategies were embedded into a few specific elements within the *ViTo* interface. More details about the design of, motivation for, and exploratory evaluation of the *ViTo* prototype system are described in other work [5].

4. ACKNOWLEDGMENTS

This was funded, in part, by NSF National Science Foundation ITR grant #0313065 and the House_n Consortium. The authors thank Jennifer Beaudin, Eli Stickgold, Randy Rockinson, and Sarah Paterson for their help producing the video.

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