

Using transmedia games and wearables to encourage fitness in children

Adam Tindale¹, Michael
Cumming², Sara Diamond^{3 1}
^{2 3} OCAD University Toronto,
ON M5T 1W1 Canada
atindale@faculty.ocadu.ca,
mcumming@ocadu.ca,
sdiamond@ocadu.ca

ABSTRACT

Studies show that the degree to which children move around is a good predictor of overall fitness. In addition to being fitness trackers, wearables also have the potential to encourage activity and fitness. We have built a wearable device that encourages its players to actively move in order around to participate in an engaging transmedia collection-type game. We propose that combining intellectually and physically engaging game-play on wearable devices that also encourage activity and fitness holds promise for both wearables and transmedia games.

Author Keywords

Transmedia, wearable technology, fitness tracking, biometrics

ACM Classification Keywords

H.5.m. Information Interfaces and Presentation (e.g. HCI): Miscellaneous

INTRODUCTION

This work concerns the intersection of transmedia game design and wearables that encourage activity in children. Most games oriented towards children, even those played on wearables, encourage sedentary playing positions. This is a problem with many games for children: they tend to encourage a sedentary lifestyle. Since game-playing is such a popular activity for many children this clearly is a threat to their overall fitness. Games and game-oriented wearables cannot be seen to decrease the health or fitness to whom they are marketed. Gaming for children should at least reach the threshold of 'do no harm.'

Many children enjoy playing games. The reason that spend so much time playing them is that they find

them engaging. Our device supports a transmedia and location-based game called Time Tremors.

Wearables, with their many sensors and potential as gaming platforms, can also be designed in to encourage movement. If children are less sedentary their overall fitness is expected to improve. Since, obesity in children currently is a major concern, this approach could be helpful towards health and fitness in children. The goal of this research is produce intellectually and physically engaging wearable devices and games involving narratives for children designed to encourage activity and fitness.

THE PROMISE OF 'EXERGAMES'

Exergames are ones that encourage or require movement in their players. In order to work they both have to be shown to actually require physical activity, and they also have to adequately engaging and interesting to provide incentive for people to play them [2]. Activity that is expected to be have a significant fitness effect tends to be rather strenuous. The results of a new regime of exercise may takes months to appear. An effective exergame must encourage people to start moving more and it must be sufficiently interesting for people to continue working at it. Like gym memberships, the novelty of exercising often wears off quickly. This is a rather difficult standard for a game or device to achieve. The most prominent examples of exergames are those played on the Nintendo Wii.

Whitehall, et al. survey the number of calories expended while playing exergames and found that there is a wide range of values. Typically, these games are marketed towards children, who find them fun to play. There is also a large market for exergames – if they actually do encourage fitness over the long term – for the elderly, where the negative effects of sedentary lifestyles are even more problematic than with children [1].

There is a strong correlation between heart rate and energy expenditure[2]. Activities that engage the whole body tend to be more effective for fitness than ones that engage individual limbs. One way of encouraging whole body movement is to attach several sensors to player's limbs. Some exergames (e.g. Wii) allow pseudo-movement: minor movement read incorrectly by device

Paste the appropriate copyright statement here. ACM now supports three different copyright statements:

- ACM copyright: ACM holds the copyright on the work. This is the historical approach.
 - License: The author(s) retain copyright, but ACM receives an exclusive publication license.
 - Open Access: The author(s) wish to pay for the work to be open access. The additional fee must be paid to ACM.
- This text field is large enough to hold the appropriate release statement assuming it is single spaced.

Every submission will be assigned their own unique DOI string to be included here.

sensors as major body movement. Exergames should be designed to prevent 'cheating.' Measuring more aspects of activity, such as body and limb movement, and heart rate more accurately measures real activity that will likely to have a real effect on fitness.

THE GAME AND DEVICE

Our device is an device that enables the child to interact and play with the transmedia, location and collection-based game called Time Tremors. Time Tremors is a collection-type game. Children collect virtual artifacts that they discover while on location-based treasure hunts in museums, and other venues. Children must maintain a level of a game-specific quantity called 'time energy.' Time energy is gathered as one maintains a level of physical activity while wearing the device. If the player has sufficient time energy players are able to collect 'time treasures.' Time treasures are the item collected within the game. If sufficient treasures are collected, in certain combinations, then other opportunities to collect additional treasures are presented to the player. There is also a transmedia connection in that players can collect treasures while watching TV episodes connected to the game, navigating successfully through a flying game, or solving puzzles. Therefore,

Our device is a wrist wearable that incorporates a wireless bluetooth microprocessor, an electrocardiogram (ECG) type heart sensor and an accelerometer that measures movement and accelerative forces. The purpose for using these two sensors is to get a composite measure that indicates the overall physical activity of the child wearing the device. The player needs to have a heart rate above a certain threshold and also have physical movement measured by the device's accelerometer above a certain level.

BIOMETRICS ON WEARABLES

Measuring biometrics is an area of increasing interest, especially in the medical fields [?]. Biosensors measure physiological parameters like blood pressure, heart rate, oxygen saturation of the blood, respiration rate, electrical muscle activity in limbs and the heart, body and skin temperature, etc. This technology is expected to have a major effect on real-time monitoring of health and fitness for personal information and medical diagnostic purposes.

GAMES ON WEARABLES

COLLECTION AND LOCATION-BASED GAMES

CONCLUSION

Children spend an inordinately large number of hours playing games. One approach to increasing the value of this time spent is to convert some of them into so-called 'exergames.' This type of game has the promise of increasing activity and fitness in the children who play them. It is not difficult to engage children in a game for short period of time. However, healthy habits

with respect to activity requires a long-term commitment and high levels of physically and intellectual engagement. Our approach is to integrate and to increase the engagement of players using the device of transmedia gaming. The narrative appeal of transmedia should increase the incentive of physical activity, not by the appeal of heightened fitness, but by the desire of players to explore narratives.

ACKNOWLEDGMENTS

We would like to thank NSERC, ISTP, OCADU and others for their support.

REFERENCES FORMAT

References must be the same font size as other body text.

REFERENCES

1. Vonstad, E. K. Exergaming for elderly: Subjective experiences and objective movement characteristics.
2. Whitehead, A., Johnston, H., Nixon, N., and Welch, J. Exergame effectiveness: what the numbers can tell us. In *Proceedings of the 5th ACM SIGGRAPH Symposium on Video Games*, ACM (2010), 55–62.