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# The Extra Mile: Augmenting the Experiences of Runners and Their Supporters

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**Abstract**

In this work-in-progress report we will outline a research for investigating interactions during organized running races. Currently we are investigating the preparation method and how mobile and social technology can enhance user experience when preparing for and running in big events. In the future we plan to prototype a number of augmented running devices that provide additional information to runners and supporters. The goal is to find out whether ubiquitous interfaces applied to a community-based running experience can boost performance and user satisfaction.

**Author Keywords**

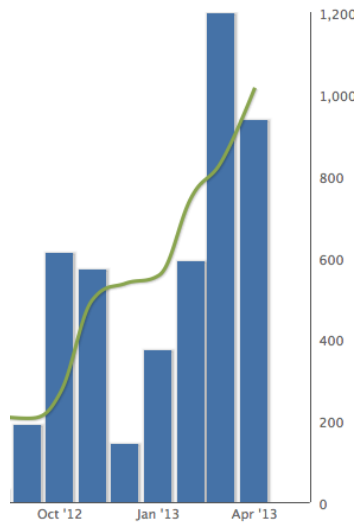
Running, ubiquitous computing, mobile computing, social technology, big events, sports events

**ACM Classification Keywords**

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

**General Terms**

Human factors, design



**Figure 1.** Current state of the art for consumer running data visualization. The chart presents total running distance per week (blue bars) and average calorie burn per activity (red line).

## Introduction

Supporting runners through communication with remote partners has been explored by Mueller et al. [3] with a solution where paired joggers in different locations receive audio feedback from each other if they are matching each others' or a preset pace. The results of "Jogging over a Distance" suggest that the social support enhances users' engagement. We see a need for investigating other kinds of feedback for running.

We should encourage running for the running pleasure itself, and so the form of the supportive feedback should not obscure the experience. McGookin and Brewster [2] have presented *PULSE*, a mobile application that attempts to present voice information as ambient streams of sound that collect in geolocations, where a user could search out individual messages. While it starts as ambient, passive sound, the user has to engage with it in order to get the spoken messages.

Heart beat is arguably a very ambient sensation. Slovak et al. [5] have studied heart rate sharing and its effect on perceived connectedness. The participants of the study felt that the heart rate sound did provide a connection, and argued that the connection was more relevant if the other person was far away, since other aspects of people close to you were more powerful. On the other hand, heart rate was considered very personal information by some of the study participants. Vibrotactile feedback has been explored by van der Linden *et al.* [1], who created immersive theatre experience in a pitch-black space, where audience members were provided with a haptic device to enhance their discovery of the space. They found that in addition to supporting exploration it reassured the

participants. As this form of providing information is less intrusive, it may work unobtrusively during the running experience.

## Preparation

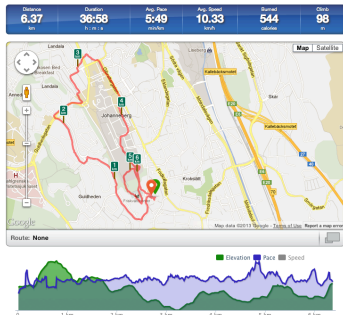
### Methodology

Our first activity was to chart assess current methods for enhancing the running experience digitally and helping friendly supporters participate in the preparation for a race. We strived to fully understand the process of training as we saw this as the only way to design for the running experience (a methodology promoted by [4]). In order to gather enough insights, one of the authors of this paper enrolled to participate in the GöteborgsVarvet – one of world's largest road races (in terms of runner participation) and began a 16-week-long training programme.

We used RunKeeper to track the runner's progress and manage the training plan. Routes and speed were logged using GPS and heart rate histories were logged from a Bluetooth-enabled chest strap. Furthermore, the runner collected notes and strived to include his friends and family in the running experience. A mid-term goal of the plan was participating in a seeding race with a live friends-only broadcast.

### Results

Extensive running statistics were obtained during the training period. The collected data will be used to see if advanced visualisation techniques can add more meaning to the statistics and help in improving training routines. Current measures for reflecting on training data are rather basic (see Figure 1).



**Figure 2.** Runkeeper information will be presented to people who have friended the runner.

current means of remote participation by friends and family. During the seeding race, the positional data and hear rate was available online to invited guests. The runner was sure that selected friends were supporting him during the effort. Unfortunately, a technical glitch prevented most of the prospective audience from watching. This caused disappointment, but also produced a new significant design consideration. There is a need for providing two-way communication between the runners and the supporters. This way, those who cannot be cheering on the race route can still support their loved ones. We see a potential for developing unobtrusive remote supports solutions that will benefit both the runner and the supporters. Ambient displays and vibrotactile feedback may be the interfaces to be further investigated.

## Race

### Methodology

In our future inquiries we plan to conduct proof-of-concept in-the-wild studies of new interactive techniques for augmenting the running experience with We will investigate ambient feedback techniques such as visual displays and haptics to communicate the engagement of the supporters to the runner. We hope to make extensive use of wizard-of-Oz techniques and remote mobile device management in the early stages of our inquiry. We will present live running data to the supporters in the form presented in Figure 2.

We aim to identify the specifics of the running workout settings and describe the unique design constraints that accompany the jogging context. Through extensive prototyping, we will reach design insights that will help runners and supporters in gaining motivation. We will strive to answer the question how to foster

engagement in the runner and motivate him to run the extra mile not using artificial stimuli, but the positive vibe of his friends and family. Furthermore, we will try to determine what kind of feedback is most effective while running.

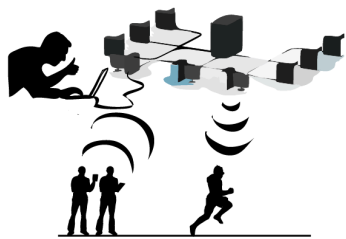
### Design

Our initial design proposes two devices – an augmented baton for relays and an ambient bracelet for individual races. We will test vibration, pressure and visual feedback. We have consciously decided to omit auditory stimuli as these have been already explored and cannot be applied in all environments (our pre-study shows that it may be unsafe to use ear buds in busy environments and many runners consider running with headphones during a race dangerous). Both devices will feature connectivity features both for supporters in a remote location and those cheering on site (Figure 3).

The *augmented baton* supports a relay team by communicating the team spirit within the team to the current runner. We also see a possibility for communicating team instructions through the baton. We also propose a *runner bracelet*, inspired by commercial solutions like the *Nike FuelBand*. The wristband will communicate support through lights and varying pressure. The device will attempt to eliminate any discomfort and provide a pleasurable enhancement to the race.

## Conclusions and future work

We have assessed current methods for real time supportive feedback to runners, and based on our findings we have outlined a plan for further in-depth studies.



**Figure 3.** The interactions within the proposed system. Friends at the track and elsewhere can view the runner's data and send support through mobile phones or internet-connected computers, which is then presented as a non-intrusive signal to the runner.

Our proposed solution has a number of innovative aspects. Vibrotactile or ambient visual displays will be used rather than audio feedback..The system will provide two-way communication between runners and non-running friends, but will aim to be non-intrusive in order for the runner to fully enjoy the running experience. We anticipate that haptic devices can provide the reassurance of supportive friends without intruding unnecessarily on the running.

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