

# Creating a New Sense by Feeling Remote Information

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**Abstract**—One approach to smart city initiatives is to gather vast amounts of sensor data, process it, and then present results to planners or citizens. However, this is usually accomplished via the visual modality, often through websites or mobile applications that render a stream of data as maps, charts, or text-based webpages. We have developed a prototype system, SenseProxy, that conveys information about motion from one person to another, rendered not visually, but instead as periodic vibration patterns on the receiver’s leg. This system provides a background sense of a partner’s motion, and when coupled with already-known context information, can provide insight into meaningful information such as location changes and transit choices. We will demonstrate the latest version of the system linking two people, as well as a one-to-multiple scenario. Our goal is to stimulate thinking around the broader idea of sending such partially-summarized streaming data as an ambient sense of remote events or real-time data streams, and its application to scenarios such as understanding what is taking place in a city, without dominating the visual field.

## I. PROTOTYPE DESCRIPTION

Systems for mobile haptic communication have been built in the past, including for providing a background sense of remote events [1], [2]. However, these have typically used phones, which make rendering finer haptic feedback difficult due to inconsistent coupling of the phone to the body.

For the demonstration, we will bring smartphones and Pebble smartwatches running our SenseProxy remote implicit communication software. The system is an updated version of work described earlier [3], which uses an ankle-worn Pebble smartwatch to sense motion of a partner’s leg (Figure 1), and render the magnitude of this motion, as well as other parameters, on their partner’s leg every 10 to 60 seconds. The goal is to create an ambient awareness of a partner’s activity, which when coupled with existing knowledge about their routines or plans for the day, provides useful feedback [3]. Since this feedback is non-visual, and since it is ongoing in the background, we expect that the user will learn to treat it as a new sensory input, and to pay attention to it when it has useful meaning, while ignoring it the rest of the time.

The latest version of SenseProxy now includes the ability to configure the feedback with additional parameters one wishes to perceive from their partner (e.g., their overall velocity or phone charging state), and also allows the output vibrations to be routed to one’s phone instead of just to an ankle-worn Pebble smartwatch.



Fig. 1. Pebble smartwatch on user’s lower leg.

We propose that although the system was originally conceived to form a direct link between two individuals, a demonstration at MMSP would stimulate discussion of how such a non-visual system could be used to provide a new sense of remote information, without dominating the visual field. In addition, it speaks to issues of how much a raw signal should be processed and interpreted automatically by a computer, as opposed to being fed directly to the user so their brain can extract meaning from a richer, or more nuanced, signal.

### A. Demonstration requirements

To effectively demonstrate the system we would need a small table to hold the devices when not in use, as well as reliable WiFi so the phones can be connected to the internet to relay the data between participants.

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