

Sit-By-Me: A Multi-Sensory Feedback Bench for Social Impromptu Interactions

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Abstract. We propose Sit-By-Me, a multi-sensory feedback system in the form of a bench where interactions are facilitated merely by passively sitting on the bench with another. It integrates visual, tactile, and audio feedback depending on the sitting pattern, allowing for numerous interaction paradigms between a pair of users. We found that Sit-By-Me could stimulate people’s motivation to explore it and thus trigger some simple conversations and discussions. The interactive behaviors of the participants together create musical feedback that enhances the sense of connection between them.

Keywords: Public Space · Impromptu Interaction · Multi-Sensory

1 Introduction

Face-to-face interaction is produced by the mutual influence of the individual’s physical presence and his or her body language [5]. It is one of the basic elements of the social system and an important part of individual socialization. It is also essential for the development of communities, groups, and organizations composed of individuals [1]. With interactive systems, people’s behaviors in public spaces can be transformed and expanded.

However, it is challenging to initiate a friendly interaction through a interactive system in these public space. Monastero et al. [4] studied how to provide and increase opportunities for individuals in the same space to communicate with each other through personal devices. Yet, people’s participation in interactive activities based on daily objects in public spaces, and whether interaction methods in different contexts will affect people’s social interaction behavior and experience has not been evaluated.

Kinc et al. [2] and Monastero et al. [3] both designed an interactive bench to promote interaction. However, the interactions were short-lived and were not tested in public spaces. Thus, we propose Sit-By-Me, a public interactive system that employs a bench as the interface. Encouraging connection and consequent interaction through the passive behavior of users sitting on a bench is our core concept.

2 System Design

We used pressure sensors to detect participants' behavior of sitting on the bench or touching the bench surface with their hands. The pressure sensor used in this study adopts polymer thick film (PTF) and the FSR406⁵ sensor. Each of them are connected to an Arduino Mega 2560⁶. Applying pressure to the sensing part of the sensor causes the material to deform and thus increase its resistance. We designed a wooden cushion to load the pressure sensor as shown in Figure 1. This disperses the pressure evenly across the panel.

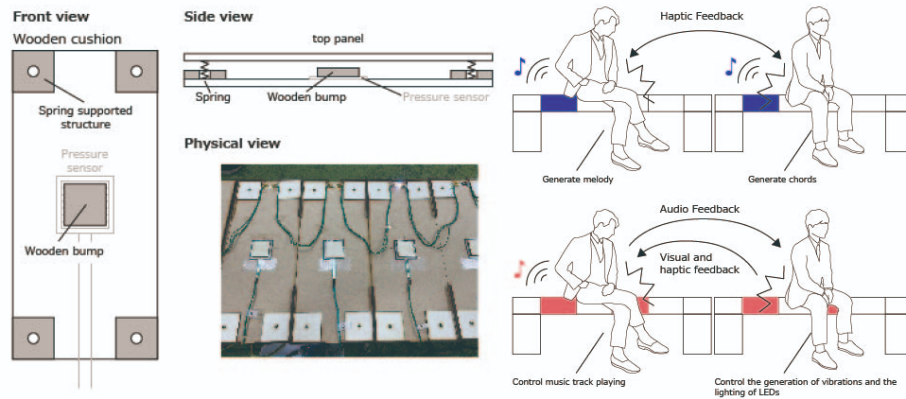


Fig. 1. (left) Wooden cushion structure in the bench to support the (top right) cooperative mode and (bottom right) empathic mode

The audio output of the Sit-By-Me is realized through an external speaker. Because the Arduino microcontroller has limited audio drive, we made an additional Processing⁷ software to play the audio feedback. The person sitting on the left side of the bench will send waves to the right, and vice versa. Lastly, we implemented two interaction modes: cooperative mode and empathic mode. For the cooperative mode, the program will detect all cushion units during each detection period. No matter which position the participant made an input, the bench will generate the right music note. For the empathic mode, one of the benches will continue to play piano music while the participant sits down. There are two different piano pieces, a passionate one and a calm one, which can be switched according to where the participant sitting.

⁵ <https://akizukidenshi.com/catalog/g/gP-04158/>

⁶ <https://store.arduino.cc/products/arduino-mega-2560-rev3>

⁷ <https://processing.org/>

3 Preliminary Workshop and Results

We selected a co-working space in a university to test Sit-By-Me and let the participants experience both Cooperative Mode and Empathic Mode for 5 minutes. We invited 8 groups (two to a group) of 16 participants (12 females and 4 males) to take part in the test.

In the Empathic Mode test, participants were relatively quick to discover the Sit-By-Me interaction. They spontaneously adjusted their seats and kept touching the surface of Sit-By-Me with their hands. The participants also tended to explore the correlation between the two benches through simple discussion and interactive behaviors at the same time. On the other hand, in the Cooperative Mode test, most of the participants in the test group did not fully understand the principles of music generation within 5 minutes, which seemed to frustrate them. They found that the interactive behavior of Sit-By-Me could trigger the generation of notes but were confused by the difference in the timing of each note generation. Most of the participants reported that they felt that the generated notes were continuous but could not be identified as a song.

4 Conclusion and Future Works

Through Sit-By-Me, users can interact with the people around them in a collaborative manner by simply sitting or touching. For our future works, we plan to more systematically test and understand how haptic feedback behaves when people start and engage in social interaction.

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