

beacon 2+: Networked Socio-Musical Interaction

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Figure 1: *beacon 2+ - new interfaces for networked socio-musical interaction. Interaction with the beacon (left), beacon 1 (center) and, beacon 2 (right).*

1 Introduction

This work proposes an environment for socio-musical interaction where people can generate sounds and play music by feet in collaboration with each other. We have been developing a new musical interface, *beacon*. Each beacon produces laser beams lying on the ground and rotating around it. Audio sounds are then produced when the beams pass individual performer's foot. As the users are able to change the sound pitch and length according to the foot location and angles facing the instrument, their bodily motion and foot behavior can be translated into sound and music in an intuitive manner. In addition, two different types of beacons are connected via network. Throughout the performance, walking, dancing and stepping around the devices, users could feel and make his/her presence felt in a distant place, and also they can easily and intuitively understand how it works.

2 Overview

The developed interface consists of a loudspeaker, a small-size computer, 60 line laser modules, 2 laser range finders, dial and buttons interface, and battery. All equipments are installed in a cylinder shaped metal interface as illustrated in Figure 1. The laser beams are used not only to mark the current location to produce the sound but also to assist musical interaction. At the bottom of the instrument, two laser range-finders are installed and used for the distance measurement to performers, in particular those foot positions and its angles every 100 ms at the height of 1 cm from the ground. The installed range-finder has 4[m] measuring range with 99% range accuracy, and also has a 240 degree angle of view for each. We used two range-finders in order to obtain omnidirectional distance map every time.

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Regarding the laser emission, beacon 1 and 2 have different styles: (i) 60 red laser beam emissions in a sequential manner, (ii) green laser emission based on the galvanometer. In the beacon 1, up to 4 red laser beams with equiangularly-spaced directions are lying on the ground and rotating during the performance. The rotation speed of laser beams can be controlled between 40bpm and 100bpm, which corresponds to the musical tempo. On the other hand, in the beacon 2, the green laser beams are projected on the ground by the reflection of the installed lens and galvanometer. A green laser beam is reflected by the lens which is rotated by the motor. beacon is, therefore, able to show the user's location on the other side by using another laser beam in addition to the rotating beams which indicate the time line. The beacon 1 simply uses the red laser beams according to the other's location, and the beacon 2 is capable to show the other's footprint by using galvanometer-based laser projection as illustrated in the right figure of Figure 1.

3 Performance

The beacon generates sounds when the beams passed individual performers as if each user could be a musical note. Also two beacons are connected via internet and people in a distant place can share the generated music simultaneously. In the demonstration, participants can not only generate sounds by using these feet around the devices but also can feel the other's presence thorough both visual and auditory feedbacks from laser beam projected on the ground and generated sound. This novel interface thus can be used for the physical exercise or recreation with fun. Moreover, by arranging small objects around the instrument, a variety of sound will be produced like a environmental music box. The proposed interface also provides a new artistic expression for spatial designers. This round-shape interface does not have any directional characteristics and plays a key role of gathering people for affective communication.