

Robot Aitu: An attempt to make wave emissions of mobile phones perceptible

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Figure 1. Robot Aitu interacts with a mobile phone.

ABSTRACT

This paper describes the concept, context and development of Robot Aitu, which transforms surrounding wave emissions of mobile phones into acoustical and visual effects. Robot Aitu, in essence, makes invisible things visible.

Categories and Subject Descriptors

J.5 [Computer Applications]: Arts and Humanities – *fine arts*

Keywords

Wave emissions, awareness, mobile phones, visualization, critical design

1. INTRODUCTION

Robot Aitu transforms high frequency waves emitted by mobile phones of nearby users into acoustical and visual effects. Depending on the intensity of the emissions, the robot triggers sonar-like sounds and a snowstorm of small styrofoam globules in a capsule. Aitu freely moves around using a simple technology of sensors which makes it turn once it «collides» with an object.

The project mainly focuses on detecting and exposing the existence of wave emissions by mobile phones. Visitors can use their own mobile phones to activate and intensify the effects by dialing a number of their choice. [1]

2. CONTEXT

Mobile phones are extremely popular in present day life. Whether young or old, rich or poor, we use them every day. But do we know enough about the technology of mobile phones? «What goes

on inside such artifacts, besides the human sensory-motor coordination with them, is no longer relevant to their users. In fact, it can remain quite incomprehensible – as long as users can handle it adequately and are not frightened by it. Consider [...] how little personal computer (PC) users know about the hardware architecture they are working with». [2] Moreover, are we fully aware of the possible negative implications of the frequent use of mobile phones? How can an object of this size do any harm to humans? «[Die Geräte] bleiben, obwohl irgendwie wahrnehmbar, doch unerkennbar. Sie schützen ein Aussehen vor, das mit ihrem Wesen nichts zu tun hat, sie scheinen weniger als sie sind.» [3] Just as in «Out of sight, out of mind» the waves of mobile phones cannot be seen and therefore are regarded as something we do not need to worry about. Countering the blatant disinformation strategically circulated by the mobile phone industry, this project reaches out to give greater weight to the implications of wave emissions.

As part of my research I came across the project Sky Ear by Usman Haque. [4] A colorful «glowing cloud» of helium balloons visualizes the radiation in the air, including the emissions of mobile phones. Looking at this friendly image I concluded that although the project points to the right direction, it is not nearly as dramatically staged as it should be considering the possible implications of radiation. Robot Aitu hopes to remedy this default in seriousness.

3. CONCEPT & FUNCTION

Robot Aitu's point is rendering wave emissions of mobile phones perceptible, recognizable and sensible in a visual and acoustical way. Mobile phone users get a direct correlation between the invisible waves produced by themselves and the visible and audible effects of the robot. They get the idea that using a mobile phone causes wave emissions, which must be taken serious. Aitu, in a first step, is about raising the public's awareness of these emissions and, in a second step, about questioning their necessity. Therefore, the conceptual artwork design of making something explicit is embedded in a reflective context.

In a performative situation visitors are called upon to use their own mobile phones to activate and intensify the visual and acoustical effects. The interaction itself is easy to understand. Aitu reacts to wave emissions from the moment a call is initiated. Depending on the intensity of the wave emissions, on a visual level, small styrofoam globules are swirled around in a hemispherical capsule like in a snowstorm. At the same time, on an acoustical level, several different noises are triggered. The image «snowstorm» and the various noises are conceived as natural elements. They imply a measurement scale that visitors understand because of their own experience with nature. Sounds

like thunder, storm or wind derive from «strong» or «severe» and others such as a slight ripple or a single drop of rain stand for «smooth», «subtle» or «gentle». If there are no wave emissions, a sonar-like sound is used to signal the «search» for new emissions.

Another conceptual part of the project is Aitu's capability of moving around independently. It is about getting to the people and interfering with their common sense. It brings up the image of self-driven machines in our physical environment. Aitu can move forward, backward, turn and curve in either direction. When it recognizes an obstacle, it turns around and moves to another direction.

4. DEVELOPMENT

4.1 Product design

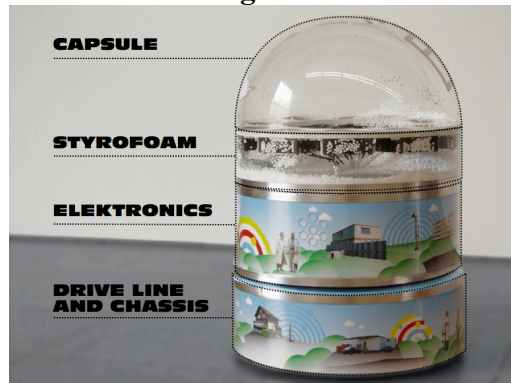


Figure 2. Main parts of Robot Aitu.

Aitu consists of the following materials: wood, PET, acryl glass, paper and the computer and electronic hardware described below. As seen in Figure 2, there are different levels within Aitu's body. All technical parts except the ventilators are hidden by graphic design showing mobile phone antennas and people talking on mobile phones in a surrealistic landscape of houses, alienated nature and symbolized radiation. Inside the capsule ventilators are placed to swirl small globules of styrofoam through the enclosed air.

The formal appearance of the robot results from (i) the fact that it needs to be able to turn without crashing into an obstacle and (ii) the connotation with snow globes often used as tourist souvenirs.

4.2 Technological Setup

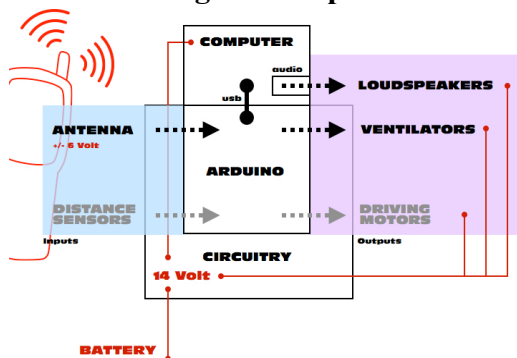


Figure 3. Scheme of signal processing.

The following components are part of the second version of the technological system used to run Robot Aitu. They are all placed inside the robot's body.

The system's inputs come through a high-frequency antenna [5] and various infra-red sensors. An Arduino board [6] (Cinetix Sensorbox [7] earlier) acts as primary control interface with an A/D-converter. An MMX-Pentium embedded PC plays the acoustical effects. Ventilators, loud speakers and two engines are the output components. The supply voltage comes from a lithium-ion battery. It is conducted over a custom-made circuitry to all the components. The multi-band antenna is supplied by a symmetrical voltage and reacts to wave emissions in the range between 900 MHz and 1900 MHz. The resulting analogue signal returns the intensity of the emissions and is digitized by the A/D converter.

The logic on the Arduino board examines the voltage information and triggers either the output devices directly or passes down the information to the embedded PC via a custom-made protocol. The embedded PC gets abstract information about the level of the intensity of the wave emissions and plays pre-defined sounds from a repertoire that is played and mixed in correlation to the intensity. The robot's first version built in 2005 used a MaxMSP-Patch (on Windows XP), which interacted with the so-called Cinetix Sensorbox. Now, the sound engine is made out of Linux open-source programming libraries.

From the infrared sensors the Arduino board gets analogue voltage information about the distance to possible obstacles, so that the robot turns before getting in touch with them. The Arduino board accesses the motors for Aitu's wheels over a custom-made circuitry.

5. REACTIONS & CONCLUSION

The robot has been on display in several exhibitions and evoked a flurry of different reactions from visitors. It attracted many astonished looks and curious faces. Though it took some visitors a moment of distance, most of them quickly overcame their hesitations and went closer to the moving object.

Although I would have had the credibility as the robot's producer, I disclaimed its use as proof for the harmfulness of mobile phone wave emissions. Robot Aitu is about increasing the general awareness of wave emissions and making something silent and invisible audible and visible – Aitu is not a measuring device.

Through my research I got to know that negative implications of mobile phones are not a fancy subject. It appears that no one wants to imagine the fearful implications they have because most of us are addicted to communicate through mobile phones. A step backward would cut tremendously into our needs.

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