RATTLE – A MULTIMODAL VISUALIZATION OF SEISMIC DATA

Javier Gurza[a], Katrin Wolf[b]

[a] BTK – University of Art and Design, Berlin, Germany, javiergurza@gmail.com;
[b] Hamburg University of Applied Science, Hamburg, Germany,
katrin.wolf@acm.org

ABSTRACT: Information visualization is becoming a widely used information representation technique in exhibitions considering the dominance of our visual sensations and its ability of intuitive and easy transferring content. However, it has been shown that using multiple modalities can lead to an improvement of understandability. Moreover, using alternative techniques of information visualization can lead to an even clearer presentation of data.
In this work, called Rattle, we use a kinetic sculpture to visualize seismic data, which produces sonic output as side effect. Rattle is a real-time seismic reader that makes a pendulum spin in different speed depending on the grounds´ motion in a given city. Changes in the waveforms from seismic data are translates into sound as the pendulum hits the rectangular metal rods. Increase in speed and sound creates a type of "seismic alarm" which is intended to resemble the rattle of a snake that is used by these animals to create a kind of alarm when they feel something is threatening them.

Fig. 1: *Rattle setup*

1. INTRODUCTION

Our perception of physical events in this world is limited to our senses. Thus, we perceive our world in different scales depending on the sensibility of them. This does not mean that there are physical events happening just beneath our feet, just like the earth´s seismic movements. Although we are not able to perceive some of earths movements from which we are not affected, we do feel them if they come to be on a scale that our senses can perceive. Most of the time at this stage this movements become a threat to our everyday life. This project aims to visualise the earth´s movements translating the seismic graphs available from the seismic stations into the speed of a motor, reminding the viewer that earth is in constant movement, and creating an alarm if the movements are enough to be considered an earthquake.

2. RELATED WORK

Data visualization is now being used in many artistic ways, and using seismic data is not an exception. David Johnson created The Poseidon Ensemble [1], a program which creates a generative orchestral composition using data of earthquakes in a time of 100 years. This orchestral composition has a visual animation that runs for eight days. Johnson divided the world into eight regions and assigned different instruments to them. He wanted to give as much information as he could with just one note. Hence, he also translated the event´s magnitude with the velocity of the note and the length of it.

422 South [2] is a British data visualization lab that created Global Earthquakes - Data Visualization, which shows all the earth´s earthquakes from the year 2000 to November 2015. The ear quake is visualised as dots which vary in size according to the scale of the quake. Although this work is not related to sound visualization it is a interesting way to visualize earth´s seismic activity.

3. METHOD

Rattle uses real time graphs obtained from a specific station and generated by the Rapid Earthquake Viewer product of the University of South Carolin, the Incorporated Research Institutions for seismology and the Digital Library for Earth System Education. This graphs are loaded every 5 seconds and processed using Processing. Then the graph´s highest position is send to an Arduino, which reads this value and and maps it to a motor´s speed that moves a pendulum. The pendulum is hanged with a metallic chain from a tubular base and spins according to the motor´s speed. The pendulum then hits 18 rectangular rods forming a bowl type container creating an sound change depending on the speed of the pendulum.

4. CONCLUSION

Rattle intends to visualize the seismic movement of earth´s surface through sound, letting the viewers perceive the change through the speed of a pendulum, provoking them to think about physical events that we are not able to perceive and realise that earth is always in constant movement. Although this project was initially intended to be an alarm system, the change in the seismic data could also be translated into different sounds with the use of different materials in the installation, creating a variations in sound compositions.

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6. REFERENCES

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