

SOUND: VOLATILE: METOPIA

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Fig. 1. Eruption of Eyjafjallajökull, Island 2010.

Metopia (meta + topos, the place beyond) is a research project using a wireless sensor network and sonification to examine environmental hazardous dust and air pollution. Microscopic matter, invisible to the human perception, traverses the human body, through the air we breathe and through our skin, such as bacteria, dust and other airborne particles, such as volatile organic compounds, both biological and anthropogenic. According to the World Health Organization, WHO, an estimated 3.7 million people died from premature deaths from outdoor air pollution, due to the exposure of particulate matter with a size of 10 microns or less. [1] Figure 1 shows the eruption of Eyjafjallajökull on Island in 2010, which caused exposure to natural dust. Political conflict using firearms and explosives causes exposure to particulate matter, mostly anthropogenic, have a deep impact on the human respiratory system. Metopia is using measurements from sensor data so we can experience the information of hazardous dust through the use of sound.

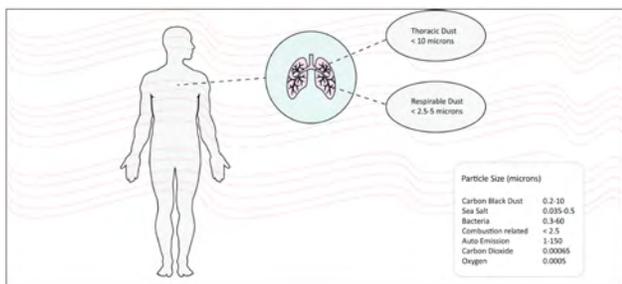


Fig. 2. The human respiratory system and particles measured in microns.

What we breathe have a continuous impact on our bodies and on our behavior. Figure 2 shows the human respiratory system and particles sizes measured in microns. One third of the world population is exposed to biomass fuels, which causes respiratory problems. [2] Other sources of exposure of particulate matter come from Industry, transport, energy production, waste

management and urban planning. [1] Figure 2 shows a diagram of the human respiratory system and gives examples of particle sizes. Thoracic dust of sizes less than 10 microns can enter the lungs but airborne particles less than 2.5-5 micron can also enter the blood-stream. One other aspect that is addressed in this project, other than the quality of air and health issues, is the economical and political framework in relation to the concerns around air pollution and how information around this matter is handled.

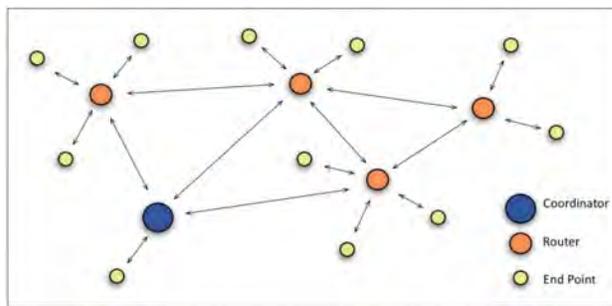


Fig. 3. Topology of a scalable Wireless Sensor Network.

In *Sound: Volatile: Metopia*, the complex volatile processes of air pollution in our environment is addressed through the use of a range of sensor technologies, including Volatile Organic Compound (VOC) sensors and dust sensors, to experience the data of the measured air pollution. The changes in toxic levels in the environment are used as data in a sound composition to be experienced by the general public. This wireless sensor network project consists of a mesh network, using ZigBee devices, which uses a routing protocol on top of 802.15.4. It is a low-power, scalable network, which may cover a large area of the city. [3] Figure 3 is showing the topology is this wireless sensor network. The sound composition is using Pure Data, an open source, visual programming environment. Pure Data is highly portable and can be used on various operating systems and portable devices. [4]

REFERENCES

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