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By *wildwalkers*

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One Sentence Description:

Does the City breathe and why not?

Full Project Proposal:

In a post-climate world urban air quality is one of the biggest threats to human health, as well as to the Earth's ecosystems. How can we make the process of 'breathing' in an urban environment more transparent and visible to citizens, raise awareness and elicit debate and action about this important issue? 'Breathing city' is an innovative platform using different existing online and offline tools, such as data visualization and mobile-based augmented reality. The aim of the project is to provide urban area inhabitants with creative online tools, which will empower and help them understand the air quality of their city, how it may affect them, and provoke conversation and action which can potentially bring change to their communities. Our proposal for Breathing City is consisted of two aspects: 1. A distributed network of air quality sensors collecting various data from the environment. The network will make the data publicly available on the web in machine-readable formats and suitable APIs, which will enable the creation of third-party tools. 2. A set of web-based interactive data representation tools (data visualization and mobile-based augmented reality apps) developed in order to engage citizens address the issue.

Context:

The implementation of the project will rely on a combination of existing open hardware and free software (free as in freedom or FLOSS). The hardware part will build upon the extensive local experience and knowledge of the Skopje Hacklab (<http://hackerspaces.org/wiki/KIKA>) of using the Arduino microcontroller (<http://www.arduino.cc/>) as an interface to the environment sensors. The project will also make use of experiences of the neighboring Slovenian community <https://nodes.wlan-si.net/> that used the OpenWrt (<https://openwrt.org/>) router firmware in order to build their independent infrastructure for Internet communication. For the type and model of air quality sensor the project will build upon the documentation used for the AirQualityEgg project <http://airqualityegg.wikispaces.com/AirQualityEgg> As for data visualization and augmented reality, the project takes its inspiration from: <http://slaveryfootprint.org/> and <http://www.mixare.org/>

Innovation:

Where institutions/governments fail, people will take initiative and self-organize. The idea is to build cheap reference design sensors in autonomous weatherproof devices that can be deployed by people in cities and regions in the world. These devices will gather air quality data and feed it to an online platform. The data will be available in human and machine-readable formats and suitable APIs. Thus striving to engage citizens, media organizations and other developers to make their contribution, explore the data sets, make correlations and build upon the existing platform. Harnessing the power of the open web, the project will represent a platform to collect, share, visualize and correlate valuable data by implementing and open APIs and using standard based web technologies, it will raise awareness and provoke debate about the environmental issues which affects us all.

Audience Engagement:

Breathing City empowers citizens to use affordable technologies to make an impact within their local communities and address global environmental issues, especially in an age where Internet access is ubiquitous and we are actually living in the age of the Internet of things, where cheap internet devices can gather data from various locations on the planet and provide local communities with the visualisation and data processing online platform, the knowledge of local air quality in their environment. This will enable the communities to improve their quality of life and help them monitor and bring transparency to institutions, companies and municipal authorities, that pay little or no attention to the these really important issues, that affect people's lives. Access to environmental data is mostly limited, often based on outdated technologies and is rarely or never available to the public. It will no doubt spark creativity and collaboration by visualising data and publishing viral videos, by crowdfunding even cheaper air quality measuring devices using kickstarter, sharing data to social networks, comparing assembled data on a global scale, correlating number of vehicles and trees to pollution and air quality. Combining online creative collaboration, crowdsourcing data and civil action to address important issues like air quality and pollution, the project will definitely represent a novelty for these regions across the globe.

Skillset:

The Skopje hacklab community has programmers with proficient knowledge of Python, CouchDB, Nodejs that would be used to develop the back-end systems, data aggregation and analysis; hardware developers with extensive knowledge of Arduino, ARM, AVR to build the sensor nodes, network engineers to connect it all, and graphic and web designers with knowledge of Javascript, HTML5 for the visual and artistic aspects of the project. And mobile apps development using HTML5 and web technologies.

Collaborators:

Our collaborative team is consisted of people with different backgrounds ranging from programming, electronics and FLOSS activism, to design and social activism. Since we are embarking on a ambitious project, we will be needing some of our best people to join and make the difference we all have envisioned: Damjan Georgievski - system architect, integration, embedded Ana Risteska - web design, front end developer Iva Galevska - graphic designer, concept developer, social activist Aleksandar Lazarov - hardware engineering, microcontrollers, embedded Georgi Stanojevski - infrastructure, cloud Gorgi Kosev - programmer, nodejs expert, cloud Arangel Angov - system administrator Igor Stamatovski - programmer, Internet, floss Novica Nakov - writer and maker Andrej Trajchevski - programmer We will have to design the hardware, architect and build the online platform to gather, analyse, visualize

and share data. Promote the project, get traction and energize other communities to participate.

Facilities and Tool Usage:

Thank you for the invitation for the time being we do not think that we will need to use Eyebeam equipment and facilities. Yet we still reserve the right to visit you if needed in the later stages of the project.

Work Sample 1

Work Sample 1 Description:

Hacklab Monitoring (HM) currently gathers data about indoor and outdoor temperature and the number of network devices currently present in the Skopje hacklab. This data is being gathered using a temperature sensor, this is hooked up to an Arduino Duo, the network devices mac addresses are being collected from the hacklab's router. All together we fed data to cosm (https://cosm.com/about_us) for further graphing and analysis. It meant to be viewed as a research into the Internet of things, we implemented the measurement and analysis of data, the second step is the control of the airco unit, still under development. It is a pilot for the Breathing City project, through the process of implementation of HM we gathered valuable experience and overcome practical obstacles.

Work Sample 1:

<http://status.spodeli.org/> [1], <http://wiki.spodeli.org/Хаклаб/Температура>, <https://github.com/AleksMK/temperature-interface#readme> [2], <https://cosm.com/users/glisha>, <https://cosm.com/feeds/64676> [3], <https://cosm.com/feeds/64655> [4],

Work Sample 2

Work Sample 2 Description:

"Research on intrinsic 3D - product metadata in virtual environments" explores sets of symbolic ways of representation of data, such as temperature, product dimensions, sound emission or weight. The physical processes and the data are simulated in 3D. The representation methods include usage of pictograms, color hues, sound frequencies and particle systems in order to deliver information about the 3D-models, yet overcome language obstacles. The user is represented by a hand-avatar, which detects bounding boxes of objects and calls an interface that offers triggering of different metaphors about the product characteristics. Breathing City will offer intuitive ways for data visualization, the experiences gathered from the implementation can serve as a solid basis for the interactive part.

Work Sample 2:

http://www.youtube.com/watch?v=rouM-sd_aNw [5]

CV:

 [free-software-macedonia-CV.pdf](#) [6]

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Links:

- [1] <http://status.spodeli.org/>
- [2] <https://github.com/AleksMK/temperature-interface#readme>
- [3] <https://cosm.com/users/glisha>, <https://cosm.com/feeds/64676>
- [4] <https://cosm.com/feeds/64655>
- [5] http://www.youtube.com/watch?v=rouM-sd_aNw
- [6] <http://apply.eyebeam.org/sites/default/files/free-software-macedonia-CV.pdf>