

WIND. MEDIATED REALITY VISUALIZATION

TOMAS LAURENZO

City University of Hong Kong / School of Creative Media

JAVIER BALIOSIAN

Universidad de la República / Instituto de Computación

Resumen

En este artículo presentamos *Wind*, un trabajo en curso que pretende construir nuevos modos de interacción con la ciudad, a través de una visualización poética de datos en tiempo real. El proyecto consiste en un dispositivo de adquisición de datos que mide y guarda la intensidad y dirección de las señales provenientes de enrutadores Wi-Fi y de antenas celulares, junto con dos prototipos de cascos de realidad aumentada que modifican lo que los usuarios ven o escuchan.

Los prototipos permiten visitar la ciudad, interviniendo en la percepción de ella, así como también permiten explorar los efectos de mapear los datos de recabados en una ciudad sobre la percepción de otra.

Palabras-clave: REALIDAD AUMENTADA, RED, DERIVA, CASCO, VIENTO

Abstract

In this paper we present Wind, an on-going research project that aims at constructing new modes of interaction with the city via poetic real-time data visualization. The project consists on a mapping device that measures and stores the intensity and direction of the signal coming from Wi-Fi routers and cellular antennae together with two Android-based augmented reality prototypes that modify what their users see or hear.

The prototypes allow us to re-visit the city, intervening on our perception of it as well as allowing us to explore the geographical and perceptual disruption that arises when using one city's data onto another.

Keywords: AUGMENTED REALITY, NETWORK, DRIFT, HEADS-UP DISPLAY, WIND, POETICS OF SPACE

1. INTRODUCTION

There is a long and rich tradition of artistic explorations of cities and urban environments. Building on early theoretical and practical discourses by surrealists and situationists, artists have developed critical studies of cities and their cartographies, often finding alternative ways of engaging with and acting onto the city¹. These “arts of urban exploration” have worked not only in alternative modes of directly engaging with the city but also offer critical explorations of cities representation, turning explicit the political subtext inherent to the cartographic practice. This explicitation of the politicality is particularly relevant as cartography is an “abstract and influential creative practice, rich with the power to engineer political views, religious ideas and even the material world itself”². Maps are a contested practice embedding particular sets of power relations that guide our perception of what the world is and steer our actions in it³.

It is possible to detect a tension between the abstract, synthetic, and macro-scale perception of a city that cartography provides, and the more visceral, human-centred experience of everyday life in the city.

Among the human-scale artistic explorations of the city, the situationists’ “dérives” are particularly well known. Situationist theorist Guy Debord defines the *dérive* as “a mode of experimental behaviour linked to the conditions of urban society: a technique of rapid passage through varied ambiances”⁴.

We can see these unplanned journeys as an implicit visualization of the city’s characteristics. Under this point of view, visualization can be thought not as an objective process (or a process that attempts to be objective) but as an embodying process. The *dérive* operates in two layers; first the drift itself adopts a dual role: an experience and a tool for data gathering. The obtained data operates afterwards as a visualization of certain aspects of the city that now have become visible thanks to the *dérive* itself.

Under this framework, visualization can be thought as both an experience and as the result of this experience. In other words, there are certain characteristics of the urban construction that require being experienced to become visible, and it is in the interaction between the city and its users –in the consumption of the city– that the experience and visualization converge. In other words, we cannot visualize without experiencing, and experiencing is visualizing. The detection of hidden processes is a major objective of the social analysis of cities. To visualize processes like gentrification requires an understanding of the underlying socioeconomic currents that emerge as specific urban patterns. However, detecting the actors and motivations behind the result of capitalist processes has proven to be an extremely difficult problem.

Within the framework of capitalism, it is possible to structure the interpretation of the urban processes on the twin themes of accumulation and class struggle⁵.

In effect, we can informally model the city as a collection of interconnected strata from which their interaction urban social processes emerge. This informal layer-based model of urban dynamics would incorporate social and economic layers, as well as physical, and service layers. Again, analysing the relation between these layers is extremely complex. An arbitrary example: What can we say about how one takes a stroll in a given city in relation with the drinking water service in that area? How can we discover relations between indicators and their effects? (In our example, better water quality, could trigger gentrification, which, in turn could foster public investment, and so on).

This project aims to artistically reflect on the visualization of some of these layers. We think of visualization as an attempt at turning visible something invisible, as a creative and constructive process as well as a research tool.

2. The wind metaphor

Wind is a work in progress consisting of several cartographic prototypes based on augmented and mediated reality. We have constructed a mapping device that allows us to register the intensity and location of network sources (Wi-Fi access points and cellular antennas). By using this device while performing an urban drift we construct data fields with this information.

The prototypes built allow for a metaphoric visualization of this field (we build on the metaphor of wind, considering every network source as a “virtual wind” blowing on to the city), turning this specific layer of urban infrastructure visible.

We have constructed two mediated-reality prototypes that using augmented reality fusion the human-scale perspective of the situationist *dérive* with the abstract representation of cartography and data visualization. These prototypes allow to dynamically explore the aesthetics of visualization while explicitly showing its power of affecting our understanding of reality. It is in this reflection on reality itself where the chosen techniques show their value.

The underlying assumption of augmented reality that what the camera sees constitutes the reality should be questioned. In Flusser words, “the task of a philosophy of photography is to reflect upon this possibility of freedom - and thus its significance - in a world dominated by apparatuses”⁶. This recoding of visual reality is of particular interest to the authors as it could be argued that art constitutes an aesthetic mediation between perception and intramental representation. In particular, the participatory aspects of art were emphasized by movements like Fluxus and Situationism, among many others, and the so-called relational art has been a marked trend in contemporary art from the 1990s onwards. This use of media technology has also been described in situationist terms, as a form of *détournement*, in which the (mis)appropriation and repurposing of conventions produce shifts in social consciousness⁷.

3. The prototypes

We have built a mapping device (based on a standard Android cell phone) that measures and stores the intensity and direction (using a metallic tube) of the signal coming from Wi-Fi routers and cellular antennas, and two prototypes of visualization.

Using the mapping device we perform walks in the city and construct a geo-referenced dataset, where, for every point in our walks we store its position together with the network information that the device captures.

We represent the captured data as a virtual wind. Every antenna and Wi-Fi access point contributes “wind” to the field from the direction of its signal. For all the points of the route we calculate the intensity and direction of the wind resulting from the combination of all the captured signals. Both prototypes created also run on Android phones. The first prototype synthesises sound of wind, aurally representing the data field. The sound intensity is directly mapped onto the modulus of the vector resultant of combining all the network sources. We use a synthetic Head-Related Transfer Function (HRTF) to simulate the direction of the wind in a binaural signal. The second prototype uses an augmented reality head-mounted display (HMD) to visually intervene the city with the virtual wind. The head-mounted binocular display –based on a Google Cardboard HMD with an Android phone– shows in real-time the city as captured by the phone’s camera. This live video feed is distorted using the intensity and direction of the virtual wind as input data. We have implemented a single-phone version (dividing the screen to provide faux-binocularity, see Fig. 1) and a two-phones version (see Fig. 2) using two phones’ cameras for stereography.

4. Conclusions

We can think of a city as a network, a human construction for information transfer. This project aims at reflecting on what makes a city exist, at what is the interpersonal linkage that makes a city work. What is the aestheticity of the relationship between geographical immediacy and the invisible network of information transfer?

If light is what allows us to see, this project offers a humble new kind of light that permits us to delve into some otherwise obscure aspect of the city.

This technologically mediated recreation of the situationist’s drifts also aims at reclaiming the poetics of urban traversing in the hyper-connected city. In the city that exists in multiple layers that are not open for touring.



Fig. 1. Screen capture of the graphical prototype. Two phones version (only one is shown in the figure).

Turning visible the invisible, casting light on it operates, then, as an aesthetic reclaiming. With both prototypes we are able to re-visit our drifts in the city, intervening on our perception of it. However, we also explore the geographical and perceptual disruption that arises when using one city's data onto another.

In this sense, we propose not only a new way of travelling the city but also a synthetic construction, a meta-city that appears on this mapping. A reflection on the abstract city that emerges on to the triviality of its pedestrian navigation Art Science City 2015

5. Future work



Fig.2. Google cardboard HUD with two phones.

Much work is to be done to improve the existing prototypes and to create new ones. We have built prototypes based on one phone (and therefore using only one camera and not allowing for a binocular experience) and on two phones (Figure 2). Although our two-phone prototypes do offer a stereographic experience, we envision more work needed with respect to the aesthetics of the three-dimensional perception experience. Also, the phone-based prototypes show relatively low resolution, hurting the AR experience. Although higher resolution screens and cameras are available, it is unlikely that we will use them in this project. However, this explicitation of the artificiality of the image also plays a role in the visualization process. Quoting Flusser again, image-capturing devices produce "camera memories, not information, and the better they do it, the more they prove the victory of the camera over the human being."

Finally, we will focus on the creation of new prototypes that offer new interactive modes of visualization of these data.

References

1. Pinder, David. 2005. "Arts of urban exploration". *Cultural geographies* n°12.
2. Oliver, Julian. 2008. "Cartofictions". *Inclusiva* '08.
3. Lorenzo, Tomas. 2013. Decoupling and context in new media art. Instituto de Computación. PhD in Computer Science. Montevideo: Universidad de la República
4. Debord, Guy E. 1958. "Thèses sur la révolution culturelle". *Internationale Situationniste*. 1, 20-21.
5. Harvey, David. 1978. "The urban process under capitalism". *International Journal of Urban and Regional Research* n° 2.
6. Flusser, Vilém. 2011. *Filosofia da caixa preta: ensaios para uma futura filosofia da fotografia*. São Paulo: Annablume.
7. Shanken, Edward A. 2014 *Art and Electronic Media*. New York: Phaidon Press.