Sensity
www.stanza.co.uk/sensity/index.html

The Poetry of Data.

Sensity is a series of artworks based on connecting city spaces. The results are visualisations and sonifications of real time spaces using the artist's own wireless sensor networks and environmental sensing technologies (2004 - 2009).

Sensity involves collecting data across the city which is visualized to make art. The city data space becomes mirrored online and the environment becomes an emergent series of generative artworks. The city is made up of bits of data that change. This project captures this change to try to understand the underlying fabric of city space.

The artworks in the Sensity series represent the movement of people, pollution in the air, the vibrations and sounds of buildings. They are in effect emergent social sculptures visualizing the emotional state of the city. As we move about the city we art in fact interactive agents, by default we are actors doing our bit and affecting the system. It is this agency that forms the interactive elements in my responsive system Sensity. The whole world becomes a dynamic real time artwork.

The art of environmental data

In the first artwork visualization Sensity Brixton the dynamic data around my environment is to make the artwork from the wireless sensor network around my house in London. I live nearby a railway line, a factory, some trees and a mobile phone mast. I also took a sensor kit with me to Sao Paulo and made a new version of Sensity from the area around the exhibition space. Two versions were made a online local version and a real time version. Sensors data and recordings were taken and have been made in Porto, Sao Paulo, Paris, London, Nottingham, Copenhagen and Austin Texas.

Artistic Conceptual Contexts.
The 'value' of information will be a new currency as powers change. The central issue that will develop will be the privilege and access to these data sources. By allowing access to the (MY) 'system', I am opening up the control and trying to enable a system of trust.

The Mother of Big Brother.

Imagine walking out the door, and knowing every single action, movement, sound, micro movement, pulse, and thread of information is being tracked, monitored, stored, analyzed, interpreted, and logged. The world we will live in seems to be a much bigger brother than the Orwellian vision, it's the mother of big brother.

The Central Question.
Can we use new technologies to imagine a world where we are liberated and empowered, where finally all of the technology becomes more than gimmick and starts to actually work for us or are these technologies going to control us, separate us, divide us, and create more borders.

Will the securitization of city space create digital borders that monitor our movement and charge us for our own micro movements inside the system. The city becomes a 'world' full of data, a 'city of bits'. These new data-spaces can help us understand the fundamentals of our outside environment.

The City Experience.
The city experience is a web of connected networks and multi layered threaded paths that conditions us to the emotional state of the city space. In essence, the city fabric is a giant multi user multi datasphere. To take part you really have to put something back in, that's like life. In this case, to take part you have to input data so others 'may' see the output of the data response.

The city has a history of stories relative to time and place, stories from the street. Love stories personal and extreme, crime stories, stories that are small or that can affect global parameters. All of these spheres can be represented by media and therefore by data within the digital realm and becomes a data source so powerful so interwoven that its scale can only be imagined as metaphor. The size and scope of such an archive, of such rich mediated data experience would support many projects. As such it can be interpreted as history via one sort of interface or as a game via another sort of interface. A possible objective is to 'mediate' data into a conceptual artifact. With this perspective there are many unimagined threads of data and connections that describe our world that can be explored within which we can create artistic interpretations.

Open Hardware Technologies.

Custom made software now enables the sensors to communicate will one another in a network over a proxy server in real time. Control to the hardware is opened up and the data is used to create visualizations in an open source environment. This means other online users can also re- interpret the data and interrogate the various sensors in the network as this is open source (see xml streams). Representations of these data sets will allow unique understanding of the urban environment and environment in real time.
The tiny wireless sensor boards are called motes. They gather the data and communicate to the central server. They sense the micro incidents of change in the weather, the noise traffic flows and people flows. The interactions of all this data, are controlled via bespoke interfaces that re-form and re-contextualise our experiences in real time of the city.

Technology Overview.

I now have two separate kits of twenty sensors for my tests. However thousands of motes can be deployed across the city for gathering data in wireless sensor networks. Used in large numbers they communicate with one another via radio signals across the network. They reconfigure themselves or self heal, so that the network stays stable. The data is funneled through a system to a point where it can then be interpreted. The motes themselves can be deployed every 30-50 metres depending on the frequency, and 500m with the new ones, and any number can be place in a network. A new mote, just developed (2005)allows nine hundred metres without line of sight, suitable for my city wide version. Each mote can sense its own position, wakes up and find its neighbour in the network. They have low energy use, (but this is a major issue in using them and depends on how you program them) the life expectancy is determined by the battery. In the future it is imagined they will run on solar power, but again these solar panels are very big three book large to power on mote). My concept is to embed multiple cities with thousands of motes to gather data for the creation of artistic artifacts and to allow other access to the data

for city based studies and analysis. Several versions (networks and visualizations) have now been deployed as part of my research into the emergent city and intelligent buildings.

Technologies Software.

I have made two versions of the Sensity interface software. One works with recorded data (ie, a sampled piece of time) and one that works with the real time data (ie ever present, always changing, always in the moment), which means the sensors are switched on always and working through a router. This uses custom written java based mote proxy software now in version 1.6. NOTE: The changing data is what affects what you see and experience. The flash interfaces reflecting these real time changes in the interactive city space.

Live XML feeds from real time sensors when switched on. This is open source so other academics, urban designers, researchers as well as artists can make use of the data. The sensors can monitor temperature, sounds, noise, light, vibration, humidity, and gps. The sensor network takes a constant stream of data which is published onto an online environment where each different interface makes representations of the XML
From this lots of artistic interpretations can be imagined and made. These above example are some in this series.

The technology presently consists of Xbow's MICA2 motes and MICA2DOT motes. It uses an Atmel Atemega 128L processor running at 4 megahertz. It also has some flash memory to store the program. It consumes only 8 milliamps when it is running, in lower power mode it will run for more than a year. The trick is to write the program so the mote is asleep for most of the time therefore saving power. The mote can wake up for a few micro seconds and then sleep again for period of time. They have an a/d converter so the sensor data can be digitized. The software is written to control the mote is built on an OS called Tiny OS. The chips contain all the components found in a mote: a CPU, memory, and A/D converter for reading data and radio transmitter. Tiny OS is written is Nes C, a special programming language for motes developed at Berkeley. To do this for the 420CC one has to hack the two programs together for the low and high power mode and then upload via OATP as a lower power version. This is how it gets a GPS fix for its own position.

Future Cities. Connected Virtual Spaces.

Future cities will be merged real time connected up data cities. Sensity connects up networks of real time information flows. The results are mashed up cities and real time performative city mashings. The shared data space can overlap and there is a new space the space in between that only two nodes share. The aestheticization of the shared city space. In one of my experiments I have merged collected data from various cities. The images below show an integrated architecture the space where the cities overlap and create a new architectural space. This trial shows connected up cities data from three cities over layered onto the same map or images.

The general hope is that these motes, this technology will become so small they will become 'dust'. They are therefore being called 'smart' dust. This is still a long way off. The technology, despite the preaching is still costly, and devices are also very unstable when deployed. This type of proactive embedded computing will be hidden inside the fabric of our lives and our environment. It will be inside the fabric of

the real city creating a new emergent data city. The real world will become virtualized into an archive retrieval system using such a system. The emergent city is a sense city embedded with millions of computers to re-engage with the urban fabric and to enable new artistic metaphors within city space. It will enhance our experience of city space as well as monitor both the the environment but out condition and movement and place within the city space. This brings up data regulation as the control of these systems increasingly become part of a data marketplace.

Other technology observations.
Most of the issues to with motes are to do with power over time, and then trusting that the sensor packet data you receive is accurate, (and not because the power of technology is failing). I have now spent six years messing, playing and testing this equipment and making a whole range of discoveries with it. This has led to the development of new software to get them to work and be deployed.
Overall; I have to say as a practice based artist using such a complicated technology it has been at times a serious struggle. This is because most of the technology research has been hampered not by my ambitions for the project but by the unstable nature of the technologies, connections and networks involved.

This project is available for exhibition and for further development proposals are available. Please get in touch if interested.

Exhibitions

Sensity Porto For Future Places 2010
Sensity V & A at Decode show. 2009 - 2010
Sensity Pace Digital New York. 2010
Sensity @Plutopia SXSW Texas. 2009
Radiator Festival and Exhibition Nottingham 2009. "Exploits in the Wireless City".
Biennale of Sydney Revolutions – Forms That Turn 2008
V & A Museum. 2008. Around the gallery
Smart City Paris.Cité internationale universitaire de Paris 17, bd. Jourdan. 75014 Paris. 31 october 2008.
Motomix, Sao Paulo, Brazil. 2007. Custom made Sao Paulo version.
NIME New York City. USA. 2007.
Share IT in Italy 2007.
Dislocate. Koiwa Art Space Tokyo Japan. 2007.
Presented at Force of Metadata Conference at Goldsmiths college. 2008
Read a review on Futherfield.

Stanza is an independent UK based artist.

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