

# BIRLOKI system: an Urban Space Activator for Singapore Smart City

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## **Abstract**

In the last few years, since the Smart City concept appeared in our lives, we have been looking for a city that reveals intelligent but also gives the citizen the opportunity to deal with the city itself in a closer range. The search for the optimization of resources and the efficiency and control of facilities, made us forget many times the day-to-day life of the citizens. There are things in the city that are as important as these and that can be unveiled only from the street point of view. This paper presents a smart adaptive interface between the city and the citizen based on the patented system BIRLOKI, as it has been submitted to the InfoComm Development Authority of Singapore. The system has been awarded at the International Concept Design (2010) and in 2012 in the Innovative Initiative category in the Smart City World Congress Awards.

## **Author Keywords**

Urban Acupuncture, Urban Design, Interactive Urban, Smart Urban Furniture, Smart Urban Planning, Citizen Participation

## **Introduction**

We introduce a new method to tackle the urban space solutions in the city.

URBAN ACUPUNCTURE is an innovative approach that blends together URBAN HARDWARE and URBAN



**Figure 1.** The BIRLOKI system and Urban Acupuncture: Healing the City

SOFTWARE to provide a PLUG AND PLAY interactive way to address our cities. BIRLOKI system offers a new way of thinking urban furniture. No doubt the future of urban elements should go in this direction in the coming decades. Interaction with our own personal devices has become familiar and we expect the same level of real-time personalization with the sphere of public objects on the streets. BIRLOKI is a customizable, modular and adaptive piece of urban furniture that can be used to capture and share information about the city and its citizens.

#### *Case Study*

The case – study for the city of Singapore involved these specific objectives:

- Adaptation of the BIRLOKI system into the JLD both as a single system and as a network;
- To conduct a pilot study in a real environment on: collection of data from the environment (pedestrian counting); interaction of the system with the citizens; deployment, changeability and re-deployment of the system; maintenance;
- To validate the effectiveness of urban acupuncture approach to city life.

#### **Urban Acupuncture**

Since 2008, when the urban population surpassed for the first time in history rural population, the world governments are facing a growing pressure to research and develop scenarios for smarter cities that will be able to face the challenges involved in this unprecedented change in human history.

The envisaged state-of-the-art solutions are built on three distinct and separate approaches:

- digital, IT based solutions;
- architecture and infrastructure planning and building solutions;
- policies of citizens' inclusion in the decision-making process, that covers a wide range of initiatives from bottom – up and interactive IT solutions and immersive and enhanced experiences in the urban environment. In this varied and rapidly evolving scenario, we propose an integrated solution that combines Urban Design, IT solutions and Emotional Design. The underlying concept of this solution is “Urban Acupuncture”.

Urban acupuncture is a term that relates directly to Asian culture and to a holistic point of view that engages perfectly with our vision of the future. These two words have already appeared timidly to describe punctual little actions to solve urban problems with a bottom-up approach. But acupuncture infers a much more comprehensive conception of the world and therefore of Urban Design. Acupuncture understands the body (the city) as a whole, as a balanced network of streams and flows, each of them with a specific sense and function. The same way that classical Chinese acupuncture works, we identify blocked points, and we tone up or disperse the corresponding channels to balance again the whole energy system of the body of the city and its different organs and components.

Urban Design analyzes the diverse flows of energy of the city (mobility, power supply, social connections...) and identifies possible lacks of energy, points where the

flow is broken or can be enhanced (by strengthening or lowering it).

We have designed interactive, user friendly and ergonomic needles, creating a network of points that enables creating a more vivid, liveable and efficient city. When the “needles” are on and connected, the streams of information such as efficiency, transport and emotions flow freely and continuously balancing the seamless connectivity and interactivity of the smart city of the future.

### What we do. BIRLOKI System

The core of the proposed solution is the interactive outdoor piece of furniture “BIRLOKI”. BIRLOKI is a highly flexible, adaptable and fully customizable interface between the city and the citizens.

The BIRLOKI system consists on a simple base element that works as a street connector onto which different functional elements are plugged. The concept of the solution is similar to the “LEGO”: it consists of interlocking parts that can be connected, assembled and re-assembled in many ways.

The composition of each BIRLOKI can be changed and adapted regularly and seamlessly, following the metamorphosis of the cityscape and the needs of the stakeholders (governments, agencies, citizens). The Urban acupuncture healing process relies on the potential of an endless open recombination of the BIRLOKI elements.

For this first test in a real environment we proposed the following BIRLOKI elements:

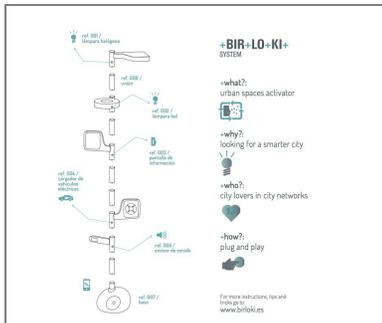
- The base element with people counting and sound diffusion system through bone conduction
- Light element (LED/halogen)
- Screen element
- Space element with RFID tag
- Sound element (speaker)

### The Proposed Solution for Singapore

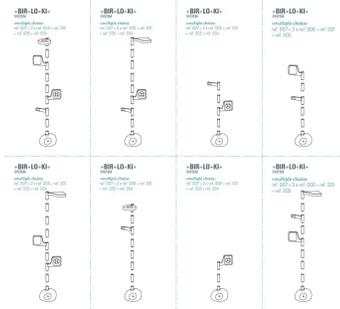
As a single unit, the BIRLOKI interacts with the environment in two ways:

- Collecting data (people counting)
- Pushing information (through the screen); conveying emotional experiences (through the sound module)

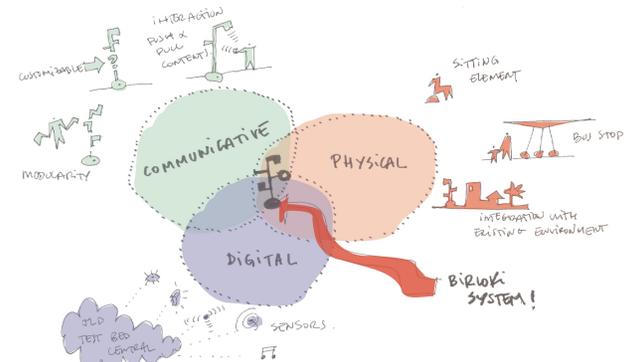
As a network, the BIRLOKI systems interact with each other sharing relevant information and perform collective analysis such as counting the direction of movement of people.



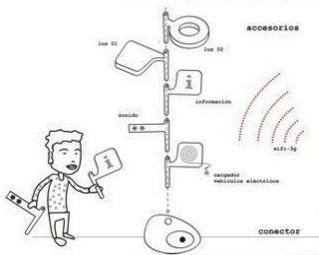
**Figure 2.** BIRLOKI modular system with the currently developed functional elements



**Figure 3.** BIRLOKI possible configurations



**Figure 4.** The 3 needs of the Smart City of the Future (Inspired by Copenhagen Cleantech Cluster 2012)



**Figure 5.** BIRLOKI modular system with the currently developed functional elements



**Figure 6.** BIRLOKI system prototype

An “urban space activator”, the BIRLOKI system represents an integrated solution to cover the three needs of the future Smart City.

The BIRLOKI nodes interact with the city flow following the principle of Urban Acupuncture. Based on this principle, an urban study needs to be conducted before planning the mass deployment of the BIRLOKI nodes in the city.

In the concrete case of JLD, we identified four nodes for BIRLOKI system deployment as a test bed. Both the pedestrian linkway and the park are points of the body of the city in which the confluence of the diverse channels becomes more evident, due to an increased human and vehicular traffic. These nodes are critical for the redirection of the energy in terms of a better management and planning of mobility, facilities and people.

The proposed BIRLOKI configuration is as follow:

- Screen Module: E-ink for low energy and outdoor usage. Provide
- Visual feedback
- Sound Module: Bone conducting contact speakers. Provides audio
- Feedback via bone conduction of sound
- Light Module
- Sensor board, including temperature, ambient light, ambient noise and air quality sensors.
- Spacer Module: Add space between various modules while maintaining the connections. Spacer module will have a passive RFID tag embedded

- Base Module: Central processing unit (CPU) of the BIRLOKI unit is located here. CPU will interface with various BIRLOKI modules and allow plug-and-play type interactions. Also, the base module provides an interface to the external world: power socket and Wifi/Wired network connection.

### Conclusions

There is another way to understand the public space. The Urban Furniture and space solutions we are used to, don't provide that kind of interaction that the new generations actively ask for.

Objects, buildings and the urban realm itself need to be a living, livable and interactive space. The new kind of society we are moving to and the new Information Technologies provide us with the means to walk properly in the direction of the experiences of the future.

BIRLOKI system is a step towards a probably better world, but there are still millions of bytes of information, design ideas and experiences to share and combine. The system will also be implemented in the Old Center (Kasko Viejo) of Bilbao to enhance the experiences of both the visitors/tourists and the citizens of Bilbao.

### Acknowledgements

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