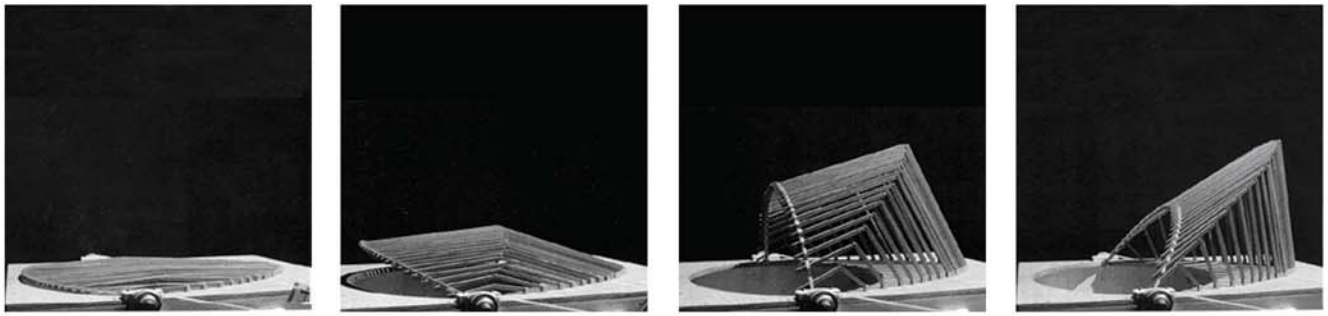
Chapter 5

Design Theory

" If architects designed a building like a body, it would have a system of bones and muscles and tendons and a brain that knows how to respond. If a building could change its posture, tighten its muscles and brace itself against the wind, its structural mass could literally be cut in half."

- Guy Nordenson Fox, M. A. : 2002



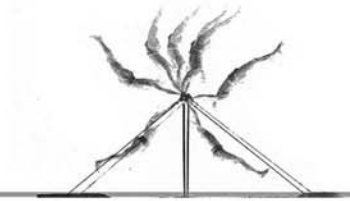
01 Santiago Calatrava demonstrates Kinetics
Kamin, B. : Architectural Record : 2002 : 92-105

Kinetic Architecture : a definition

In general, *Kinetic architecture* is defined as buildings and/or building components with variable mobility, location and geometry.

A kinetic structural solution may include folding, sliding, expanding, and transforming in both size and shape.

This can be achived by *means* of pneumatic, chemical, magnetic, natural or mechanical solutions. (*Fox, M. A.:2002*)



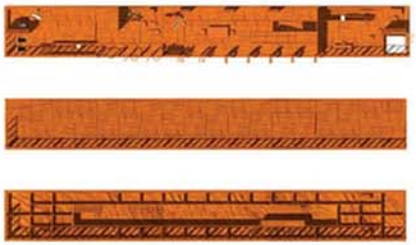
02 Swinging gymnast
Marey Demeny:1896

Kinetic architecture creates spaces that can physically reconfigure to meet changing needs. This approach places a large emphasis on the dynamics of architectural space. Three key elements come to light: structural engineering, embedded computation and adaptable architecture. Contemporary innovations include the works of such as Chuck Hoberman and Santiago Calatrava, amongst others. These demonstrate the possibility of kinetic implementation on an architectural scale. (*Fox,M.A.:2002*)

New materials such as ceramics, polymers and gels, fabrics, metal compounds and composites allow unprecedented structural experimentation. (*Fox,M.A.:2002*) In addition, technology provides a vision into microscopic natural mechanisms and advanced manufacturing of high quality kinetic parts.

The integration of embedded computation and kinetic function is fast becoming a practical and feasible reality. Intelligent kinetic systems can act as a moderator responding to change between human needs and environmental conditions. Moreover, flexibility of space responds to the requirements of any human activity. Specific applications may include intelligent shading and accoustical devices, automobile parking solutions, police box stations, teleconference stations, devices for ticketing and advertising, as well as school and pavilion access controls.

Pragmatic considerations are of importance within any building. Whan introducing kinetics to architecture, these include costs of manufacture and operations. The result could be a unique architecture that address the dynamic, flexible and constantly changing activities of today and tomorrow.



03 Suitcase House

WWW.INTERACTIVEARCHITECTURE.COM : 2007

Device / technology: Suitcase House

Developer / architect: Gary Chang

Description:
This is a space that provides ultimate flexibility; achieved through the use of partitions, lighting and mobile furniture.

An industrial shelving system is used and hidden behind curtains. Uplighting is used to articulate movable structural members. Established notions about the nature of intimacy, privacy, spontaneity and flexibility is questioned within this project.

Possible Application:
This becomes a more feasible kinetic solution, allowing multi-functionality that accommodates a wide spectrum of sports at different times of the day.

Device / technology: Dune Underground Exhibition

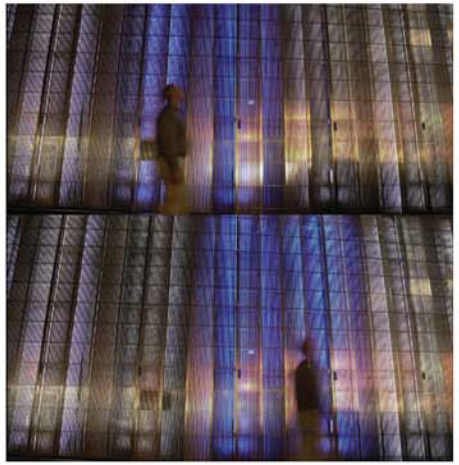
Developer / architect: Daan Roosegaarde

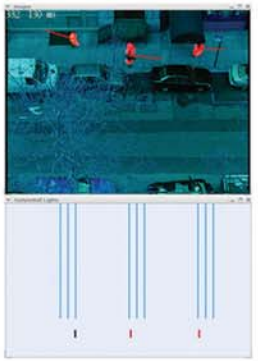
Description: Using fibres, steel, microphones, sensors, software and other media, Roosegarde creates variable square meters of display. Optic fibres respond to the presence of humans by changing appearance and following the movement and sounds of pedestrians.

Possible Application: The notion of lights responding to presence can be simplified and applied to streetlights running along the heritage route.

The concept can even be incorporated into the stadium lights that respond to the noise of the crowd.

04 Dune 4.0
www.studioroosegaarde.com : 2007





05 Podium light wall

www.interactivearchitecture.com : 2007

Device / technology: Podium Light Wall

Developer / architect: Kinecity, Massachussets (USA)

Description: As people walk on the kinetic pavement, a strip of blue light (7 floors tall) follows them on the wall of the building.

It accentuates the individual as well as patterns created and already existing on the streets.

Possible Application: On sidewalks along the facade to promote safety as well as interaction between interior and exterior activities.

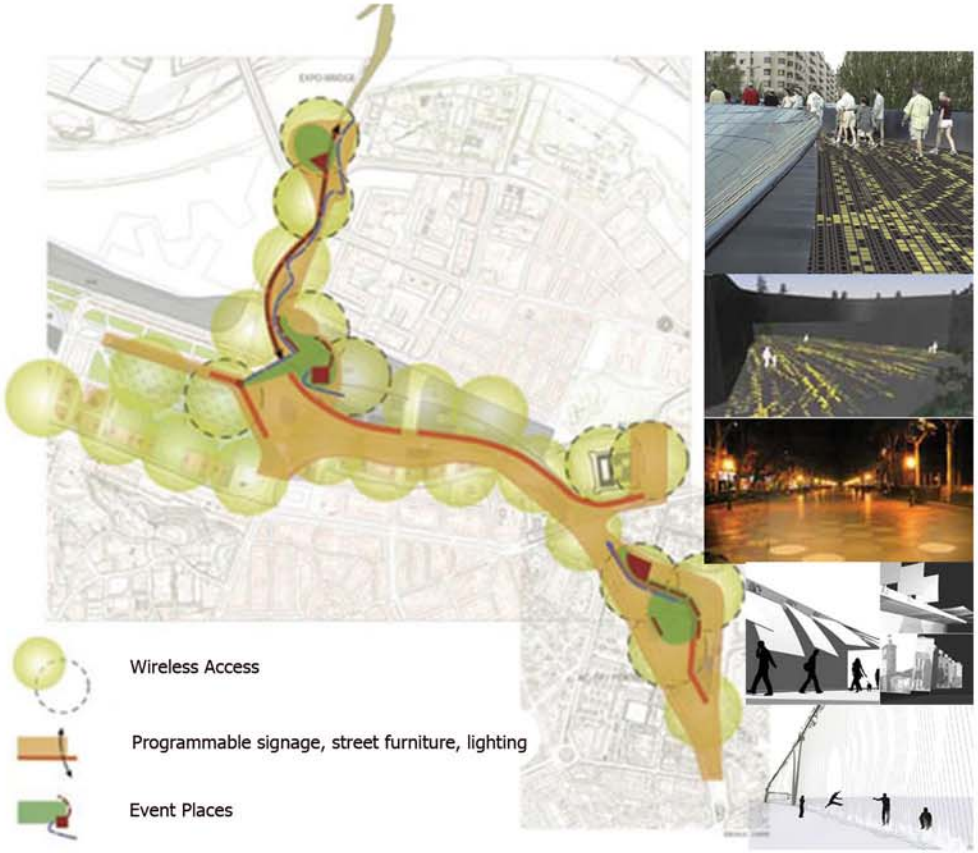
Device / technology: Digital Mile

Developer / architect: Zaragoza (MIT, USA)

Description: Incorporating digital media into everyday aspects of the public realm. Creating places that respond to users, accommodate multiple activities and provide information.

The *Digital Mile* is equipped with free wireless technology along the route. A water wall makes use of digitally controlled streams of water and an intelligent street light system, changes colour and intensity in response to the time of day. Making use of solar charging, informative street furniture provides pedestrians with up to date information on bus routes, traffic and the weather.

Possible Application: The concept of an intellectual route could be integrated with the proposed Heritage Route for Marabastad. Existing infrastructure and locality makes this an ideal area for such a proposal. Technologically advanced walkwayscould echo the identity of Marabastad.



06 Digital Mile
www.interactivearchitecture.com : 2007

"*These new programs present practical architectural situations for unique and wholly unexplored applications that address today's dynamic, flexible and constantly changing activities.*"

- Casswell, W. Fox, M. A. : 2002



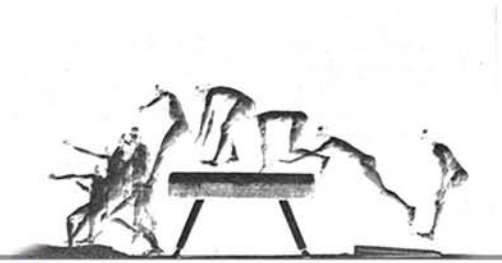


07 Mobile Concrete - Steven Holl
www.kdg.mit.edu : 2007

Learning from advanced technologies, the aim of thie dissertation is to design a structure that makes use of local construction methods to construct a building with interactive attributes. Conventional building methods are re-evaluated at the hand of kineasthetics. Unforetunately, limted skills and technology proves the implementation of kinetic and interactive architecture within the South African context relatively expensive. The challenge is thus to convince possible investors, to fund an interactive structure, as a means of improving the physical health of a community.

Obesity and related illnesses carry a health care expense of between 5 to 8% of the health budget, with considerable indirect costs. (*www.sasom.co.za*). A more adaptable structure will result in a longer its lifespan and ability to satisfy more than oneneed, and effectively luir more than one beneficiary.

The introduction of a *performance environment* within an urban context, creates the opportunity for 'lost' space to become meaningful. A dialogue can develop between inhabitant and visitor, between spectator and athlete, etc. A dynamic interchange that was once characteristic of Marabastad at the hand of a new idol, the **sport star.**



08 Leaping
Marey Demeny:1914

5.2.1 Opportunities and constraints

5.2 Application within the dissertation