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'building in a box'
an experience prototyping toolkit to reveal design needs for interactive multimedia facades

Project Thesis

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Overview:

- **Terms**
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- **Task and motivation**
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- **Concept of the project** ⇨ general description
  ⇨ hardware components
  ⇨ architecture of the software
- **Things I have learned**
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- **Future work**
- **Presentation of 'building in a box'**

Terms

- **Multimedia facades**

  ⇨ The idea of designing or modifying the architecture of buildings with the objective of using their facades as a kind of gigantic public screens

[1] Dexia Tower in Brussels
[2] Blinkenlights, project 'Stereoscope' in Toronto

- **Interactive multimedia facades**

  ⇨ A multimedia facade that offers the participants the possibility to enter a mutual dialogue with the facade, influencing the displayed content in various ways

- **Experience prototyping**

  ⇨ Is *'a form of prototyping that enables design team members, users and clients to gain first hand appreciation of existing or future conditions through active engagement with prototypes'* (Marion Buchenau and Jane Fulton Suri in *'Experience Prototyping'*, New York, 2000)

Sources: [1] Dexia tower, Brussels, Belgium http://commons.wikimedia.org/wiki/File:301_R317a.jpg, last visited 22.02.2010 ,
[2] Blinkenlights, Stereoscope. http://commons.wikimedia.org/wiki/File:Blinkenlights_Stereoscope_at_Toronto_City_Hall.JPG, last visited 22.02.2010

Tasks and motivation

- **Tasks**

  LMU ⇨ prototyping toolkit to explore various forms of interaction with multimedia facades

  feno ⇨ tool to demonstrate clients various possible forms of interaction for their project

- **Motivation**
  - Very view academic papers and user studies concerning this subject
  - Interactive multimedia facades are an expensive ambition in respects of time and money
    ⇨ wish for testing different possible interaction scenarios in advance
  - Enabling clients to evolve their own interaction ideas while interacting with the model
  - Bringing the subject of interaction with multimedia facades to a broader audience

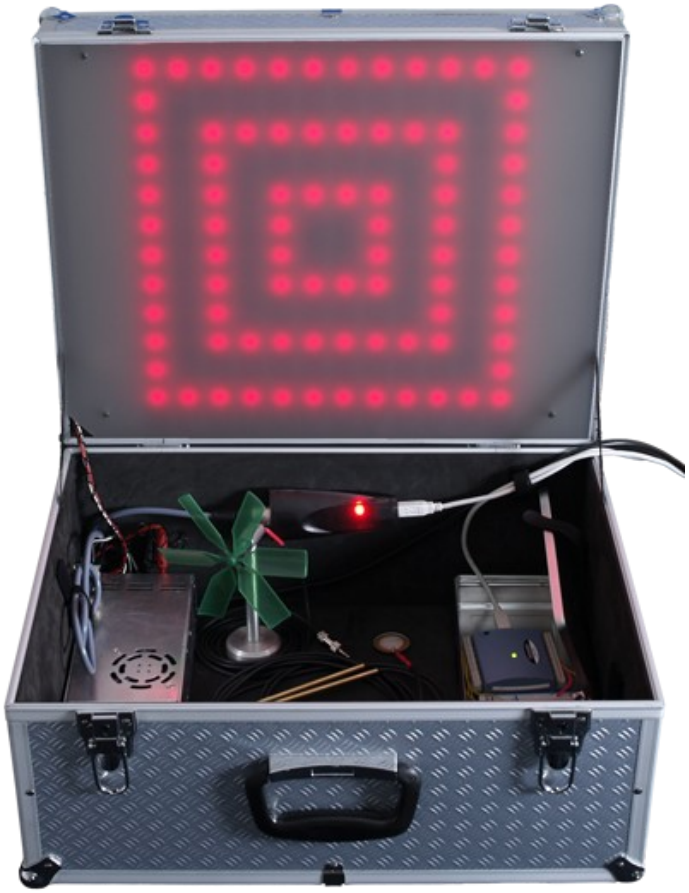
'building in a box' – general description

- **A metal box of the size 48x38x25cm with a hinged lid**

- **A panel of 12x12 LEDs mounted into the lid,**
  simulating a multimedia facade
  ⇨ two panels, monochrome and RGB

- **Box contains**:
  - PC with the software application
  - Hardware to power and control the LED panel
  - Setups to realize various forms of interaction with the panel

- Paper mock-up simulating the architecture of a building



'building in a box' –hardware components

- **Each panel consists of 12 feno LED stripes**
  - ⇨ RGB: type feno *'fm s.line 7500 rgb'* [1]
  - ⇨ White: type feno *'fm s.line7101 w'* [2]


[1]
[2]

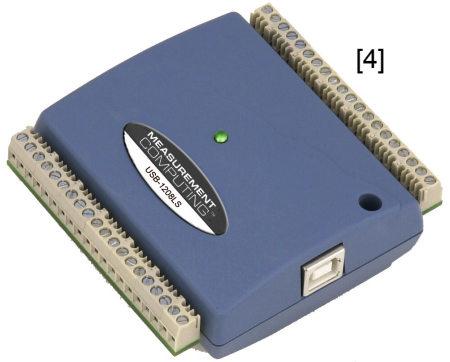
- **The LEDs are controlled via DMX**
  - ⇨ USB-to-DMX converter type feno *'fc dmx 512u'* [3]


[3]

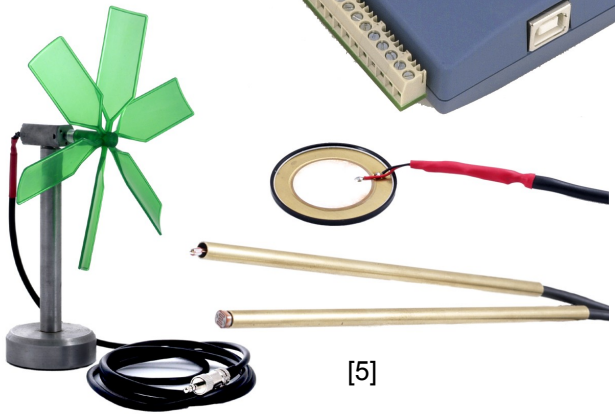
- **Setups for gathering input from the surroundings**

  have been built in sketching-with-hardware-manner
  - ⇨ four different circuits with specific sensors [5]
  - ⇨ USB-based analogue and digital I/O module

  type *'USB-1208LS'* from *'Measurement Computing'* [4]



[4]


[5]

Sources [1,2,3]: www.feno.com, last visited 22.02.2010

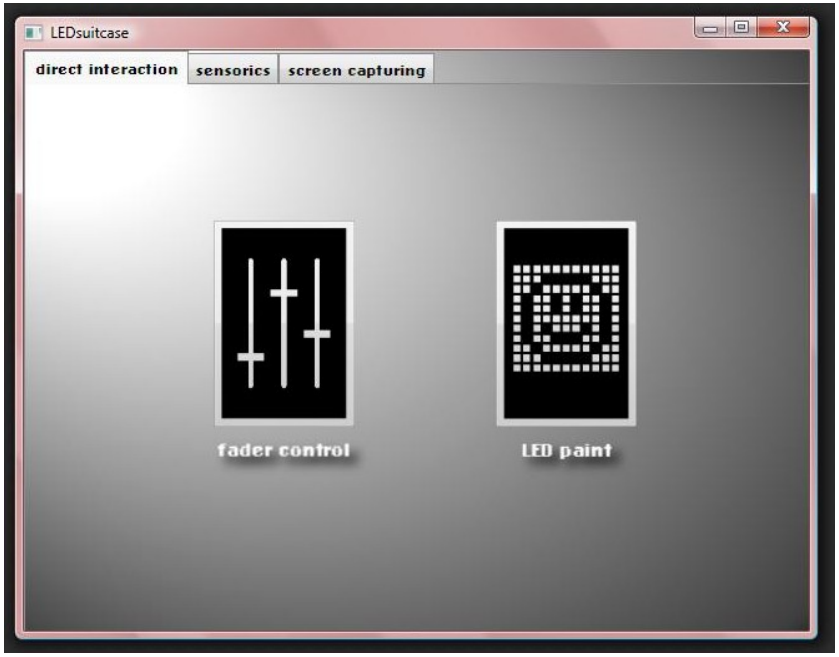
'building in a box' – the software application

- **Programmed in C#,**
  using the Windows Presentation Foundation (WPF) for creating the GUI

- **Structure of the application divided into three interaction groups**
  - *'direct interaction'* ⇨ programs *'fader control'* and *'LED paint'*
  - *'sensorics'* ⇨ gathering values from the surrounding via sensors
  - *'screen capturing'* ⇨ copying arbitrary content from screen to panel

- **All functionalities except from *'screen capturing'* run in separate processes**
  ⇨ modular structure makes it easy to add new functionality to toolkit
  ⇨ appropriate way to grant exclusive access to the hardware components

'building in a box' – impressions from the GUI



Tab *'direct interaction'*
⇨ pressing the buttons will start the corresponding programs in separate processes

Program *'LED paint'*, monochrome LED panel version

Graphical output of *'sensorics'* program *'knock detection'*

What I have learned

- **Programming C# and WPF, soldering, electronics, working with DMX** and much more

- **Screen capture functionality:**
  - Complex calculations

    ⇨ can lead to a certain delay on slow PCs
    - Should be solved with the objective of real time interaction, e.g. games
    - Solution: e.g. reducing amount of additional output (see presentation)

  - LEDs are always set with the RGB values of the pixel in the center of the corresponding area on the screen

    ⇨ this might not always result in the best representation of the original image

- **Low resolution of the display requires appropriate content**

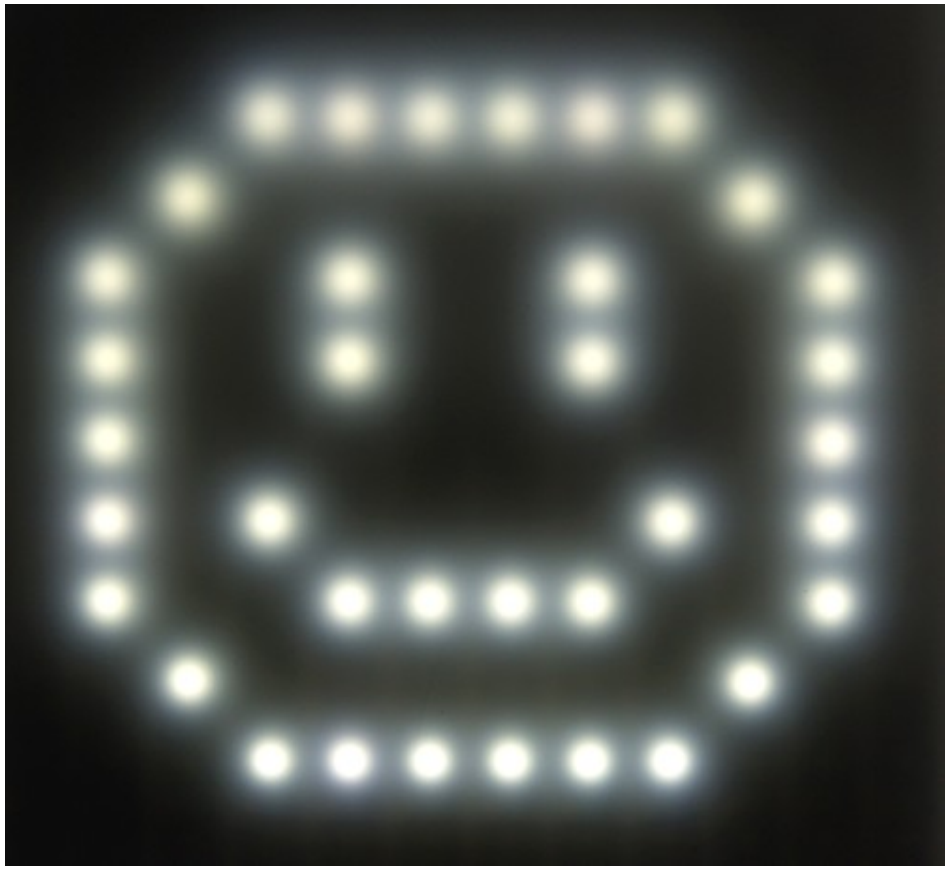
Future work

- **User studies**
  - Evaluating functionality, design and usability of 'building in a box'
  - Exploring up to what extend findings in studies with our prototype
    are comparable with user studies with real interactive multimedia facades

- **Applying prototype under real conditions**
  - Exploring new and evaluating existing forms of interaction
  - In contact with clients

- **Enhancing prototyping toolkit with further functionality** e.g.
  - With new *'sensorics'* programs, e.g. with light barrier circuits to gain traffic data
  - With games and other content suitable for the low resolution display

Presentation of 'building in a box'



Thank you for your kind attention!