Prototyping Physical User Interfaces

Short Course @ IT University of Göteborg

September 2003

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Brief Course Outline

- Breaking Interface Conventions?
- Exercise – creating a cooperative multi user game
- Nature and Value of Physical Prototyping
- Break
- Smart-its basics
- Smart-its enhanced light
- Lunch break
- Students project (afternoon) Smart-its enhanced light
- Smart-its enhanced light – results
- Building Smart-its hardware
- Break
- Developing Smart-its Software
- Smart-its Examples
- Wrap-Up

Making Things Smart

Context & Interaction is anchored in Artefacts

- Modelling and acquiring context on entity level
  - More general properties
  - Flexible and simple model
  - Open and extensible
  - Exploiting domain knowledge
- Augmenting artefacts with
  - Sensing
  - Processing
  - Communication
- Context – on artefact level – is related to interaction with the artefact
- Combining context on a higher level

A Bottom-up Approach useful contexts for…

sofa

door

briefcase

A Bottom-up Approach Examples

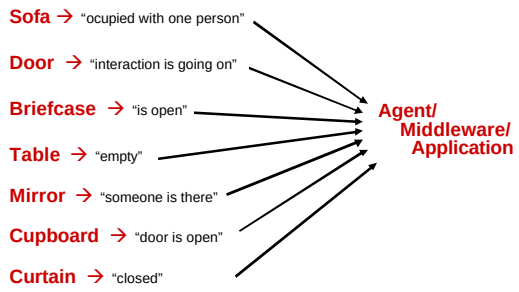
sofa
- free
- occupied with one person
- occupied with two people
- occupied with three people

door
- open
- closed
- degree of openness
- interaction

briefcase
- empty
- loaded
- open
- closed
- interaction

sofa (over the top)
- free
- occupied with one person
- occupied with two people
- occupied with three people
- jumping on the sofa
- motion of people on the sofa
- temperature on the sofa
- pouring orange juice on the sofa
- pouring wine on the sofa
- pouring milk on the sofa
- cleaning the sofa
- moving the sofa
- sofa placed on the stairs
- sofa upright
- upside down
- sofa flying in midair
- …

A Bottom-up Approach Combining Information



Smart-Its enhanced light

- **Task**
  Write a software that accesses the sensors attached to the lamp and transforms them into a higher level representation (textual or graphical).

State 1 | State 2 | State 3



Web access to sensor values

- Use a web browser to access the server that provides the sensor data
- Look at the file format
- Record values for a particular context

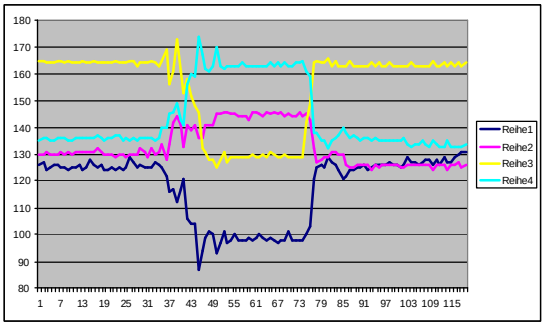
Sample Data

Sensor Readings
ID: A
Counter: 184
Touch Sensor: 0
PIR Sensor: 0
Light Sensor 1: 193
Light Sensor 2: 192
Acceleration X: 101
Acceleration Y: 114
Acceleration Z: 140
Acceleration U: 160
Temperature: 24

ID: B
Counter: 223
Touch Sensor: 0
PIR Sensor: 0
Light Sensor 1: 169
Light Sensor 2: 169
Acceleration X: 132
Acceleration Y: 157
Acceleration Z: 132
Acceleration U: 120
Temperature: 23

```
<HTML><HEAD><TITLE>Smart Its Web Gateway</TITLE>
<META http-equiv=Content-Type content="text/html; charset=windows-1252">
<META content="MSHTML 6.00.2800.1226" name=GENERATOR>
</HEAD>
<BODY>
<H1>Sensor Readings</H1><B>ID: <ID>A</ID></B><BR>
<B>Counter: <COUNT>184</COUNT></B><BR>
<B>Touch Sensor: <TOUCH>0</TOUCH></B><BR>
<B>PIR Sensor: <PIR>0</PIR></B><BR>
<B>Light Sensor 1: <LIGHT1>193</LIGHT1></B><BR>
<B>Light Sensor 2: <LIGHT2>192</LIGHT2></B><BR>
<B>Acceleration X: <ACCX>101</ACCX></B><BR>
<B>Acceleration Y: <ACCY>114</ACCY></B><BR>
<B>Acceleration Z: <ACCZ>140</ACCZ></B><BR>
<B>Acceleration U: <ACCU>160</ACCU></B><BR>
<B>Temperature: <TEMP>24</TEMP></B><BR><BR>
<HR><BR>
<B>ID: <ID>B</ID></B><BR>
<B>Counter: <COUNT>223</COUNT></B><BR>
<B>Touch Sensor: <TOUCH>0</TOUCH></B><BR>
<B>PIR Sensor: <PIR>0</PIR></B><BR>
<B>Light Sensor 1: <LIGHT1>169</LIGHT1></B><BR>
<B>Light Sensor 2: <LIGHT2>169</LIGHT2></B><BR>
<B>Acceleration X: <ACCX>132</ACCX></B><BR>
<B>Acceleration Y: <ACCY>157</ACCY></B><BR>
<B>Acceleration Z: <ACCZ>132</ACCZ></B><BR>
<B>Acceleration U: <ACCU>120</ACCU></B><BR>
<B>Temperature: <TEMP>23</TEMP></B><BR>
</BODY></HTML>
```


Example Data (acceleration)



Happy Hacking!