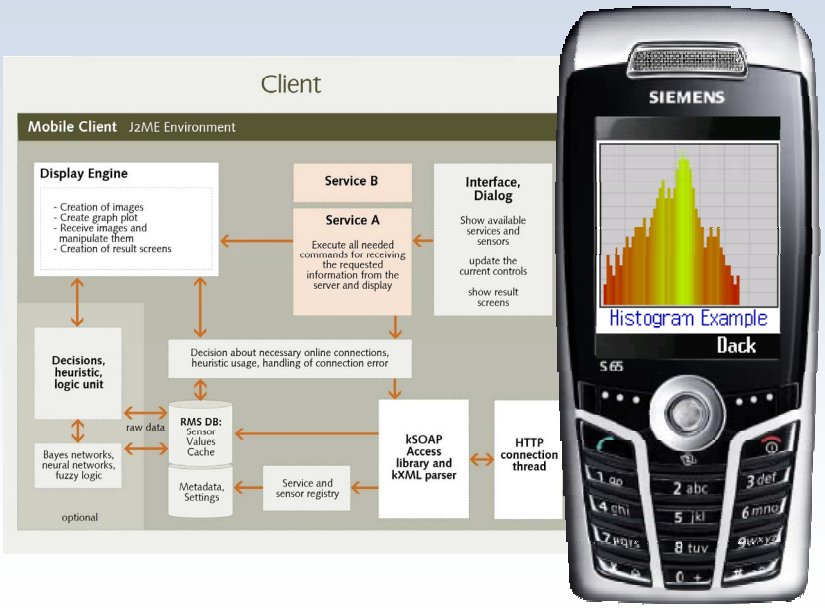
Bauhaus University Weimar



Research, Technology:
Mobile Interface, Sensor Access

Project Sensation

November 2004

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Outline

1. Technology: Sensor Server, Sockets

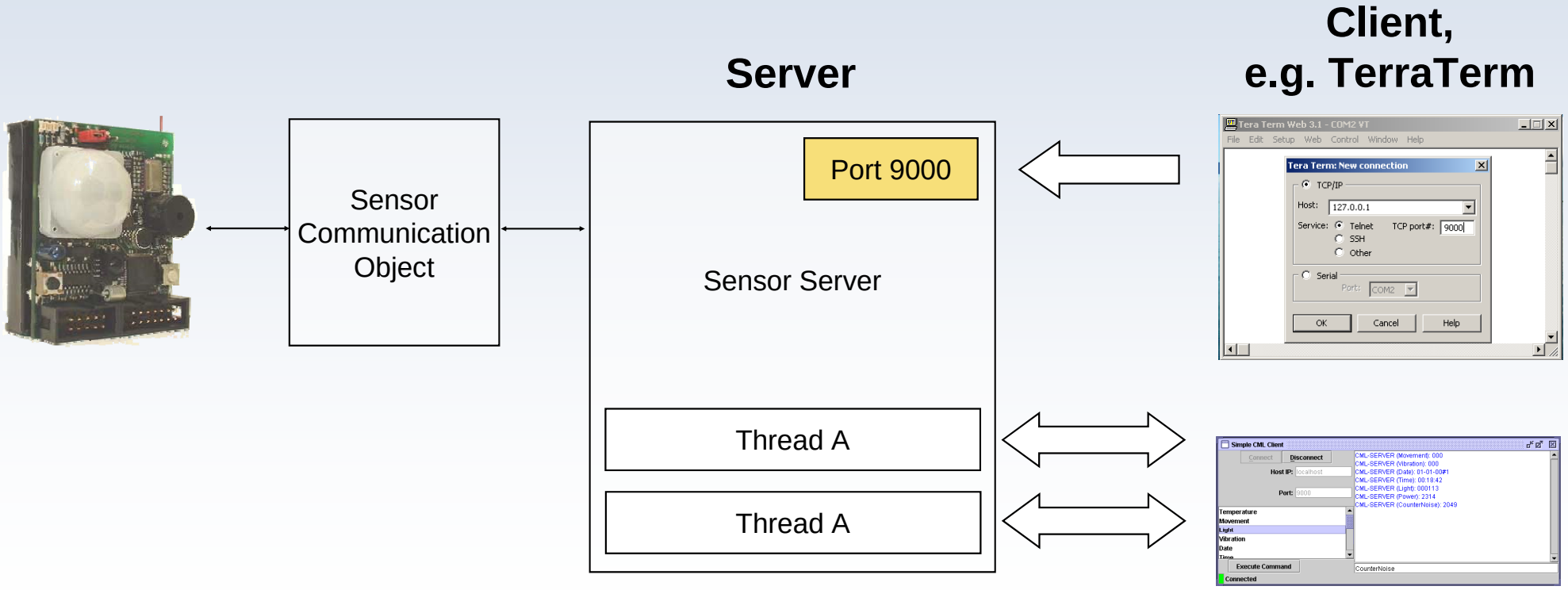
2. Mobile Interfaces: GraphEngine Class Prototype

3. User Control, Interaction

1. Technology: Sensor Server, Sockets

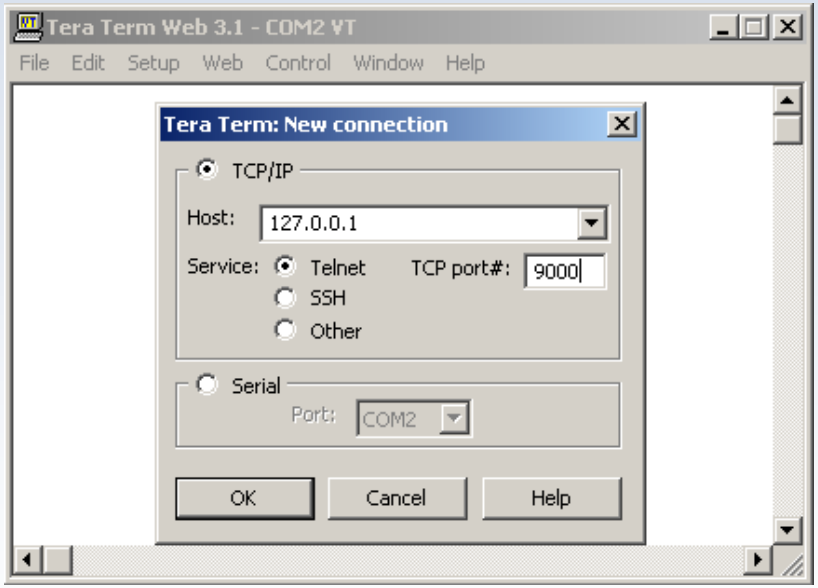
1. Sensor Server, Sockets

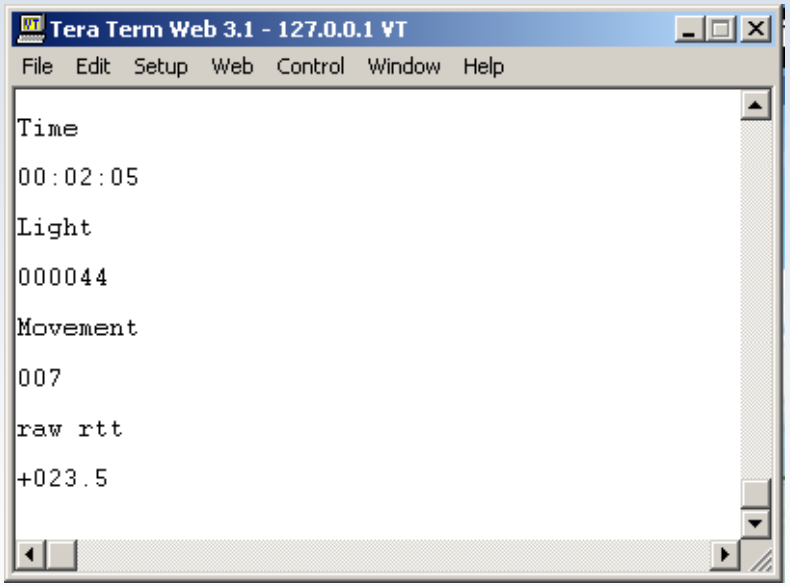
Access to the sensor data:
Server, listening to port 9000, multithreaded, using sockets



1. Sensor Server, Sockets

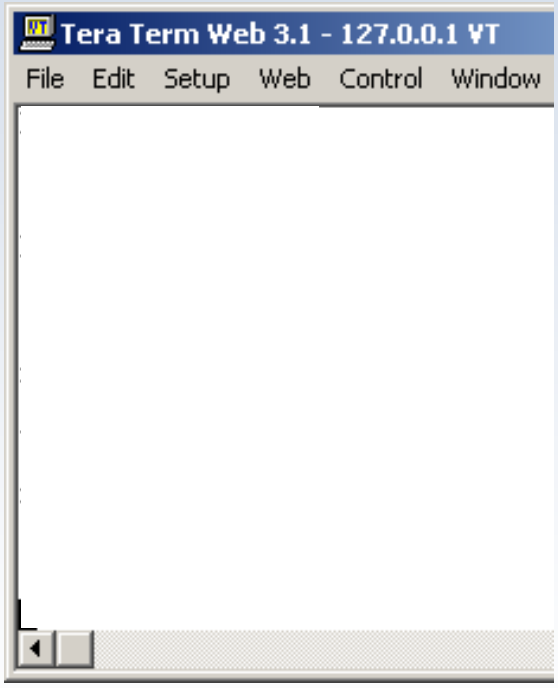
Using terminal software, TELNET: e.g. TerraTerm

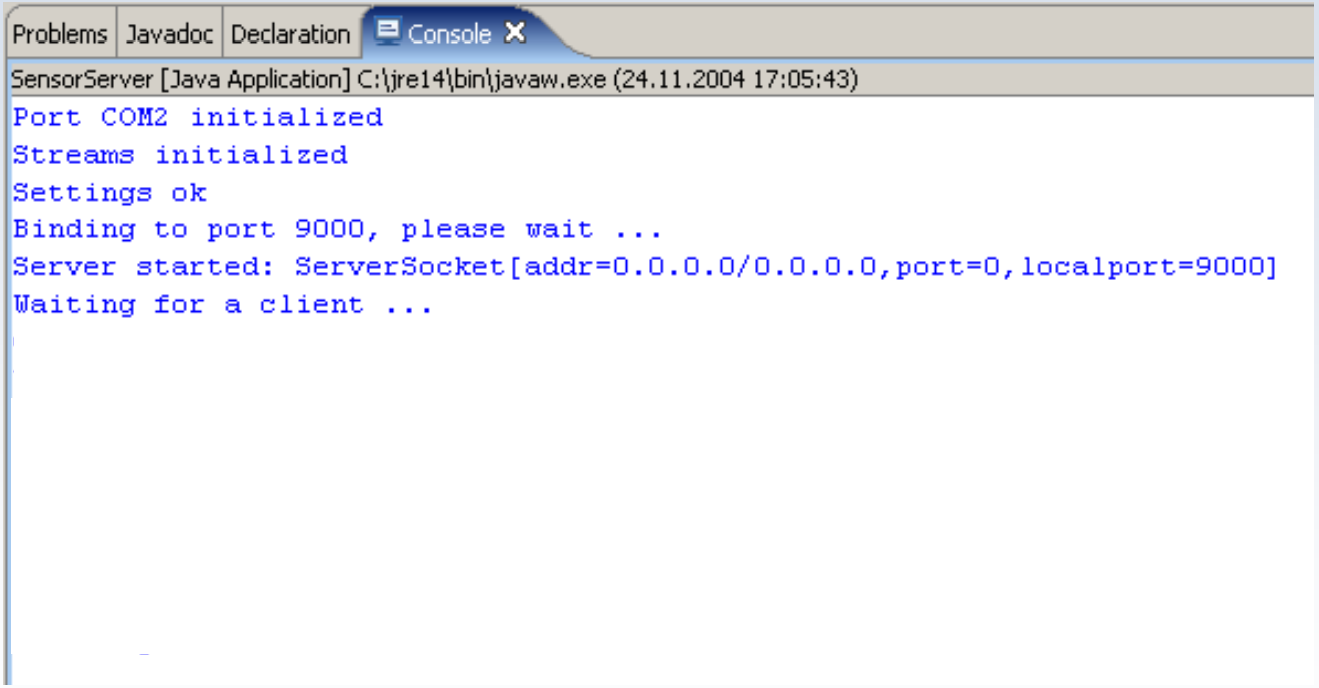




1. Sensor Server, Sockets

Client Server Connection:





1. Sensor Server, Sockets

Allowed command sets:

RAW terminal commands
(if allowed → boolean flag)

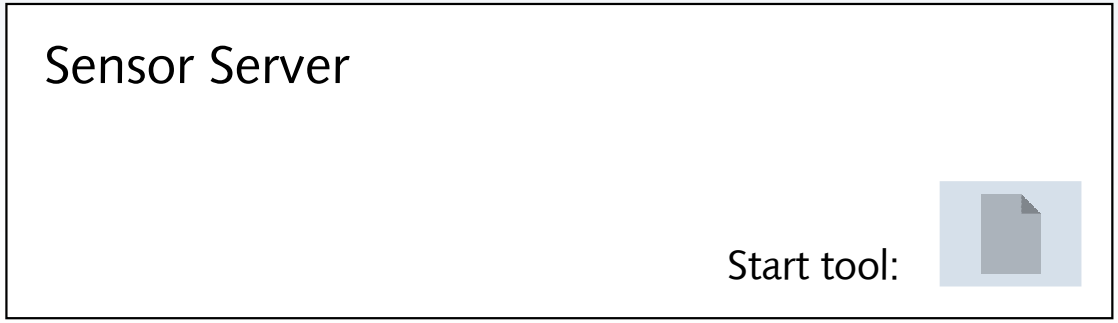
“raw“ + <space> +

```
"rtt"
"rdd"
"rct"
"rid"
"rvb"
"rms"
"rls"
"rvs"
"rmc"
"rmm"
"rma"
"rbs"
"rlr"
"rlg"
"rly"
```

SensorCommand keys
(secure, controlled)

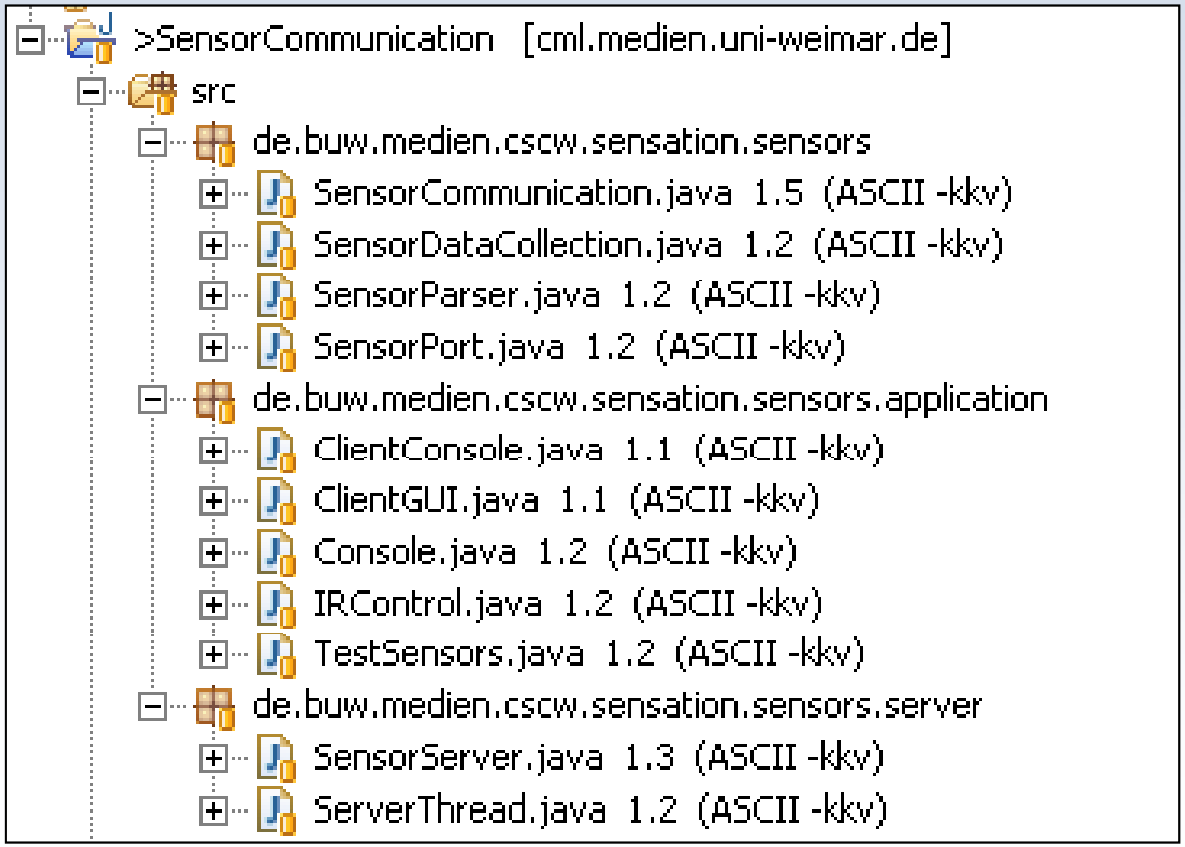
```
commandMap.put("Temperature",      new SensorCommand("rtt",6 ,5 ));
commandMap.put("Date",             new SensorCommand("rdd",10,10));
commandMap.put("Time",             new SensorCommand("rct",8 ,0 ));
commandMap.put("ID",               new SensorCommand("rid",4 ,5 ));
commandMap.put("Power",            new SensorCommand("rvb",4 ,2 ));
commandMap.put("Movement",         new SensorCommand("rms",3 ,0 ));
commandMap.put("Light",            new SensorCommand("rls",6 ,0 ));
commandMap.put("Vibration",        new SensorCommand("rvs",3 ,0 ));
commandMap.put("CurrentNoise",     new SensorCommand("rmc",5 ,0 ));
commandMap.put("CounterNoise",     new SensorCommand("rmm",4 ,2 ));
commandMap.put("AverageNoise",     new SensorCommand("rma",4 ,5 ));
commandMap.put("StateButton",      new SensorCommand("rbs",1 ,0 ));
commandMap.put("StateRedLED",      new SensorCommand("rlr",1 ,0 ));
commandMap.put("StateGreenLED",    new SensorCommand("rlg",1 ,0 ));
commandMap.put("StateYellowLED",   new SensorCommand("rly",1 ,0 ));
```

Software Demonstration 1:
Sensor Server and Terminal



1. Sensor Server, Sockets

Overview: Current CVS files



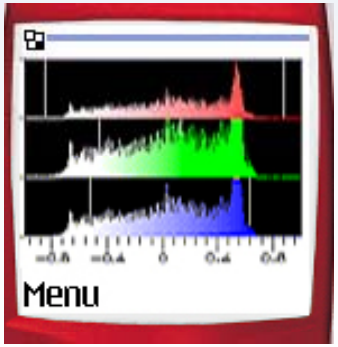
2. Mobile Interface, GraphEngine Class Prototype

2. Mobile Interface

The application scenarios (last week):

1. Awareness information
2. Connect context information with the availability service of mobile phones
3. Room profile
4. Notification service, threshold

5. Availability/usage patterns
6. Workgroup scheduling assistance (because of working room awareness)



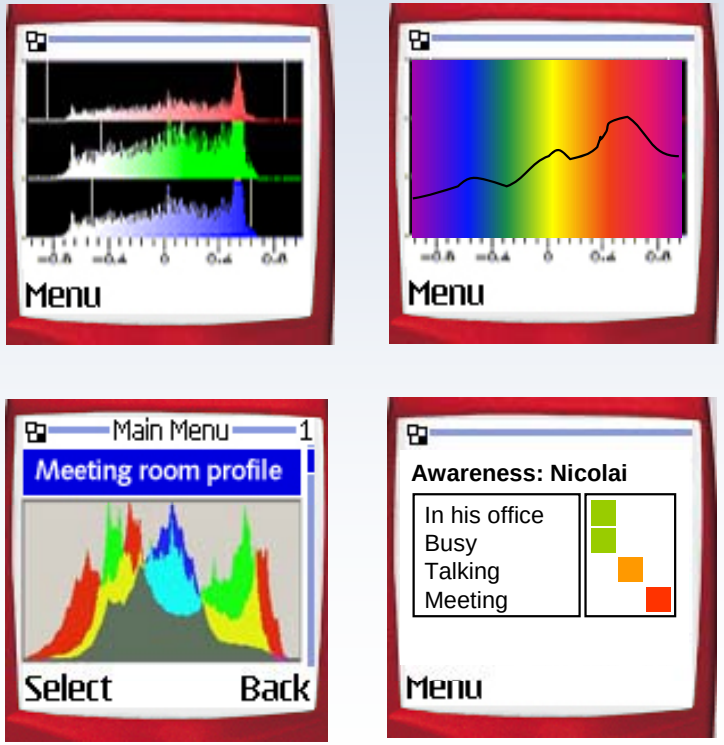
2. Mobile Interface

Display awareness information on mobile devices (J2ME Platform):

Requirements:

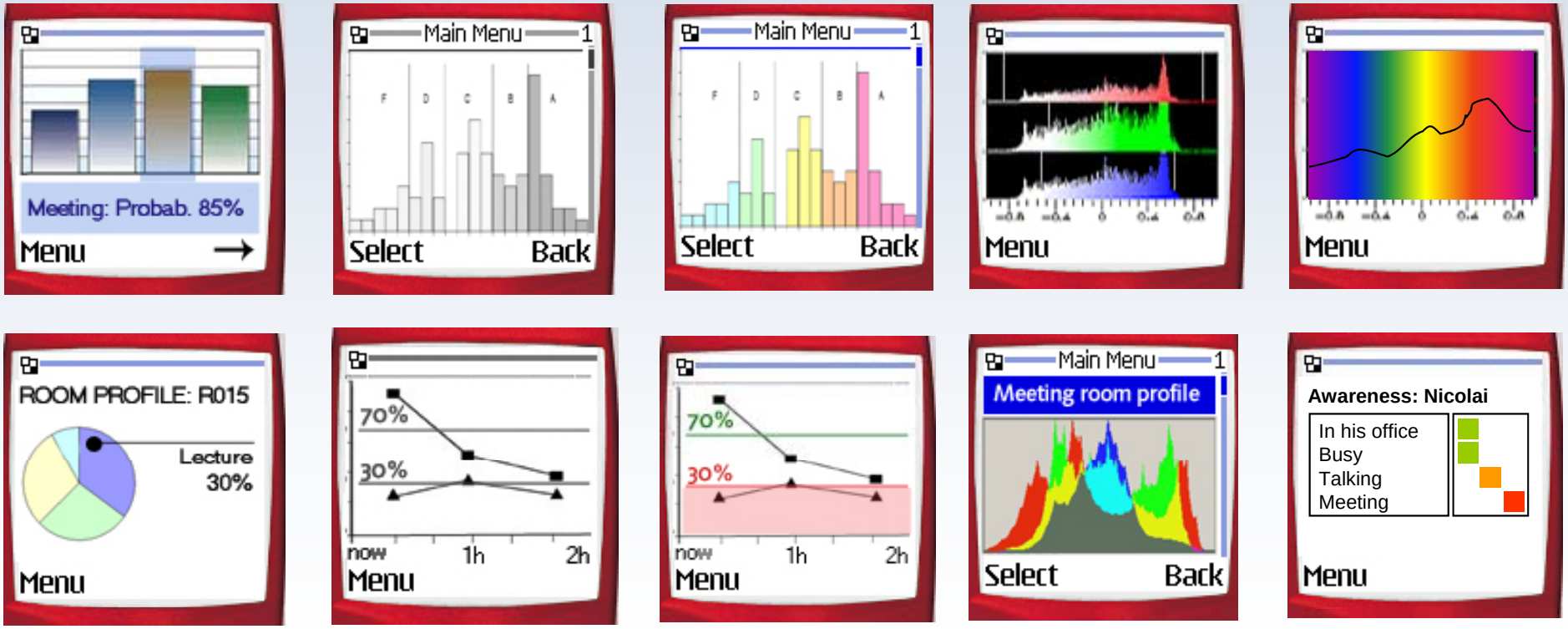
1. Compact information on one screen
2. No float calculations (as normally used in graphic methods)
3. Compression methods
4. Navigation
5. Overview and context
6. Adaptable visualization, controls
7. Display awareness information → GraphList
8. Mark prospective data → Shadowing, Color

Design concepts for awareness visualization (not yet implemented):



2. Mobile Interface

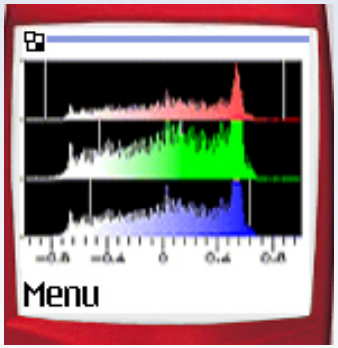
Display Awareness Information with Mobile Devices (J2ME Platform):

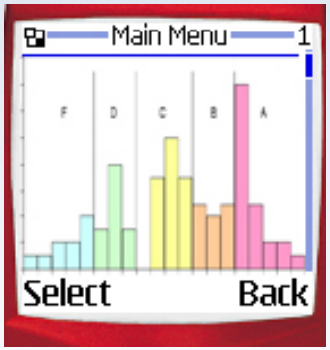


2. Mobile Interface

Display Awareness Information with Mobile Devices (J2ME Platform):

GraphEngine Prototype





2. Mobile Interface

GraphBar

- 3 to 15 values
- Awareness the next hours
- Week overview (days)

GraphHistogram

- 40 to 100 values
- More values with compression method
- Usage patterns visualization
- Room profile
- Day overview (high resolution)

2. Mobile Interface

GraphEngine Prototype, Example Bar Graph:

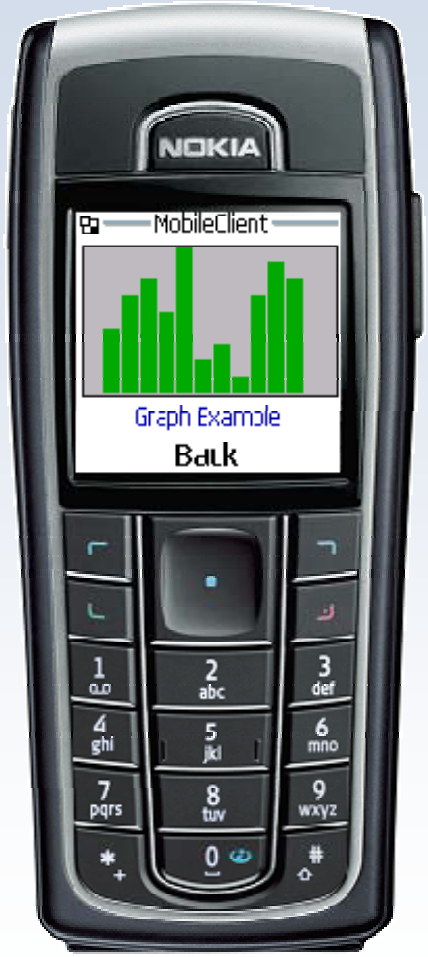
```
GraphBar myGraph = new GraphBar(this);
myGraph.setDescription("Label");

// Add only one integer value
myGraph.addValue(5);

// Add more integer values
int[] values = {1, 2, 3};
myGraph.addValues(values);
```

Example Histogram Graph:

```
GraphHistogram myHistogram = new GraphHistogram(this);
myHistogram.setDescription("Histogram");
```



Software Demonstration 2: Graph Engine and Connection

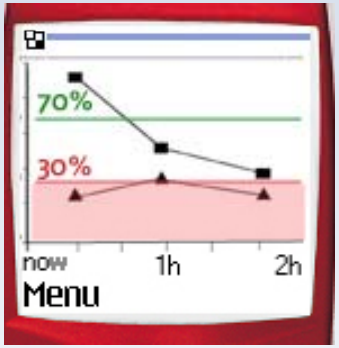
Eclipse: J2ME Project

Start tool: 

2. Mobile Interface

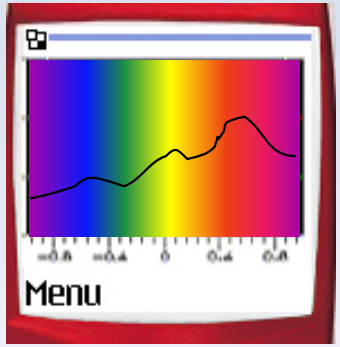
Next assignments:

- Optimization (int calculations, space)
- New graph types:
  - GraphLine
  - GraphList
  - GraphGradient



GraphLine

GraphList



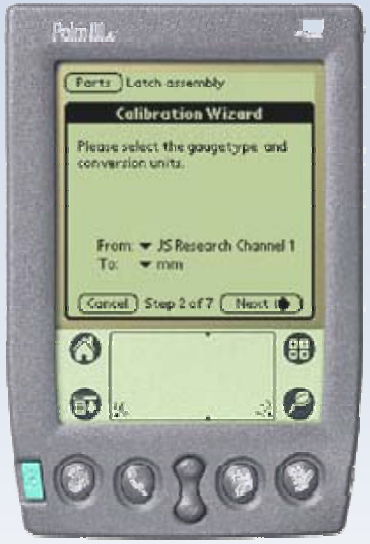
GraphGradient

3. User Control, Interface

3. User Control, Interface

Advantages: The user can…

1. … activate/deactivate observation
2. … enter meta data; additional feedback
3. … override system for some minutes
4. … access sensor/system data
5. Rapid prototyping (→ real hardware controls)
6. Use metadata for Bayesian Networks Inference

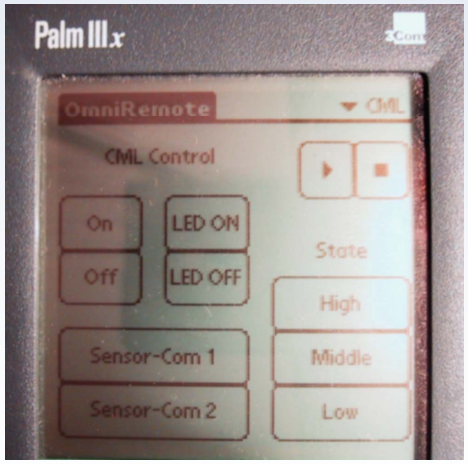


Implementation of sensor control:

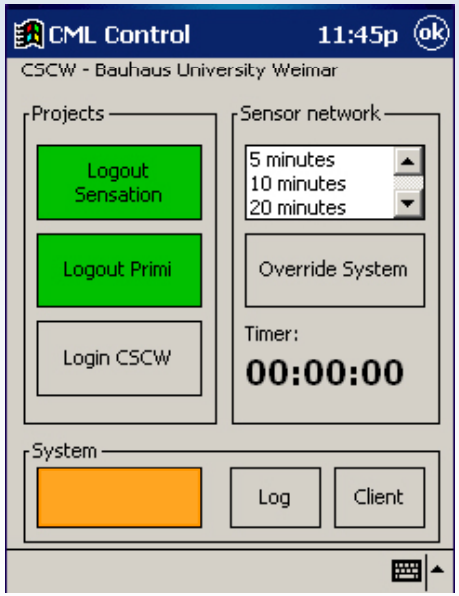
- Wireless connection via Infrared or WLAN technology
- Integration as "sensor"
- Event listener: notify all registered clients
- Logging service

3. User Control, Interface

Prototype using existing Palm remote software, training mode for application to learn RC5 commands:



PocketPC PDA prototype, connection via WLAN:



Hardware controls:

Reference: [Begole 2004]

3. User Control, Interface

Software Demonstration 3:
User Control, Parser

Ecplise: Sensor Project, IR Control

Start tool: 

ToDo

Possible assignments for the next week:

1. Extend the console application for ESB
2. Extension of the mobile toolkit GraphEngine: new graph types
3. SSL/Secure Socket connections
4. Bluetooth tests (Nokia mobile phone⇔ Apple G5 / Windows)

Furthermore:

- Prototype of interaction interface (PocketPC)
- "Sensor" Plug-in and (W)LAN communication

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Thank You

For Your Attention!