Ambient functionality in MIMOSA from technology to services

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MIMOSA IDENTITY CARD

Microsystem platform for Mobile Services & Applications

- Starting date: January 1st 2004
- Ending date: June 30th 2006
- Duration: 30 months
- Total Budget: 23 M€
- Community Financial contribution: 10 M€
**MIMOSA GOAL**

*Make Ambient Intelligence a reality by developing a mobile-phone centric open technology platform*
MIMOSA CONSORTIUM

16 Partners in 8 countries

MIMOSA WORK PACKAGES

OPEN PLATFORM FOR AMBIENT INTELLIGENCE

Applications and services

System Architecture

System integration and system platform

Technology

Short-range communication

Context awareness & actuation

User interface to ambient intelligence

Energy scavenging

Dissemination & networking

Management

Microsystems integration

User interface to ambient intelligence

Applications and services

Proof of concepts & demonstrators

16 Partners in 8 countries

MIMOSA CONSORTIUM

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WP1 - APPLICATIONS AND SERVICES

WP1 will ensure that the development of the MIMOSA core technology is based on user needs and that the resulting technical solutions will be:

- Easy to use, useful and acceptable from the end user point of view
- Applicable in different application fields from the application developers point of view

WP1 - MIMOSA APPLICATION FIELDS

Usage scenarios describe what MIMOSA technologies could provide to the end user and how the technology will look and feel in different everyday situations:

- **Sports**
  - Usage scenario example

- **Fitness**
  - Usage scenario example

- **Healthcare**
  - Usage scenario example

- **Housing**
  - Usage scenario example

Public deliverable available « MIMOSA initial usage scenarios »
WP2 - SYSTEM ARCHITECTURE

WP2 focuses in creating **specific architectural descriptions** of local connectivity, intelligent sensors, context information processing and novel user interfaces.

Architectures for context information processing

Architectures for intelligent sensors

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WP2 - SYSTEM ARCHITECTURE

**Overall architectural specification (OMAS)** for mobile-device centric open technology platform to Ambient Intelligence

- **RFID sensor**
- **Sensors**
- **Sensor interface**
- **Digital sensor**
- **Local connectivity interface**
- **Local connectivity**

- **User interface**
- **Application interface**

- **Operating system**

- **Local connectivity interface**

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**Air interfaces**

- **RFID**
- **LEE**
WP3A SHORT-RANGE COMMUNICATION

Task 1: Wireless remote-powered sensor
- 2.4 GHz RFID-technology
- passive: remotely powered by RF-field

Task 2: Reader/writer for wireless remote-powered sensors and RFID-tags
- 2.4 GHz RFID-technology
- maximized integration with Bluetooth radio

Task 3: Ultra low-power wake-up radio
- novel 2.4 GHz wake-up service for Bluetooth master radio
- increase battery lifetime
- high-Q MEMS-passives (BAW resonator)

Task 4: Low-power battery-powered sensor node radio
- 2.4 GHz low-power sensor node radio
- high-Q passives, MEMS, advanced CMOS (130nm SOI)

W3B: CONTEXT AWARENESS & ACTUATION

MIMOSA innovation:
continuous monitoring lactate sensor with painless micro-needle transdermal fluid transfer

POLYMER MICRONEEDLE & LACTATE SENSOR

Smart lactate sensor plaster

Interface for short-range wireless communication

First Si-master of sharp microneedles
**W3B: CONTEXT AWARENESS & ACTUATION**

**3D-GYROSCOPE AND 3D-MAGNETOMETER**

Autonomous tracking of position, motion, orientation, tilt of:
- user or parts of the user’s body
- mobile terminal, smart pens, etc.

9D-motion tracking unit:
- (low-power, low-cost)

Applications:
- Sports/ fitness
- Inertial user interface

Angular rate

**Applications:**
- Sports/ fitness
- Inertial user interface

**WP3C - USER INTERFACES TO AmI**

**Objectives**
- Propose and investigate transducer systems technology that can be employed as **user-friendly interfaces to the intelligent environment** via the personal trusted device

**Interface types**
- Inertial user interface
- Acoustical user interface
- Optical user interface

Inertial UI  Acoustical UI  Optical UI
WP3C - USER INTERFACES TO AmI

- Acoustical user interface
  - Silicon microphone array
- Inertial interface
  - 3-axis gyroscope
- Optical user interface
  - Laser scanning microprojector

WP3D - ENERGY SCAVENGING

- Developing energy harvesting components for powering sensor nodes:
  - Energy is gathered for powering the sensor between two data acquisitions
  - Energy scavenging solutions are various: RF, PV Cells, Thermocouples...
- Investigation on **Electromagnetic Energy Scavenging**
- Focus on GSM (900MHz) frequency band

- Sensor with RF Scavenging functionalities
- Ambient Source
- Antennas
WP4 - MICROSYSTEM INTEGRATION

- System in package
- Above IC
- Interconnection
- Packaging
- Capping integrating MEMS or passive components
- Alternatively PDI for flip-chip
- Piezoelectric Resonator
- Switch
- Inductance
- Tunable capacitor
- Resonator
- Si

WP4 - SOI PLATFORM FOR EMBEDDED MEMS

- Feasibility of embedded resonator with standard CMOS-SOI platform: from thick SOI to standard thin SOI wafer

- TODAY
  - Stand alone thick SOI (15 to 40µm)
  - Planar accelerometer

- TOMORROW
  - MEMS & IC in a thin SOI layer (150nm)
  - Feasibility of embedded resonator with standard CMOS-SOI platform: from thick SOI to standard thin SOI wafer
  - TOMORROW
  - Stand alone thick SOI (15 to 40µm)
  - Planar accelerometer
WP5 - MIMOSA DISSEMINATION

More information available on the MIMOSA public website:
http://www.mimosa-fp6.com

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Thank you for your attention
Questions?