



# MEDical Remote MONitoring with cloTHes

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## Talk plan

Introduction

The MERMOTH system

Biosensors

Textile support

Signal and data processing and transfer

Project schedule

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# MEDical Remote MONitoring with cloTHes

## Introduction

(1/2)

Main objectives of the project :

- ✓ To develop a generic medical monitoring system based on a wearable comfortable garment, integrating smart biosensors
- ✓ For the prototypes, 2 applications representative of most markets:
  - clinical drug trials
  - medical academic research





# MEDical Remote MONitoring with cloTHes

## Introduction

(2/2)

- ✓ MERMOTH is a EC/IST/ FP6 funded project
- ✓ Consortium members: Centexbel (BE, coordinator); ADDS (FR); Delta Technologies (FR); Elasta (BE); I&IMS (SP); JBM (BE); NetSmart (GR);  
Tyndall National Institute/NMRC (IR)  
and TAM-Télésanté (FR)





# MEDical Remote MONitoring with cloTHes

## The MERMOTH system (1/2)

MERMOTH is not only a garment, but a real system with capability of feedback to the patient



# MEDical Remote MONitoring with cloTHes

## The MERMOTH system

(2/2)

### GARMENT

### PC PLATFORM

Sensors

Micro-controller



Pocket PC/PDA

Power supply

Data storage

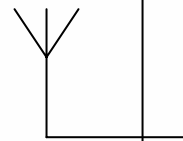
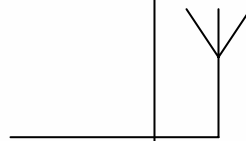
RF transceiver

Computer

Network

INTERNET

RF transceiver





# MEDical Remote MONitoring with cloTHes

## The biosensors

- ✓ A wide range of sensors may be integrated
- ✓ For the 2 first applications:
  - ECG (dry electrodes)
  - respiratory Inductance Plethysmography (RIP)
  - skin temperature
  - posture/activity (accelerometers)





# MEDical Remote MONitoring with cloTHes

## Textile support (1/3)

- ✓ Fully-fashion technology on a knitting machine
- ✓ Integration of the conductive yarns in the fabric by the machine
- ✓ Knitting of the ECG electrodes (3D shape) in the machine
- ✓ Comfortable stretchable garment



# MEDical Remote MONitoring with cloTHes

## Textile support (2/3)

Respiratory sensor : copper yarns crocheted in a polyester belt  
with rubber yarns





# MEDical Remote MONitoring with cloTHes

## Textile support (3/3)

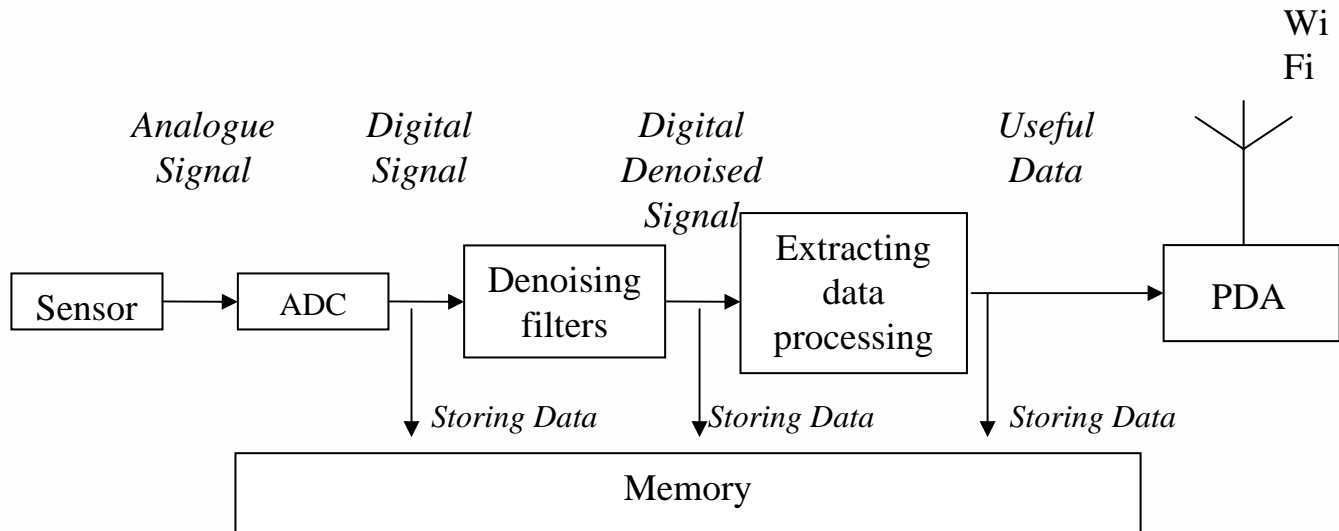
3 D shape ECG electrode ( knitted stainless yarns )



# MEDical Remote MONitoring with cloTHes

## Signal pre-processing and transfer (1/2)

Raw signals are pre-processed on a board located in the garment





# MEDical Remote MONitoring with cloTHes

## Data processing (2/2)

- ✓ Data are stored in a PDA connected to the garment, with a short range transceiver
- ✓ Data transferred via RF link are processed and displayed on a PC platform





# MEDical Remote MONitoring with cloTHes

## Data processing (2/2)

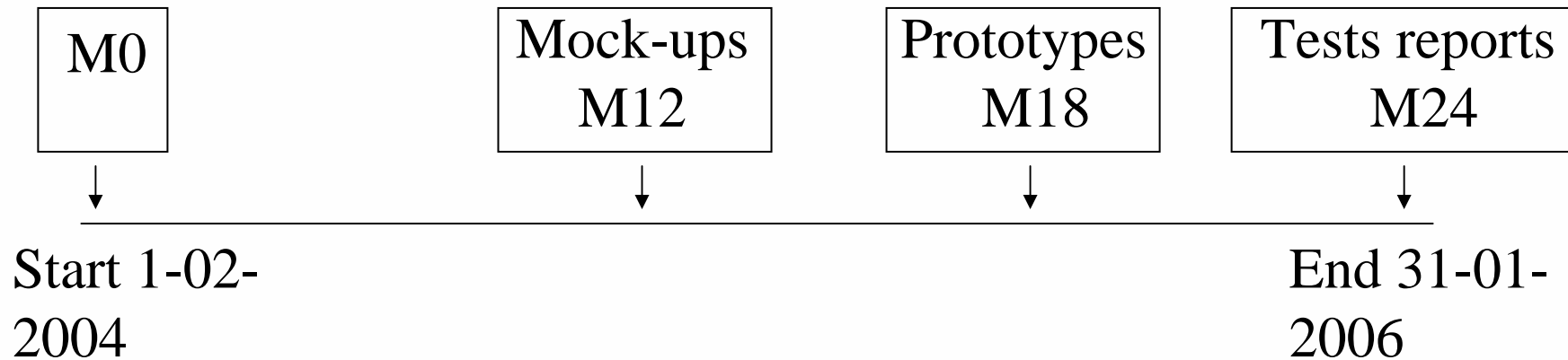
- ✓ Data are stored in a PDA connected to the garment, with a short range transceiver
- ✓ Data transferred via RF link are processed and displayed on a PC platform
- ✓ The PC platform hosts a data base, Web applications and INTERNET access.





# MEDical Remote MONitoring with cloTHes

## Project schedule





# MEDical Remote MONitoring with cloTHes

## First results

(1/4)

MERMOTH garment mock-up



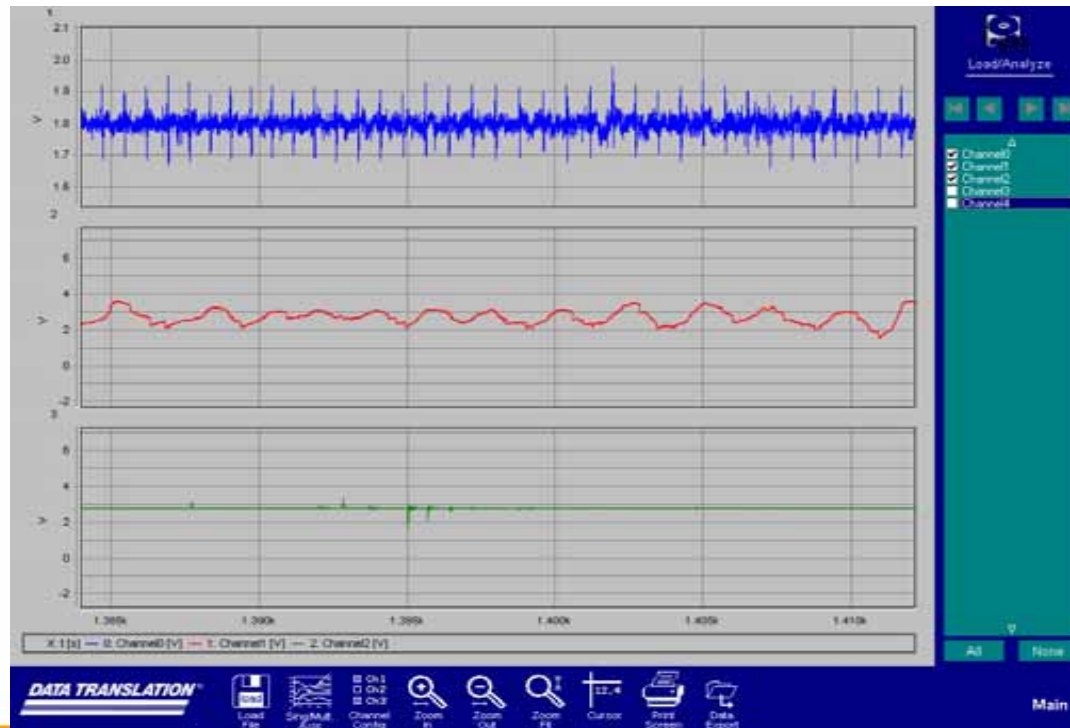


# MEdical Remote MOnitoring with cloTHes

First results

(2/4)

ECG, respiratory and activity





# MEDical Remote MONitoring with cloTHes

First results (3/4)  
ECG at rest



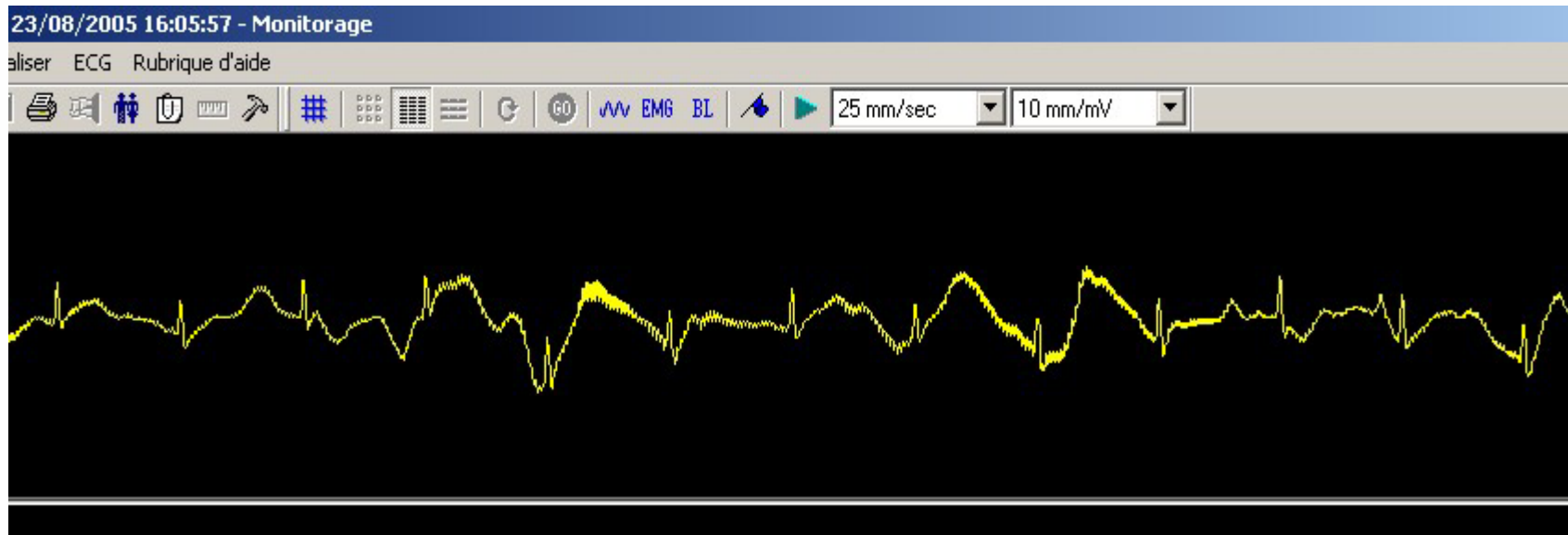


# MEDical Remote MONitoring with cloTHes

First results

(4/4)

## ECG while moving





# MEDical Remote MONitoring with cloTHes

## Conclusion

The MERMOTH consortium has developed a new generation of medical monitoring systems in ambulatory situations, with main features :

- ✓ comfortable
- ✓ easy to use
- ✓ dry electrodes
- ✓ low cost
- ✓ the concept is generic for many applications

