Inertial Sensing Systems for Advanced Chronic Condition Monitoring and Risk Prevention
Overview

• Devise person-centric healthcare solutions
  – For Chronic conditions (Elderly, COPD)
  – Home as care environment
  – Stimulate and encourage daily activities

• Real-time support for physical condition
  – Monitor
  – Self-manage
  – Improve

• Wireless sensor system
  – Inertial sensors on persons and in objects
  – Physiological sensors
  – Environmental sensors
Chronic obstructive pulmonary disease (COPD)

- Airflow limitation
  - Progressive
- Patients avoid doing activities
  - Shortness of breath
  - Fatigue
  - Feel scared
- WHO 2020
  - 5th illness worldwide
  - Mortality: 3rd cause
- Increase due to
  - Developing countries
  - New diseases (e.g. cardiovasc.)
  - Elderly people

- Coronary Heart Disease: -59%
- Stroke: -64%
- Other CVD: -35%
- COPD: +163%
- All Other Causes: -7%

Source: NHLBI/NIH/DHHS
The IS-ACTIVE approach

- **Stimulate and encourage activities**
  - Alone,
  - with training objects,
  - in a group
- **Monitor and evaluate activities**
  - In daily life indoor, outdoor
  - Training with objects
- **Give real-time feedback**
  - Motivation
  - Positive feedback
- **Wireless sensor system**
  - Body area network
  - Inertial sensors
  - Physiological
  - Environmental conditions
Goals

- **Effective sensing system for daily use**
  - Analyzes in real-time physical activity and condition
  - Helps to manage chronic conditions

- **Provide easy-to-use interface for patients**
  - Natural feedback
  - Self-management

- **Provide caregivers effective remote monitoring tool**

- **Prototype wireless sensing platform**
  - Hardware platforms and software packages
  - Algorithms
  - User interfacing and feedback

- **Field trials in three countries**
Challenges

- **Ad hoc deployment**
  - Spontaneous and dynamic composition of objects
  - Wireless sensor networking
- **Distributed activity recognition**
  - Self learning
- **Feedback mechanism**
  - Unobtrusive, yet effective
- **Diversity of patient groups**
  - Very different patient groups and expectations
Consortium

- University and Research
  - University of Twente (Netherlands)
  - Northern Research Institute (Norway)

- Industry
  - Inertia Technology (Netherlands)
  - Prosys (Romania)

- Medical Research
  - Roussingh (Netherlands)
  - Norwegian Centre for Telemedicine (Norway)
  - University Hospital Elias (Romania)
Contact

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