Biomedical Applications of Wireless Sensor Networks

Main Fields

What is imaginable?
- Replacement of biological sensors
- Patient Monitoring

Sensor Replacement

What sensors do we have?
- Ear → acoustic
- Eye → visual
- Tongue → chemical
- Skin → pressure
- Nose → chemical

What would make most sense to implement as application?
Artificial Retina (1)

- Developed by Team at Wayne State University

Artificial Retina (2)

- Processing Steps

Artificial Retina (3)

- A slightly different approach from the University of Duisburg (Germany)
Patient Monitoring (1)

- What is that?
  - Specific body features are measured over a longer amount of time
  - Smart Sensors allow immediate processing of data \(\rightarrow\) fast decisions

Patient Monitoring (2)

- Realized Applications
  - Heart Rate Monitoring (for ex. after a heart attack)
  - Breath Monitoring
  - Epileptic Attack Prevention
  - Stress Monitoring
  - Circadian Breathing Rhythm Analysis

Patient Monitoring (3)

- Lactate Monitoring (for ex. athletes, ...)
- Sensor for Immune System
- Cancer Detectors
- Glucose Level Monitor
- Monitoring of Gene Expression
Patient Monitoring (4)

- Supersystem for complete Surveillance
  - WISE

Patient Monitoring (6)

- Hardware for the WISE System

Patient Monitoring (7)

- Holter Device (Heart Activity Monitor)
  - measures anomalies
Patient Monitoring (8)

- Polar M32 Heart Rate Monitor
- For simpler applications

Patient Monitoring (9)

Patient Monitoring (10)

- Lactate Sensor:
Patient Monitoring (11)

Immune Sensor

Thank you