# Towards Supporting Contextual Privacy in Body Sensor Networks for Health Monitoring Service

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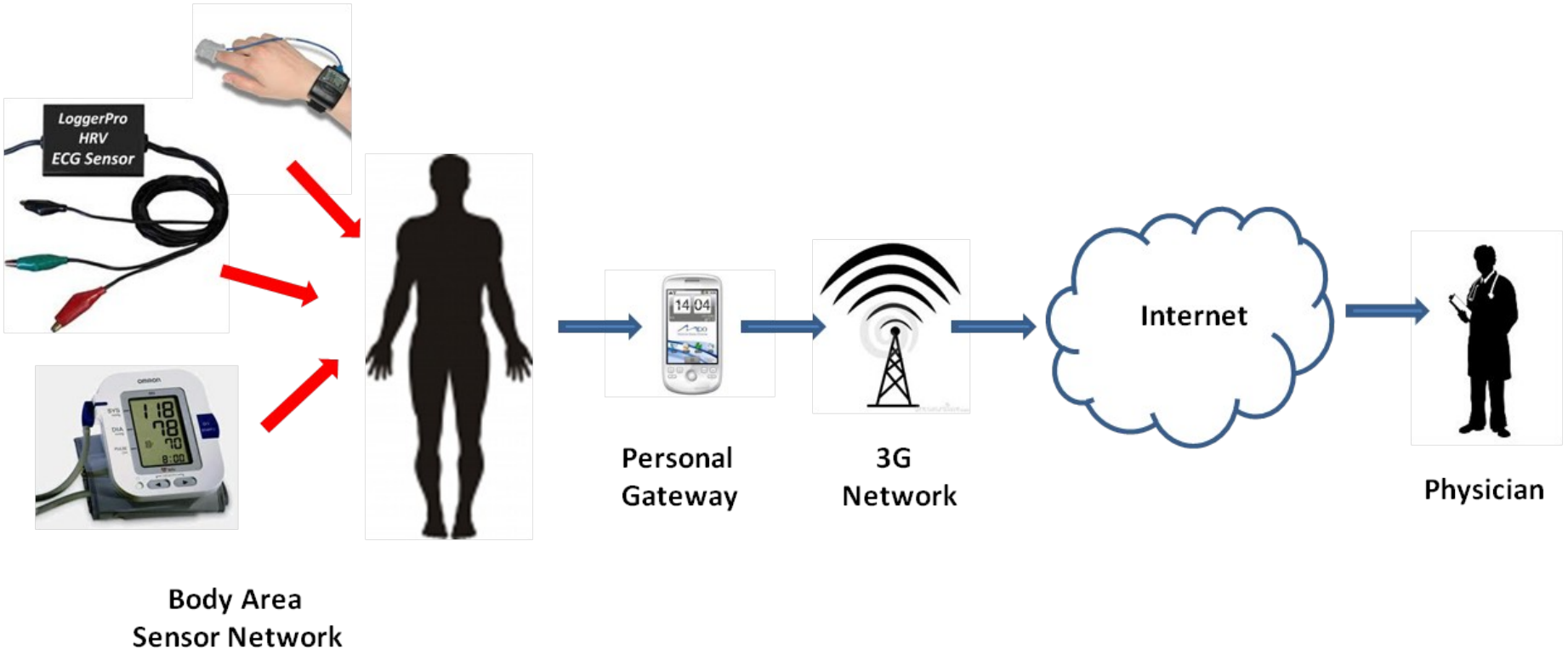
# Outline

- Introduction to Body Sensor Network (BSN)
- Continuous health monitoring using BSN
- Privacy Issues related to continuous health monitoring using BSN
- Challenges
- Our approaches
- Future work

# Introduction to Body Sensor Network

- Body sensor network (BSN) is a network of sensors attached to the human bodies
- Sensors are light-weighted, power efficient, and bounded with powerful processor and wireless communication interface
- Main application domain: **Continuous health monitoring** and logging vital parameters of patients suffering from chronic diseases such as diabetes, asthma and heart attacks

# Continuous health monitoring using BSN



# An Example: Cardiac Dysrhythmia Diagnosis

- Traditionally, cardiac dysrhythmia diagnosis is primarily based on scheduled evaluations at clinic visits
- Drawback: Fails to acquire patient's health information that can only be acquired in a natural environment, such as home or workplace

# An Example: Cardiac Dysrhythmia Diagnosis (Cont.)

- A electrocardiography (ECG) sensor is plugged into the BSN platform to continuously record the patient's heartbeat as he goes about his daily activities
- Motion sensors are used to recognize patient’s activities to better diagnose the causes of cardiac dysrhythmia
- However,  the introduction of motion sensors for activity tagging comes with privacy issues and chances for data misuses

# Privacy Issues

- Sensitive health data + continuous monitoring
  - More than enough data being collected
  - Data usage across many different roles/entities
  - Data misuse
  - Loss of control & lack of transparency

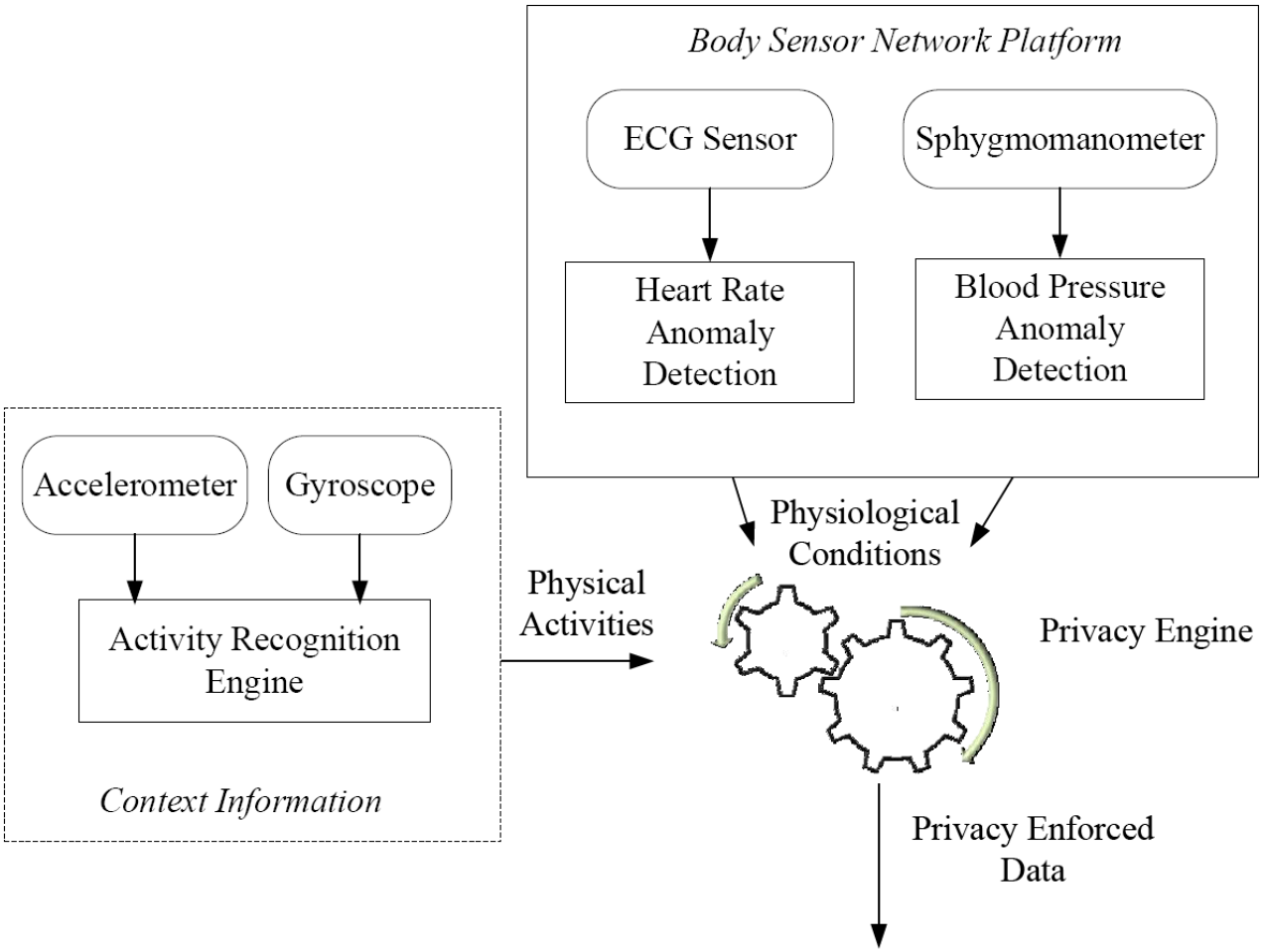
# Challenges

- Gap between data (system) and usage (application) and privacy concern (situation)
- Different definitions of privacy produce different approach
  - Preserving secrecy: data encryption
  - Hide identity : data anonymity
  - Context integrity: ?
- Privacy and context are inextricably linked: the practice of the former depends upon the **dynamics** and **heuristics** of the later – *Helen NissenBaum*

# Our approach

- Policy framework for contextual privacy
- Model “sensitive situation” using context information
  - Sensitive situation captures user’s perception of privacy
  - Application interacts with users when a situation is detected, and give awareness or annotate data with policy
  - System should adapt to changes of context (esp. those possibly lead to sensitive situation)
    - E.g. Update configuration for data collection

# Our approach



# Future Work

- Model situation to support specification of privacy concern in the policy
- Include “purpose” and “policy” specification into BSN configuration
  - <Data collection> in <granularity> from <sensor typed s> for <purpose>
  - if <situation> then apply <policy> to change BSN <configuration>
- Design privacy utility function for BSN application to balance functionality and privacy concern
- Extend P3P language to make use of context information and to specify situation of concern

# Questions ?