



# Human Body IoT

## Connected as Needed

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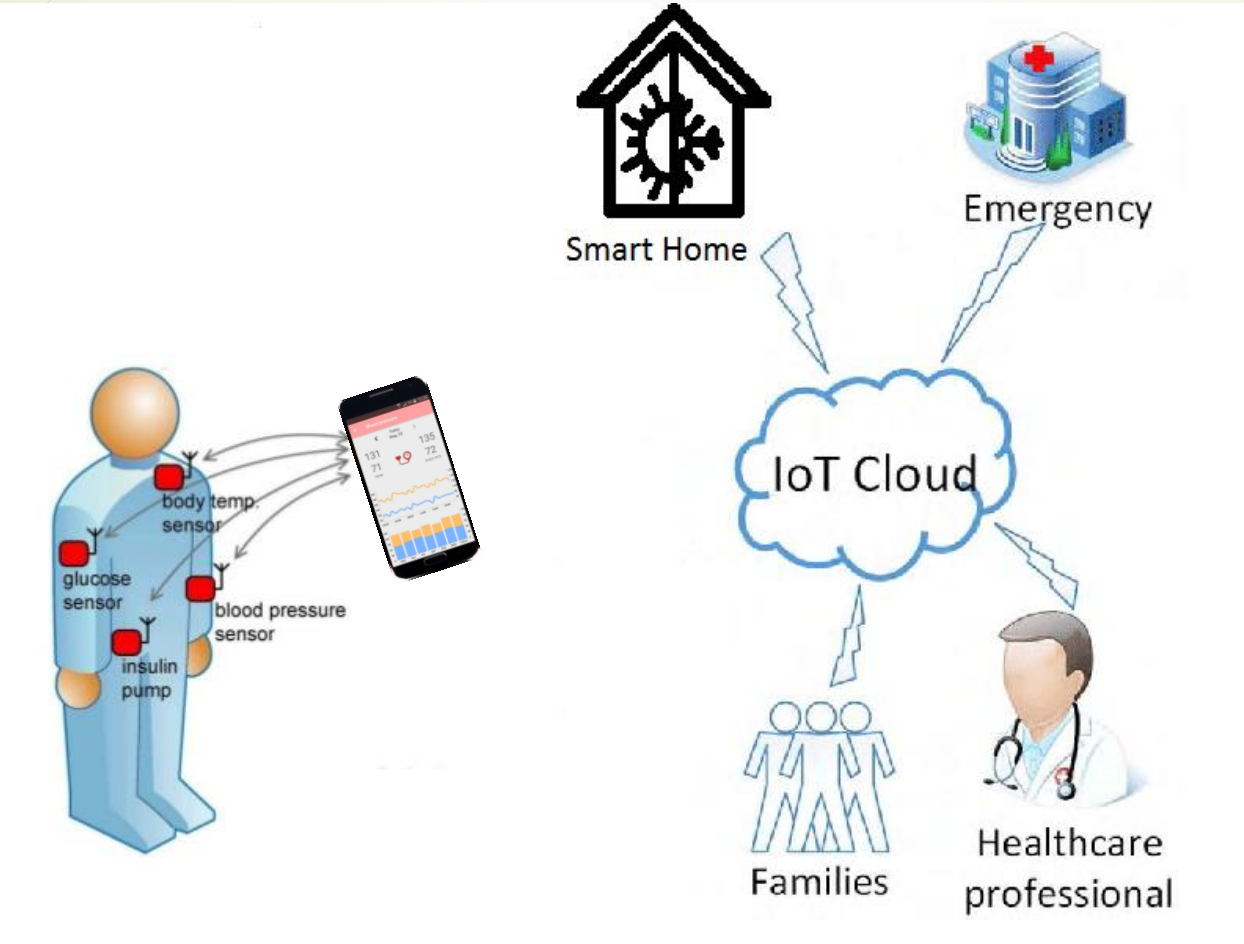
Lund Circuit Design Workshop 2018

# Human Body IoT

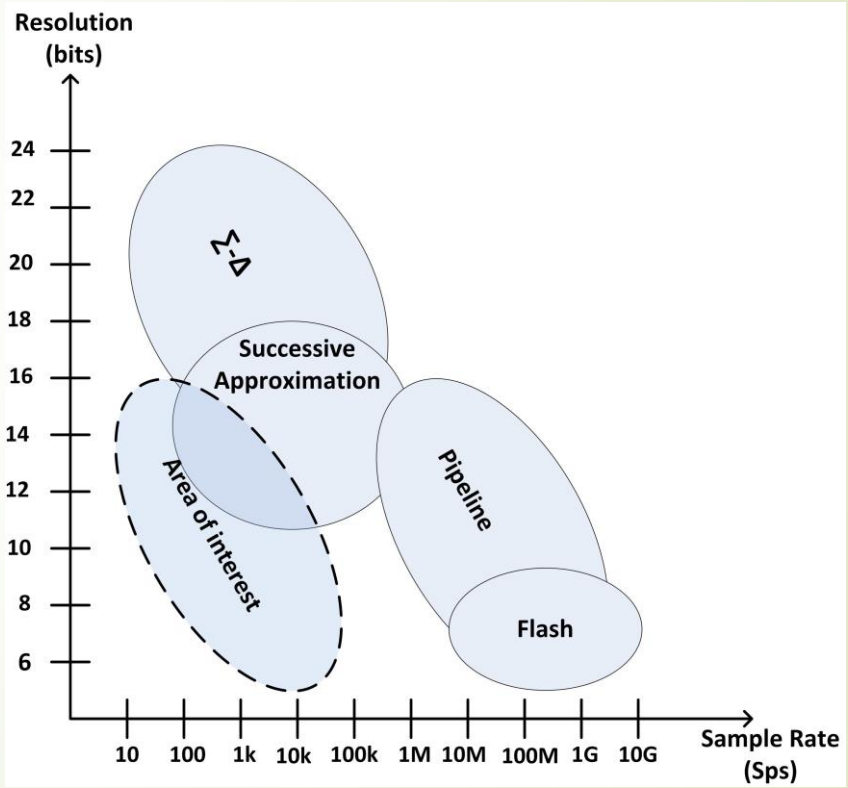


# As an example


Recreated from Leppänen, Simon, Patient user interface for future concept connecting data from wearables to healthcare, Master thesis, LU, 2017

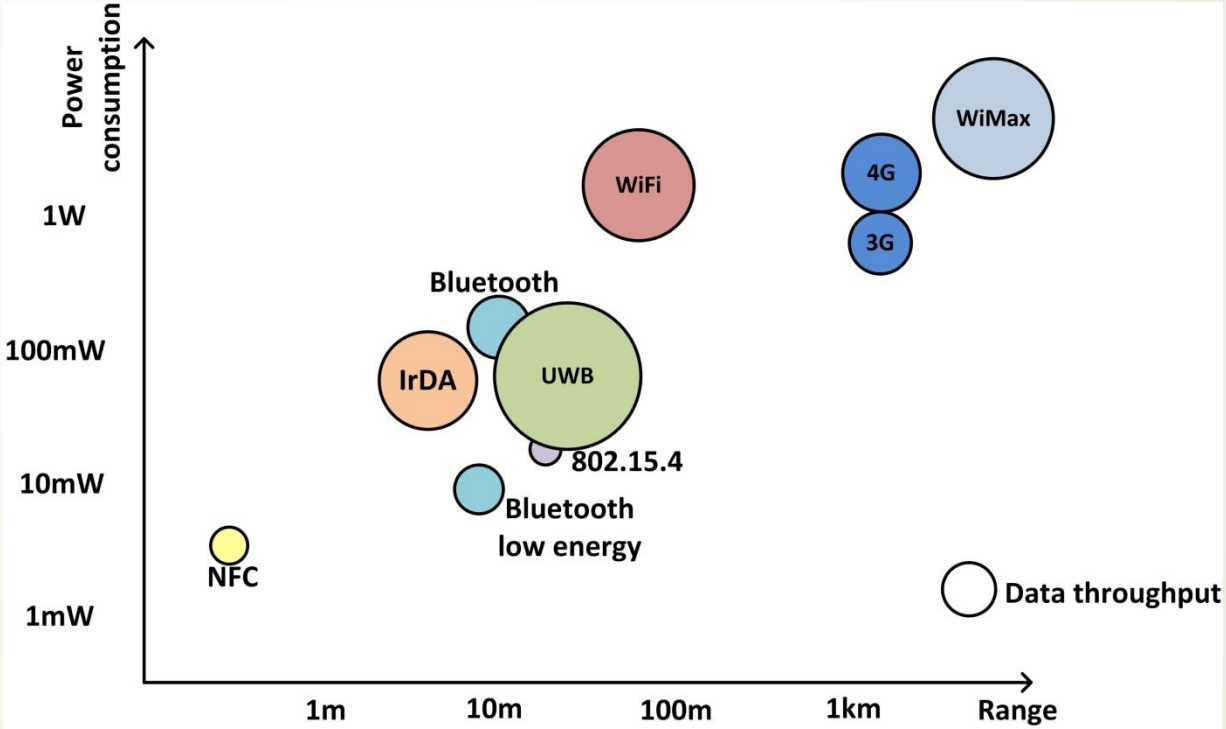
# Characteristics of Bio parameters

- Vital bio-parameters like heart rate, respiration, blood pressure, glucose level, temperature, electrocardiogram (ECG,EKG) and electroencephalogram (EEG:
  - Energy and power limited
  - Low data rate (1kbps-100kbps in most cases excluding ECG and EEG).
  - Very low duty cycle in a sense that measured data does not change rapidly




Modified from Kester, Walt. "Which ADC architecture is right for your application?" In EDA Tech Forum, vol. 2, no. 4, pp. 22-25. (2005).

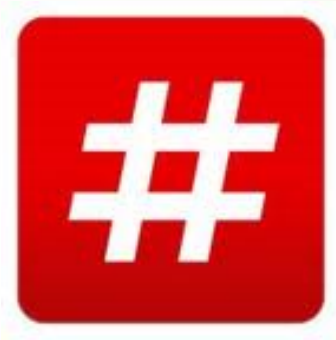
# Communication protocols




Lee, Jin-Shyan, Yu-Wei Su, and Chung-Chou Shen. "A comparative study of wireless protocols: Bluetooth, UWB, ZigBee, and Wi-Fi." In *Industrial Electronics Society, 2007. IECON 2007. 33rd Annual Conference of the IEEE*, pp. 46-51. IEEE, 2007.

# RFID - NFC

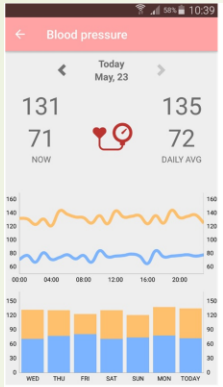

jojo
Jojo-kortet




ELECTRONIC
PASSPORT
Laminate
Person ID
RFID
label
Laminate
Processor
Antenna
Chip

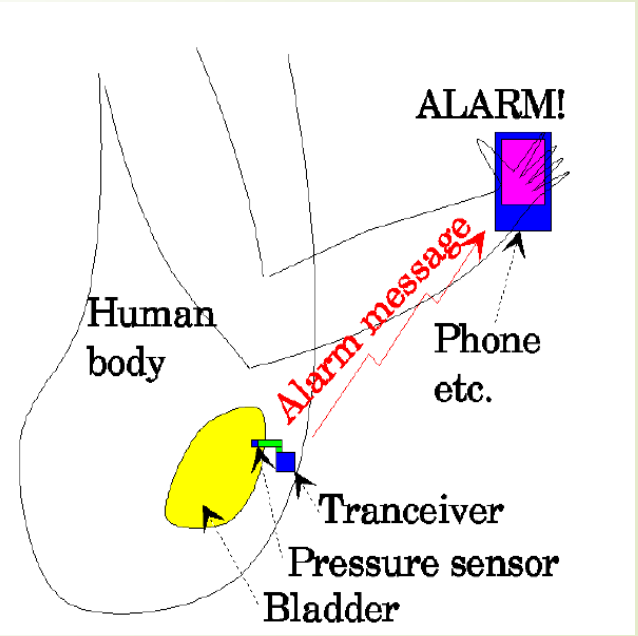

4253

# System architecture



# SUPRE project

- Cooperation between: UiO, SINTEF, Sunnaas Rehabilitation Hospital.
- Part of "Novel health service using implantable sensors connected to wireless applications"
- *SUbcutaneous PREssure sensor system*
- *2 solutions:*
  - the Medical Implant Communication Service (MICS)
  - Near Field Communication (NFC)



# Next

- On-chip NFC antenna.
- Ultra-low power (nW range) and very low data rate data converters.
- New sensors/actuators.

# Thank you