TOSHIBA
Leading Innovation

Introduction of SmartBAN experimental kit

Oct. 25, 2018

Hiro Tanaka[*,**]

* Telecommunications Research Lab., Toshiba Research Europe, ltd.
*** Graduate School of Information Sciences, Hiroshima City University

What is Body Area Network (BAN)?

Conventional Connection 1

Asynchronous wireless connections

Conventional Connection 2

Synchronous wired connections

SmartBAN

Synchronous wireless connections

Wireless Standards for Medical/Healthcare Applications

Standard	Standardization Body	Remarks
Bluetooth LE	Bluetooth SIG	
IEEE 802.15.6	IEEE	Published in Feb. , 2012
IEEE 802.15.4j	IEEE	Medical BAN in U.S.
IEEE 802.15.4n	IEEE	Chinese medical frequency band
Smart BAN	ETSI	New BAN for medical/healthcare

We proposed physical layer (PHY) and media access control (MAC) technologies to European Telecommunication Standard Institute (ETSI) and standardized PHY and MAC specifications.

1. ETSI TS 103 325 ,‘Smart Body Area Network (SmartBAN);Low Complexity Medium Access Control (MAC) for SmartBAN,’ ver. 1.1.1, Apr., 2015.
2. ETSI TS 103 326, ‘Smart Body Area Network (SmartBAN);Enhanced Ultra-Low Power Physical Layer,’ ver. 1.1.1, Apr., 2015.

Comparisons between SmartBAN and Other Schemes

	SmartBAN	IEEE802.15.6	BLE
Low power consumption	A	C	B
QoS optimization	A	B	C
Timely accessible mechanism	A	B	C
Co-existence	A	C	B
Synchronization	A	A	C

A: Supported in sufficient level
B: Supported
C: Supported in less sufficient level or not supported

Technical Requirements for SmartBAN (1)

1. Ultra Low Power Design

- HUB/Node Role Sharing
  - ✓ HUB takes care of MAC operation functionality as much as possible. Node operation is designed to be minimum.
- Simple Access Scheme
  - ✓ Minimum power consumption of node.
- Support Long Time Sleep Node
  - ✓ Sustainable connection of long-time sleep nodes
- Simple Star Network

Technical Requirements for SmartBAN (2)

2. Timely Accessible Mechanism

- Emergency Signal Transmission
  - ✓ Anytime possible to send.
- Smart Connection Setup
  - ✓ Minimizing setup time of multiple number of nodes.

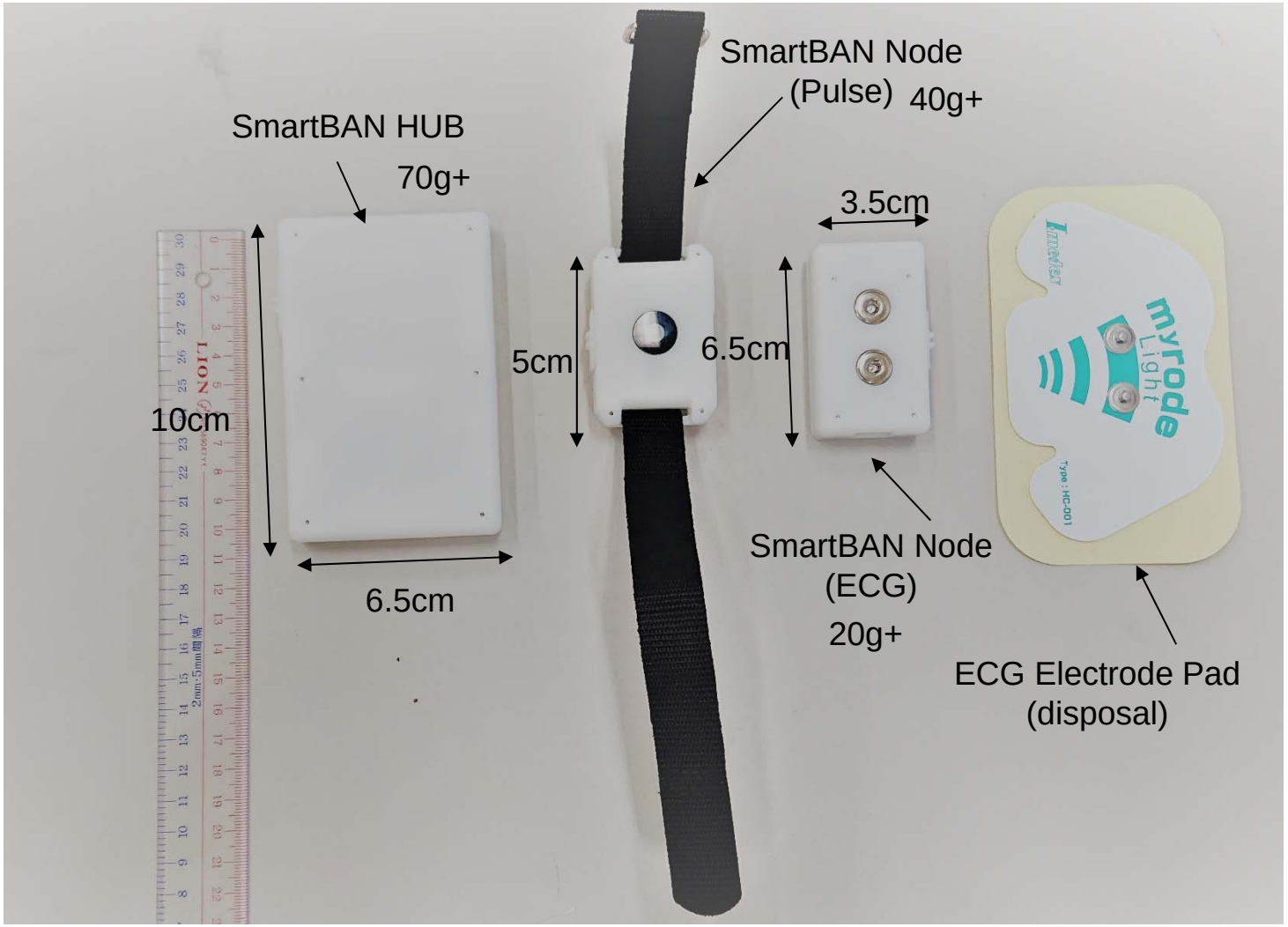
3. Co-existence Robustness

- Co-existence between HUBs
- Automatic interference avoidance between BANs using the same data channel

4. QoS Optimization Mechanism

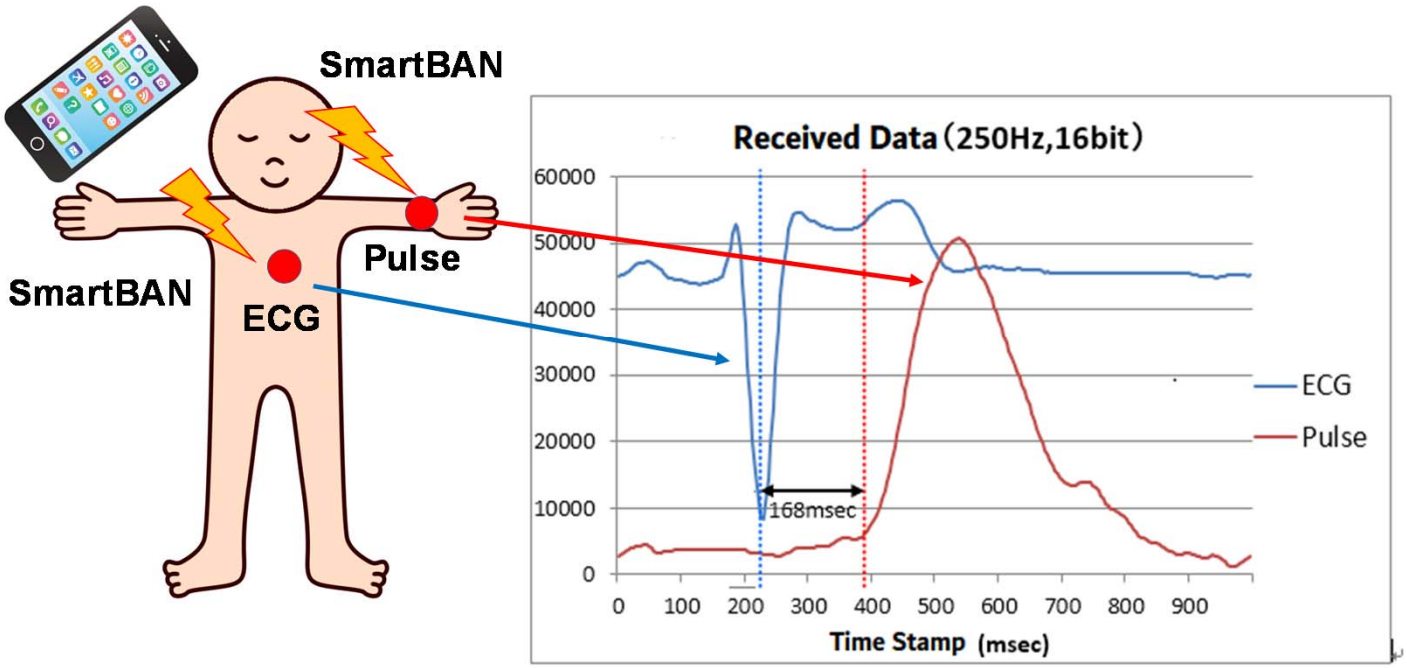
- Transmission in the required level of BER, latency, etc.

SmartBAN Experimental Kit



Blood Pressure Fluctuation Estimation Monitoring

The blood pressure fluctuation can be estimated by calculating the time difference between ECG and Pulse (Pulse Wave Traveling Time) [1].



[1] Hirokazu Tanaka, Yasutaka Hatakeyama, Tatsuya Komori, Satomi Saho and Nobuo Shiode, 'Evaluation of PWTT Based Blood Pressure Fluctuation using Body Area Network,' Proc. on IEEE Engineering in Medicine and Biology Society (EMBC'18),FrPos-30.44, #2836, Jul. 2018.


血圧変動常時監視アプリ
73
bpm
237
msec
血圧変動グラフ
心電
脈波

Thank you