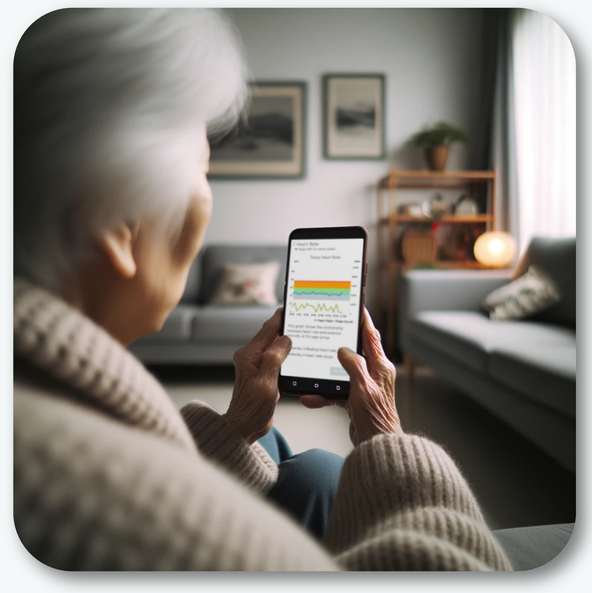
Multi-sensors Homecare System for Heart Health Monitoring with Consumer Wearables: Mobile Application



Highlights

Design and develop mobile application specifically for the ageing group

- Intuitive user interface and clear health status visualisation
- Simple functions and convenient operation
- Regular reminders of measurements and activity
- Data transmission to the edge for further analysis
- Follow medical protocols and provide mobile medical-grade heart monitoring

Background

Cardiovascular Disease Risk:

Happen frequently in the elderly, early diagnosis is significant prevention factor

Health Monitoring:

Shifting from hospital to home care and calling for long-term monitoring and regular health risk assessment

Current Software:

Mostly designed for fitness health monitoring, no guidance of professional medical knowledge and no consideration of the ageing group

Enabling Technology:

Wearable devices enable healthcare data collection outside hospitals

Normative Restraint:

Guidelines related to healthcare data and the development of healthcare applications

Target Group Analysis

Characteristic:

- Limited mobility to hospital
- Cognitive impairment
- Poor eyesight
- Slow acceptance of new technology

Requirement:

- Fundamental functions and simple user interface to provide usable and observant visualization
- Regular reminders for health monitoring and suggestions for activity

Research Question

Data Collection:

Can we enable data collection from consumer-grade wearable sensors and reach the security and safety required for healthcare data?

User Interface:

Can we combine intuitive interaction and essential functions?

Solution

Overall Output:

Develop an application with intuitive user interface and simple functions that can connect to different wearable devices and visualize health status

Real-time Data Collection:

Connect to the armband, the sphygmomanometer and the scale to collect vital signs and other health-related data constantly

Concise Functionality:

Reduce the unnecessary functions and only keep the core ones, which are easy for the eldering to operate.

Intuitive Interface:

Design simple interface that replacing abundant texts with color bars, graphs or vibration to indicate health status and notify users

Quality Assurance:

Extensive testing for the reliability, usability, security, safety and maintainability of the application

Social Impact

Improve Awareness:

Draw the ageing people's attention of long-term mobile health monitoring to detect the risk of cardiovascular disease

Software Design:

More concerns about considering the characteristics and deficiency of the elderly when designing and developing the software

Future Work:

Consideration for how to build a whole health monitoring system specifically for the ageing group

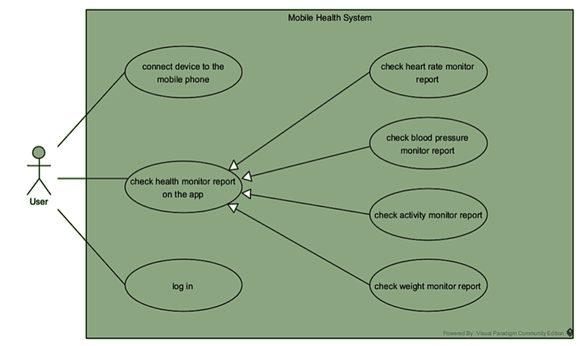


Fig 1. Use Case diagram of the application

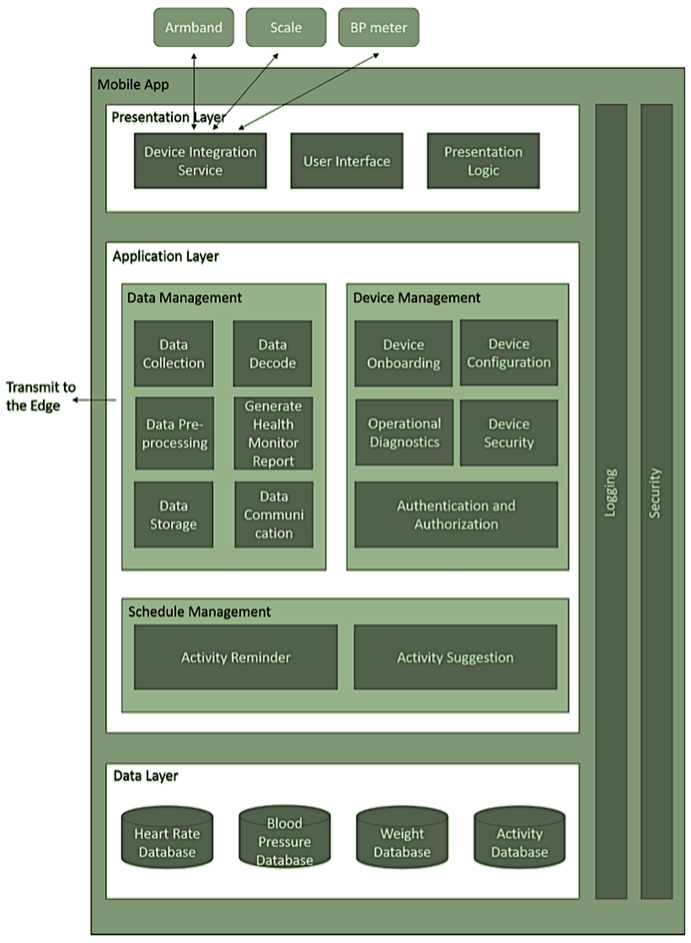


Fig 2. Architecture design of the mobile solution

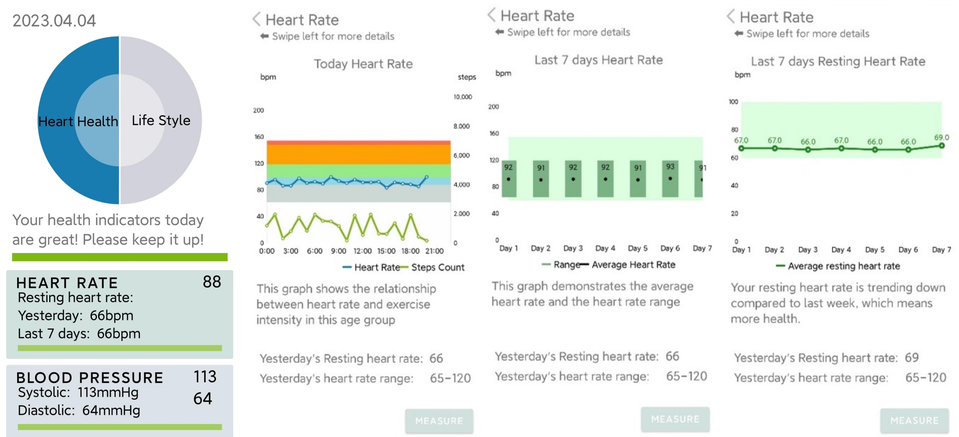


Fig 3. Intuitive interface of the application, including overall healthcare, heart rate and heart health, life style management, blood pressure management, etc.

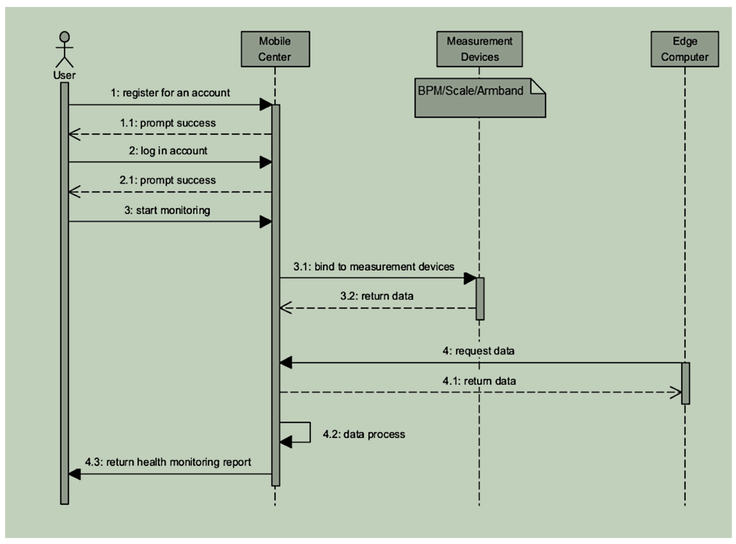


Fig 4. Sequence diagram of how the application interact with IoT or wearable sensors, and home edge server

Fig 5. Multi-sensors healthcare system, including personal mobile health terminal (where the app is running), wearable sensor, blood pressure, and scale

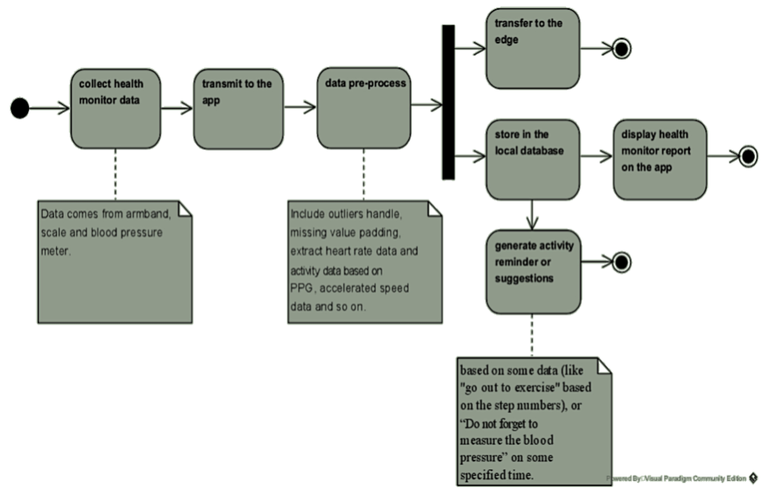


Fig 6. Activity diagram of the data collection and data transmission of the application with sensors and home edge server

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