At Home Health Monitoring System for Elderly Heart Surgery Patients through the use of Android Applications with Wireless Biomedical Sensors

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Introduction

One of the many challenges that society is faced with is caring for the ever growing population of elderly citizens. In the U.S. alone it is expected that the number of senior citizens will double in size within the next 25 years. This will have a noticeable effect on hospitals and senior care centers, which may become encumbered for lack of space and personnel to attend to the special needs of each individual patient.

Purpose

Design an Android application that works as a home monitoring system for senior citizens that have undergone heart surgery.

The system should be able to:

- Monitor and track a patient’s health activities.
- Send up-to-date time lines of the patient’s progress and their body’s response to the treatment.
- Alert hospitals, doctors and family members if there’s an abrupt change in the patient’s vital signs so they can receive immediate attention.

Design

Withings Pulse

- A device that gathers a patient’s blood oxygen saturation.
- It sends and measures respiratory rate through the skin.

Withings Blood Pressure

- The Withings Blood Pressure cuff measures a patient’s blood pressure and heart rate.

Technologies

- Withings Pulse is a device that gathers a patient’s blood oxygen saturation.
- It sends and measures respiratory rate through the skin.
- The Withings Blood Pressure cuff measures a patient’s blood pressure and heart rate.
- Android is a Linux-based operating system for smartphones and tablets.
- Java is the programming language used for creating Android applications which are free to develop.

Results

Phase 1 – Search for Sensors

Common Vital Signs used for Patient Monitoring

- Heart Rate (HR)
- Blood Pressure (BP)
- Electrocardiograph (ECG)
- Blood Oxygen Saturation (SpO2)
- Body Temperature
- Respiratory Rate (RR)

Withings Sensors where chosen because they:

- Are non-invasive technology
- Have Bluetooth 4.0 communication
- Have an open API
- Measure HR, BP, SpO2
- Connect to Android devices

Phase 2 – Retrieve Sensor Data

User uses health sensors.

Withings Sensors

1. Collects data
2. Sends data to Withings server
3. Sends results in JSON format

Withings Server

1. Extracts data
2. Sends results in JSON format

EHR Server

1. Receives data
2. Sends data into the health app

Health App

1. Requests data
2. Processes data into separate values

Health Sensors

1. Sends data
2. Receives requests

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Conclusions

- Identified non-invasive wireless sensors with open APIs.
- Commercial sensors do not allow for the Android device to read their data.
- Android device transfers the data directly to sensor’s own servers.
- The sensors save all readings in an internal memory.

References

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