Remote Monitoring Project

DATA BOOK

Intro

The Remote Monitoring project is aimed at providing remote homecare to elderly people. The system uses 24h real time location information to detect risk situations (falls, loss of consciousness) and alert the user, his family, or health care providers.

Sensors and set up

To collect the location data we use:

- 1 beacon attached to the user
- 4 to 6 static sensors, connecting to the beacon and sending the power signal to a gateway
- A gateway collecting the sensors data and sending them to a SQL database via wifi or GSM
- A set of algorithms to process the signals and to extract meaningful information from it

Usually the user has the beacon attached to his body 24h. All users have at least four sensors located at: living room, kitchen, bedroom, bathroom. Some users have two additional sensors located in other rooms (we call these rooms custom1 and custom2).

The sensors are BLE emmiters and receptors. They get a signal from the beacon and then send to the gateway data on the signal strength (RSSI). The RSSI data unit is dB, and the values range from roughly -30 dB (maximum strength) to -100 dB. The closer the beacon to a sensor, the biggest RSSI value.

The sensors check the beacon status every 2-3 seconds and then send the RSSI readings to the gateway. Every 10 seconds the gateway writes to the database the average RSSI value from each sensor for the previous 10 seconds.

Reading all the RSSI values at a given time we can infer the approximate location of the user. Looking at the changes in the readings we can infer if the user is moving or not.

The data set

The data set rssi_data.csv includes the data from 12 users during one week (from 2017-01-15 to 2017-01-21).

The variables are:

user_id: A number from 1 to 12 to identify every user

room_1: RSSI value from the living room sensor

room_2: RSSI value from the kitchen sensor

room_3: RSSI value from the bedroom sensor

room_4: RSSI value from the bathroom sensor

room_5: RSSI value from the first custom room sensor

room_6: RSSI value from the second custom room sensor

datetime: Date and time of the reading

A NA value in any of the room variable could mean:

a. The beacon is too far from the sensor, so the BLE signal does not reach the sensor, or

b. The reading has not reached the gateway for any reason (packet collision, sensor errors, gateway errors, etc.), or

c. There has been some error when sending the data from the gateway to the data base or when writing the values into the data base.