Body parameter sensing based thermostat control

HARSHA BASAVARAJ
NISHANT BHASKAR
Motivation

- Context aware health monitoring opens up huge opportunity in area of biomedical informatics and building energy efficient systems.
- Context awareness helps in making informed and accurate decisions.
- The existing system works appropriately but there are some disadvantages to the existing setup. There is no feedback from the user to gauge the comfort level to the temperature setting.
- The context aware data can serve different purposes in patient health monitoring, security and other smart applications.
Setup
Hardware Software

Read ADC for sensor values from the body monitoring unit.

Filter the values and QRS detection for heart beat pulse.

Identify the source and the data, calculate setpoint for thermostat.

Check for variations and transmit the sensor data to gateway.

Push data to cloud, alert user if needed and also set the thermostat.
Results and Findings

- We have a mesh network with Xbee gateway, mesh is used for communication between the nodes.
- The gateway communicates the relevant data to Carriots cloud which has an alert system which alerts the user by sending an email.
- The body vitals when collected over a certain period of time will be an invaluable asset in case of creating a medical profile of a person.
- Heart rate is correlated to skin temperature.
- Combining heart rate and temperature doesn’t yield many benefits.
- Our motive was to explore the possibility of developing context.
- Pulse rate tough is a vital sign in medical diagnosis, but the context can be better evaluated using strength and equality of the pulse than with just rate, but diagnosing those characteristics on a low power low profile device is difficult.
- The core body temperature varies across the anatomically locations it is measured at. The requirement is to probably run long term testing to find out most appropriate test points.
### Few Findings

<table>
<thead>
<tr>
<th>Action</th>
<th>Heart rate</th>
<th>Body Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sleeping</td>
<td>60-90</td>
<td>97-99 F</td>
</tr>
<tr>
<td>Post Exercise</td>
<td>120-180</td>
<td>Upto 105 F</td>
</tr>
<tr>
<td>Normal state</td>
<td>70-100</td>
<td>97-99 F</td>
</tr>
</tbody>
</table>
http://connect.jbiconnectplus.org/viewsourcefile.aspx?0=4309

http://publicationslist.org/data/m.elliott/ref-22/The%20eight%20vital%20signs%20of%20patient%20monitoring.pdf

http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3410956/
