Smart-Pillow: A Stress Monitoring System through the IoT

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Abstract

- Quality of sleep during the night reflects the productivity of the day.
- Lack of sleep, anxiety, work tensions, and improper food consumption could be some stressors which trigger stress hormones.
- Uncontrollable or unmonitored sleep variations during the night can lead to a disturbed productivity during the day.

Problem Overview

- Sleep apnea, also known as lack of sleep, is one of the major reasons that cause fluctuations in the stress levels of a person.
- Acknowledging the variations of sleep without help is considered as the main problem here.

Research Work

- In the Smart-Pillow system, data are collected from a pillow and a wearable and are transmitted, stored and processed in the cloud.
- The processed data is then sent back to the wearable and also to a mobile application based upon convenience.

Analyses and Results

Parametrized Ranging of Smart-Pillow

<table>
<thead>
<tr>
<th>Number of Hours</th>
<th>Snoring Range (dB)</th>
<th>Respiration Rate (bpm)</th>
<th>Heart Rate (bpm)</th>
<th>Stress State</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-7</td>
<td>50-80</td>
<td>17-22</td>
<td>54-64</td>
<td>LSS, MLSS, MSS</td>
</tr>
<tr>
<td>4-6</td>
<td>80-89</td>
<td>23-25</td>
<td>65-70</td>
<td>MHSS</td>
</tr>
<tr>
<td>0-4</td>
<td>90+</td>
<td>25+</td>
<td>70+</td>
<td>HSS</td>
</tr>
</tbody>
</table>

Conclusion

- A system-level design of the proposed system is prototyped in the Simulink® framework. The proposed system gives an overall efficiency of 91%.

References