Smart-Pillow: A Stress Monitoring System through the IoT

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The quality of sleep during the night reflects on the productivity of the day. To make the most of the day, understanding the reasons behind stress is important. Technology should be able to help a person self analyze the situation and for this we propose a system which helps in analyzing the stress variations during the day by considering the sleeping habits. Physiological parameters such as temperature, blood pressure, respiration rate, and heart rate tend to vary during the NREM (Non Rapid Eye Movement) and REM (Rapid Eye Movement) stages of sleep. Non-physiological parameters such as the number of sleeping hours, the audible range of snoring, the sleeping position, and environmental conditions through the sleep can also affect the quality of sleep.

Fig. 1: Basic Architecture of Smart-Pillow System.

In this research we propose a stress management system (Refer Fig. 1), Smart-Pillow, which analyzes stress in a person during the day by considering the sleeping parameters. The number of hours of sleep, the audible range of snoring, respiratory rate and heart rate are the factors considered here in order to analyze the sleeping habits. The data collected from the sensors used are transmitted to the cloud where the processing is done. Thus, using the IoT, a system is defined which can classify the stress levels to five states: High stress, Medium-high stress, Medium stress, Medium-Low stress and Low stress.

This proposed system helps in keeping the individual self-aware and gives feedback to allow changes in the lifestyle of the person to lead a healthy life. It also helps in maintaining a healthy life balance and warns the user before being too much affected by the negative effects of stress. A system level design of the proposed system is prototyped in the Simulink® framework. The proposed system gives an overall efficiency of 91%.