



SLEEP GUARDIAN

AN RF-BASED SYSTEM GUARDING YOUR SLEEP

We propose SleepGuardian, an RF-based system monitoring various types of fine-grained information, including respiratory rate and heart rate, to provide accurate and automatic sleep monitoring services for older adults.

It has two key merits. Firstly, it is cost-effective since the low-cost WiFi infrastructure is widely accessible nowadays. Secondly, sleep monitoring via wireless signals is nonintrusive and unnoticeable for targets, suitable for older adults.

More specifically, the SleepGuardian automatically collects the Channel State Information (CSI) from commodity WiFi devices. It then exploits the inherent characteristics of channel data on the intervene from a sleeping person to monitor this person's sleeping postures and vital signs, including respiratory rate and heart rate. The SleepGuardian thus offers an offline sleep logging service and an online abnormality warning service. The offline service provides a fine-grained sleep log like respiratory rate and heart rate, timing, bedtime regularity, sleep onset, and nighttime awakenings. The online service keeps guarding the subject for any abnormal behaviors during sleep like intensive body twitches and a sudden seizure attack. Once an abnormality happens, it will automatically warn the designated contacts like a nearby emergency room or a close-by relative.

We prototype SleepGuardian with low-cost WiFi devices and evaluate them in real scenarios. Experiments show that SleepGuardian delivers desirable results.

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