Sleep presents a third of human life and a healthy and restorative sleep is indispensable for a good performance during daytime. Human functions follow circadian rhythms and follow the need to relax and recover from daytime stressors. According to human senses and abilities this relaxation and recovery period is concentrated on nighttime. Sleep is shutting off senses and follow a dedicated program for recovery with light sleep, deep sleep and rapid eye movement sleep with different functions linked to these sleep phases and with different consequences for the physical and mental functions. Unfortunately in patients with sleep disorders this recovery program is disturbed.

In order to identify reasons and in order to explore physical and mental problems related to this, sleep studies had been developed and are conducted in sleep medicine centers. Sleep medicine centers perform a cardiorespiratory polysomnography. During cardiorespiratory polysomnography brain functions and sleep stages are quantified through assessing electroencephalography (EEG), electrooculography (EOG), electromyography (EMG) on the head and on the legs, electrocardiography (ECG), respiratory airflow, respiratory effort, oxygen concentration (SaO2), body position, and body movements. Because going to bed to find sleep is a behavioral action as well, we record video and sound in addition. This is done under laboratory conditions in a controlled and supervised setting, called sleep medicine center.

Sleep disorders can be identified and are classified into six categories: insomnia, hypersomnia of central origin, sleep related breathing disorders, sleep related movement disorders, sleep-wake rhythm disorders, and parasomnias. In addition secondary sleep disorders due to medical or mental problems or due to substances or drugs are known as well.

Due to the high prevalence of sleep disorders and sleep complaints there is an urgent need to develop and introduce simplified tools to identify sleep problems. For some sleep disorders portable recorder systems were developed. This is the case for sleep disordered breathing. For insomnia problems and sleep-wake rhythm disorders actigraphy systems are used. Only based on the recording of movement and motion using statistical analysis it is possible to distinguish sleep and wake with a good accuracy and reliability. This method is used to study sleep duration as well as sleep fragmentation to some extent. A study on sleep duration and impaired sleep in ballet dancers over a period of 60 days prior to a major premiere event is presented.