QUICK REFERENCE GUIDE

AASM
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SLEEP MEDICINE™

GLOSSARY OF TERMS

Accelerometer

A device that measures changes in gravitational acceleration in a device it may be installed in. Accelerometers are used to measure acceleration, tilt, and vibration in numerous devices.

Actigraphy

The use of a three-axis accelerometry and algorithms to estimate activity and sleep

AHI in PSG and HSAT

For apnea testing with sleep monitoring (such as lab polysomnography or PSG), Apnea Hypopnea Index (AHI) is a calculation based on the total number of apneas (complete airway airflow cessation) plus hypopneas (partial airway airflow cessation) per hour of sleep time.

For apnea testing without sleep monitoring (such as home sleep apnea testing or HSAT devices), the AHI calculation is based on the total number of apneas and hypopneas per hour of recording time (instead of true sleep time).

Clinically, AHI is used to assess the degree of apnea.

Android

Mobile operating system developed by Google for use with mobile devices such as smartphones and tablets, and now for televisions and cars.

API output capable

Application Programming Interface, such as an app on your smartphone. APIs operate on an agreement of inputs and outputs.

App

An application, typically a small, specialized program downloaded onto mobile devices

Ballistocardiography	Non-invasive method based on the measurement of whole-body movement generated by the ejection of the blood at each cardiac cycle. *(Source: Conf Proc IEEE Eng Med Biol Soc. 2011; 2011: 4279–4282. doi:10.1109/ IEMBS.2011.6091062)*
Bluetooth	A short range wireless communications technology to allow transfer of data between connected devices
Fitness tracker	A wrist-worn device that can detect some combination of walking steps, running distance, heart rate, sleep patterns and swimming laps
Gyroscope	Measures the rate of rotation in space (roll, pitch, and yaw). Microelectronic mechanical systems (MEMS) sensor gyroscope technology measures angular rates in 3 perpendicular axes
Heart rate variability	An umbrella term for many different calculations and analysis methods to measure specific changes in time between successive heartbeats, to aid in understanding autonomic nervous system activity
iOS	Mobile operating program created by Apple, Inc. for use with its mobile devices such as smartphones and tablets
Nearables	Describes the idea of smart objects – everyday items with small, wireless computing devices attached to them. Those devices can be equipped with a variety of sensors and work as transmitters to broadcast digital data, usually using Bluetooth Smart protocol. Thanks to that, those objects can provide mobile devices in range with information about their location, state, and immediate surroundings. The word 'nearables' is a reference to wearable technology - electronic devices worn as part of clothing or jewelry
Photodiode	A semiconductor device/one way switch that converts a light signal to an electrical signal for a specific application
Photoplethysmography (PPG):	Sensors use red and infrared light-emitting diodes (LED) to optically detect blood volume changes in the microvascular bed and determine pulse rate. *(Source: Tamura et al. Wearable photoplethysmographic sensors past and present. Open Access Electronics 2014, 3(2), 282-302)*

Pitch	Rotation around the side-to-side axis, e.g., the tail of the plane tips up when the nose of the plane tips down
Plethysmography	The measurement of volume
Psychoacoustics	The study of the perception of sound, its psychological response, and its physiologic impact
Roll	Rotation around the front-to-back axis, e.g., one wing of a plane tips up while the other wing tips down
Semiconductor	A material which has electrical conductivity between that of a conductor and that of an insulator; they are the foundation of modern electronics
Sleep tracker	A device which typically incorporates motion sensors to track how long and how well a person sleeps
Smartphone	A cellular phone combined with a handheld computer. A typical smart phone has a high-resolution touch screen display, WiFi connectivity, Web browsing capabilities, and the ability to accept sophisticated applications
Snoring	A rough rattling noise made on inspiration during sleep by vibration of the soft palate and the uvula
Snoring measurement	Most typically assessed with a type of acoustic microphone and analyzed via specific algorithms
Standalone device/ non-wearable	Technology that is placed near the user without being worn on the body
Wearable	Relating to or noting a computer or advanced electronic device that is incorporated into an accessory worn on the body or an item of clothing: wearable technology
Yaw	Rotation around the vertical axis, e.g., the plane turns right or left.

SENSOR DEFINITION LANGUAGE

CST accelerometers

- Uses a piezoelectric sensor that produces a voltage signal in response to movement (Chen 2005)
- Now miniaturized by microelectromechanical system (MEMS) technology
- Acceleration is typically recorded in 3-axes (tri-axial) and expressed in units of g (1g = 9.8m/s2), but then further processed into activity count data. (Chen 2005)

CST photoplethysmography

- Pulse rate is determined at the dorsal aspect of the wrist through photoplethysmography (PPG).
- PPG is an optical technique that quantifies blood volume changes which has been validated to accurately measure heart rate in multiple contexts. (Castaneda 2018, Pereira 2020)
- Data from PPG measured pulse rate used as a surrogate for other values typically derived from electro-cardiogram (such as heart rate variability). (Castaneda 2018, Pereira 2020)
- In some CSTs, algorithms are applied to PPG heart rate to indirectly estimate respiratory rate based on the known relationship between heart rate and respiration. (Charlton 2016)
- PPG is also a well-accepted method to measure blood oxygen saturation (on the fingertip in the clinical context) and recently, this feature has been activated in certain wrist-worn CSTs such that blood oxygen saturations can be extracted from the PPG sensor at the dorsum of the wrist.

REFERENCES

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