User-Friendly Wearable technology for monitoring sleep and circadian rhythm.

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Abstract

One of the most promising research areas for user-friendly wearable technology for monitoring sleep and circadian rhythms is the development of **non-invasive, comfortable, and accurate sensors that can be seamlessly integrated into everyday life.**

One approach that has shown great potential is the use of **optical sensors that can measure changes in skin blood flow and oxygenation levels to monitor sleep and circadian rhythms**. These sensors can be embedded into **wearable devices such as smartwatches, wristbands, or even clothing**, and can provide continuous and real-time monitoring of sleep patterns, including the timing and quality of sleep, as well as the duration of different sleep stages.

Another promising area of research is the **use of machine learning algorithms and artificial intelligence to analyze the data collected** by wearable devices and provide personalized insights and recommendations to improve sleep quality and promote healthy circadian rhythms. For example, these algorithms could use data from sensors to identify patterns in sleep behavior, such as changes in heart rate or breathing rate, and use this information to predict when a person is likely to feel tired or experience difficulties sleeping.

Overall, the development of user-friendly wearable technology for monitoring sleep and circadian rhythms has the potential to revolutionize the way we understand and manage our sleep and wake cycles, leading to improved health and wellbeing for millions of people around the world.

Objectives

- To showcase the superiority of smartwatches as user-friendly wearable technology for monitoring sleep and circadian rhythm and educate the audience about the benefits of using smartwatches for sleep tracking.

- To Review options available and discover how can we improve options on the market

Methods

To use case studies: analysis of a particular product and its performance wearable technology for sleep monitoring.

Existing laboratory studies: Laboratory studies involve collecting physiological data in a controlled environment, such as a sleep laboratory. This method can provide objective measures of sleep and circadian rhythm, as well as data on the accuracy of wearable technology for monitoring these parameters.

List of devices:

Oura Ring: The Oura Ring is a small, lightweight ring that tracks your sleep and provides insights on your circadian rhythm. It also offers personalized recommendations for improving your sleep and overall health.

Smart Watch/ Fitbit: Devices has sleep tracking capabilities and can monitor your circadian rhythm. It offers a variety of health and fitness features and can even detect when you are washing your hands to encourage good hygiene.

Headband / Muse S – The Muse S headband is a robust sleep tracker that includes EEG readings on top of sensors that monitor standard metrics such as time awake and asleep, position changes, and heart and breathing rates. This device could be a good fit if you are an active meditator, especially if you enjoy guided meditation.

**FitBit/ SmartWatch**
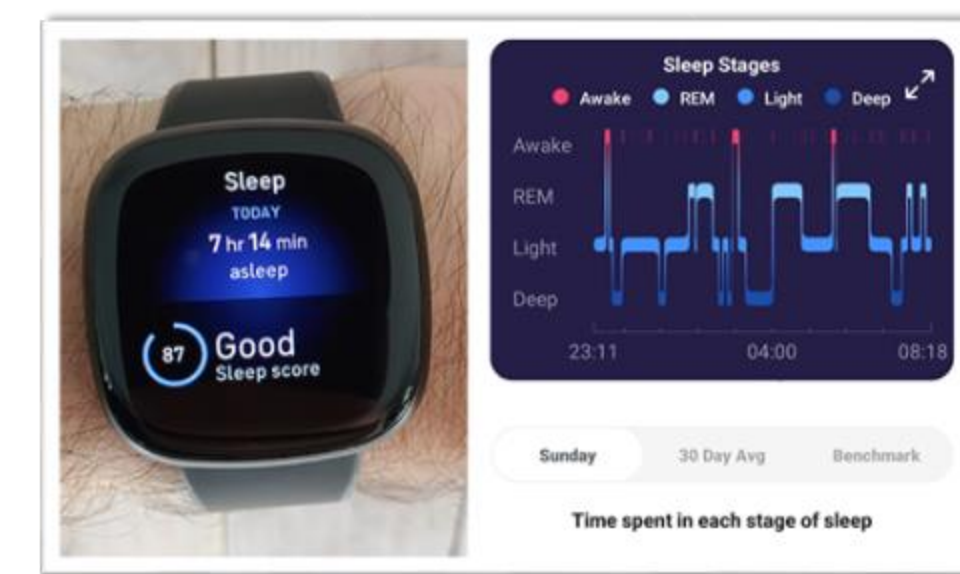
Oura Ring

Headband/ Muse S

Earbuds/Zenbuds

Results

Comparing Products

|	Oura Ring	Headband/ Muse S	Smart Watch	Earbuds
Comfort / Easy to use	Easy to use/ user-friendly	Has some challenges	Easy to use, some battery challenges	Easy to use, not sleep-friendly
Accuracy	Good accuracy	Accuracy problems	Good accuracy	Accuracy problems
Financial/ Price / Upkeep	$299 price upfront	$220-$399	$100	$150
Battery	4 to 7 days	10 hours	Up to 10 days	12 hours
Challenges	May not be as accurate	Battery issues (not long enough)	Some allergy for the band/	lack a heart-rate sensor, they can't differentiate between REM and deep sleep

Conclusion
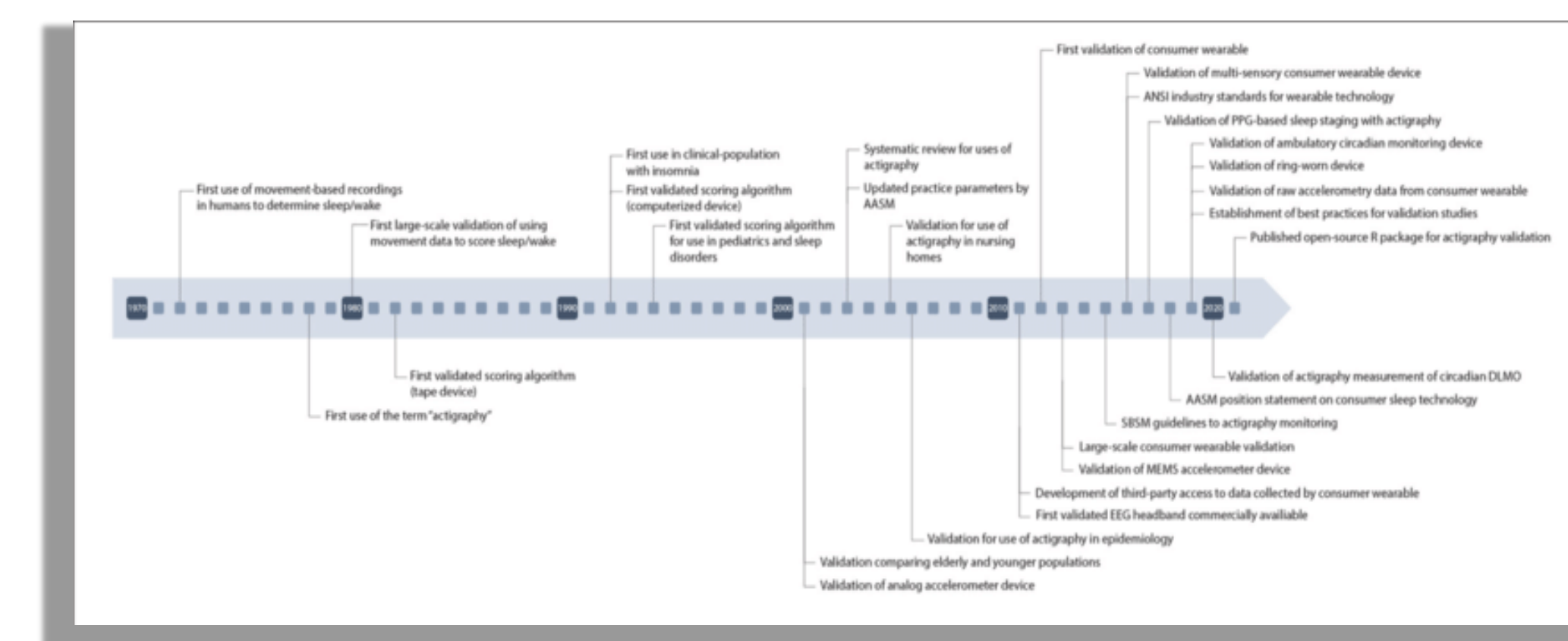
Per comparing existing products on the market, we can see that 2 main areas that are crucial to the success of wearable sleep-tracking devices are 2 topics:

- Reliable results. We need to use validated and reliable measures: It is important to use validated and reliable measures for sleep and circadian rhythm, such as actigraphy and polysomnography.

- Make product more user-friendly. We need to simplify the user interface, Personalize the device, Provide clear feedback

- The most promising products on the market is currently are Smartwatches (such as Garmin and Fitbit) and

Proposed improvements:

- Increase sensor accuracy:

- Avoid subscription model to simplify the process and use

- Use new technologies, Incorporate AI and machine learning
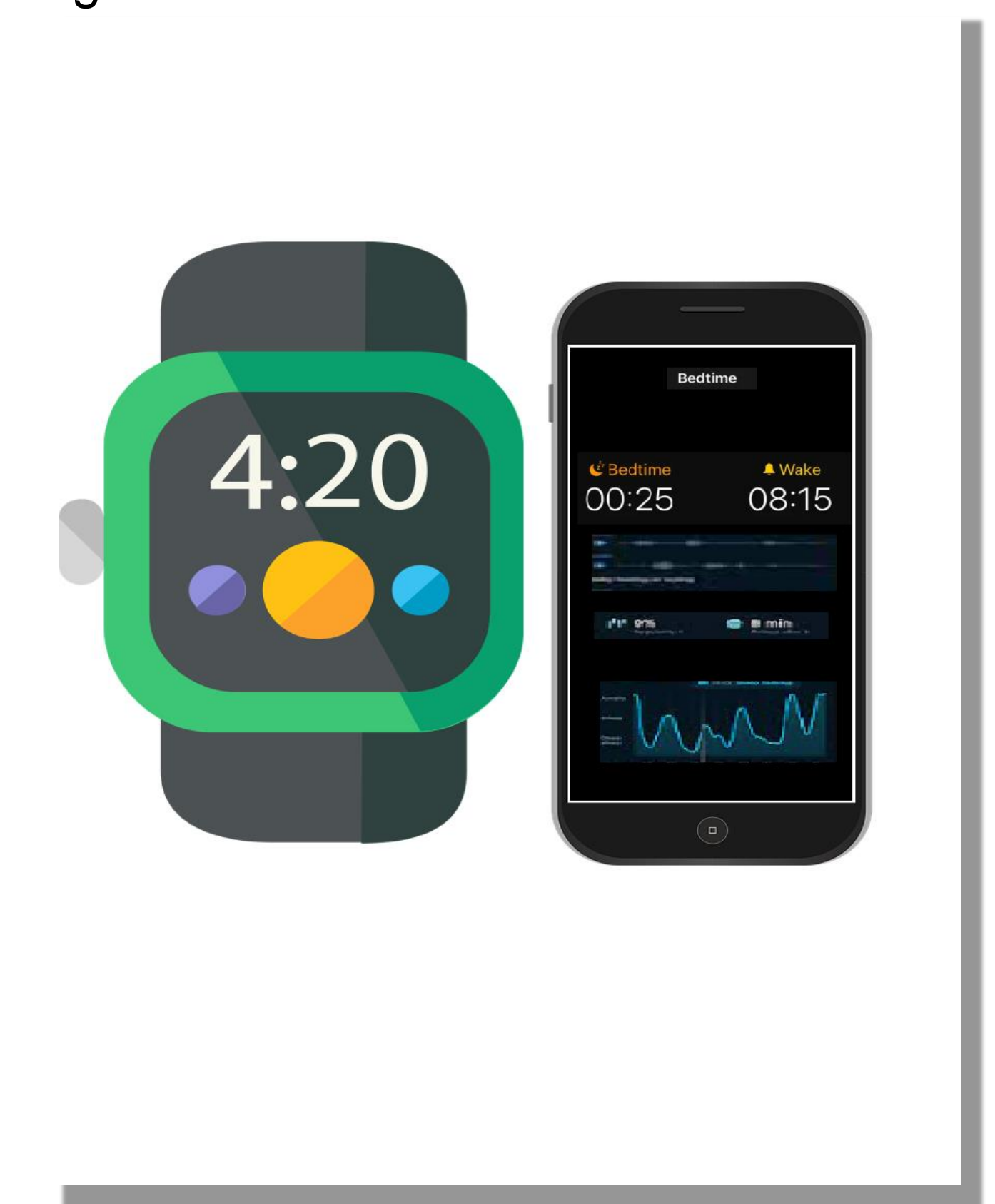
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