1, what is sleep disorder?

In our live, there is one third of time spending on sleeping. However, sleep disorder has become a public problem in people's life. The four major sleep complaints include excessive daytime sleepiness, insomnia, abnormal movements or behaviour during sleep and inability to sleep at the desired time.

(https://www.researchgate.net/profile/Sudhansu-Chokroverty-2/publication/42389723\_Overview\_of\_sleep\_sleep\_disorders/links/53d27b5a0cf228d363e943b2/Overview-of-sleep-sleep-disorders.pdf)

2, consequence of sleep disorder

Lack of sleep may affect the quality of life and health.

Sleep disorder may affect the ability of drive safety and cannot concentrate on driving.

The sleep problem also caused a lot of economic loss in our society now.

(https://academic.oup.com/sleep/article/29/3/299/2708047)

The sleep quality influence the day's efficiency.

The sleep disorders are often confused by the chronic headaches. A good sleep quality might improve the headache.

(https://jamanetwork.com/journals/jamainternalmedicine/article-abstract/623667)

3, Professional Testing (PSG)

In the professional sleeping monitoring, there are a lot of wire device to detect the sleep quality. Polysomnography (PSG) is the gold standard method to assess sleep and is the main reference for device validation. PSG is a comprehensive measure of sleep, based on the simultaneous recording of cortical (electroencephalogram [EEG]), submental muscle (electrocardiogram), and electroocular activity via the standardized positioning (international 10/20 EEG system) of scalp surface electrodes.

4, The disadvantage of PSG:

PSG devices are not suitable for home consumers due to the size and prize. The tester need some medical knowledge to read the result. What’s more, use PSG during sleeping is also not comfortable.

5, Watch Advantage:

In this research project, we hope to use a compatible device to make people know more about themselves.

We consider 'wearable sleep-trackers' as those over-the-counter, relatively low-cost devices available without prescription or clinical recommendations.

Compatible devices accessibility (cloud-based platforms used for data storage and integration), usability (mobile user interfaces), novelty, and affordability has led to their widespread use and contributed to an increased awareness about the importance of sleep in the general population.

A wearable device could be used to administer these applications outside the laboratory, increasing accessibility. The testers are able to make sleep minoring at home. Compared to the professional lab, home is a more relaxing environment and have less effect on testing. It is more comfortable

6, Development:

In the beginning, the devices are just able to measure a small number of different kind dataset. In the beginning, there is only heart rate will be measured with inaccurate result. (https://ieeexplore.ieee.org/abstract/document/8614753/references#references) Later,

These devices are now able to capture different bio-signals for determining, for example, heart rate and its variability, skin conductance, and temperature, in addition to activity. They perform 24/7, generating overwhelmingly large datasets (Big Data), with the potential of offering an unprecedented window on users' health.

(<https://ieeexplore.ieee.org/abstract/document/8076024?casa_token=C2TeAmoqBJgAAAAA:0Yyw_xAMYHvL7L7WsMAeY1Sk8W7sxGWksWw8TPvxnLxwKQxVponWNc7wc8AAAntZchrjTHg4naU>).

7, Disadvantage:

However, there is no such a specific guidance for consumers, which lead to confusion and controversy about their validity and application. Without correct method, the device may not get a correct result. The watch result may simpler and contain the unusable data. Watch may not be stable as professional device. It might be sensitive to detect the sleep but difficult to detect wakeup.

Ultimately, wearable sleep technology holds promise for advancing understanding of sleep health, however, a careful path forward needs to be navigated, understanding the benefits and pitfalls of this technology as applied in sleep research and clinical sleep medicine.

Aim and research question:

8, Why we want to make this experiment? (Aim)

Aim is to find if the compatible device could provide an accurate result compared to professional device and algorithms. And make people understand their daily sleep quality and the elements that might influence the sleep quality.

9, Research questions:

We want to know the accuracy of the compatible devices. Is it as accurate as professional device? Is there any different between them? And possible reasons cause the result not accurate. Is it true that the professional device may have more veracious data and have more accurate result? Does the age effect the measurement? Is there any difference on results for male and female to use the device? Is it severely influence people's sleep quality under pressure? Does it influence person's sleep quality after long-time exercise?

Could we use the simple device (watch or any compatible device) to get accurate result?