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Devices With Artifical Intelligence and Healthcare - A Review.

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Abstract:

With the rise of mobile medicine, the development of new technologies smart sensing and the popularization of personalized health concepts, the field of smart wearable devices has developed rapidly in recent years. Among them, medical wearable devices have become one of the most promising fields. AI related to health is combined with devices like watches and phones so along with their respective function, health can be monitored using these devices simultaneously. Wearable technologies can be innovative for healthcare problems. Some watches/fitness bands are used to monitor calories, heart rate, sleep quality and blood oxygen saturation. Some application in smart phones also helps to detect blood glucose level. Wearable devices are also used for patient management and disease management. Issues such as user acceptance, security, ethics and big data concerns in wearable technology still to be addressed to enhance the usability and function of these devices for practical use. This article will introduce the concept of wearable devices with its advantages and challenges of its application in the healthcare industry.

Keywords: Wearable devices, personalized health care, disease prevention, health monitoring, medical field.

Introduction:

As the potential growth in technology, the handheld devices are available to the user such as smart phones, fitness bands and tablets. The users are also having interest to wear these kinds of devices that promise to improve the quality of human life. But these cannot be achieved alone. The devices and accessories which can be worn over body along with connection to multimedia sources or the internet, which could help humans in counting physiological parameters, are called wearable devices. This category involves garments, wrist bands, socks, hats, shoes, eyeglasses, wristwatches, headphones, contact lenses, e-textiles, smart fabrics, headbands, jewellery such as rings, bracelets, hearing aids and skin patches[1]. There are also non-wearable devices used to track health at home. These devices can be linked to your smart phone application. When a person performs test or tasks, these devices monitors and records the data on the connected smart phone application. Various tests can be performed at home using non-wearable devices as well.Such as personal ECG, portable gluten tester (helps people with gluten allergy), blood pressure monitor (detects BP, ECG and also helps in diagnose valvular heart disease by virtue of its integrated digital stethoscope), wireless smart glucometer, brain sensing head band (has EEG sensors) and fertility track bracelet and pain relief devices.

Fig 1: Healthcare devices worn on the body.

Fig 2: Portable household healthcare devices

Aim:

1. To analyse the devices that can be externally attached to body.
2. Involvement of healthcare devices in daily life in monitoring health and prevention of disease.
3. Drawback in its practical application.

Mode of action of wearable devices inpersonalized health:

People not related to medical field tend be always keen of the recordable assessments such as haemo-dynamic values viz. blood count, blood sugar levels, hormonal values, blood pressure or any value that can be generated from tests. Wearable devices are equipped with micro sensors that could read temperature, vibrations and physical movements as well as geological location. The sensors are placed on the devices in such a way that they could get in direct contact with the skin. The mode of action of the wearable devices is demonstrated in the fig 3

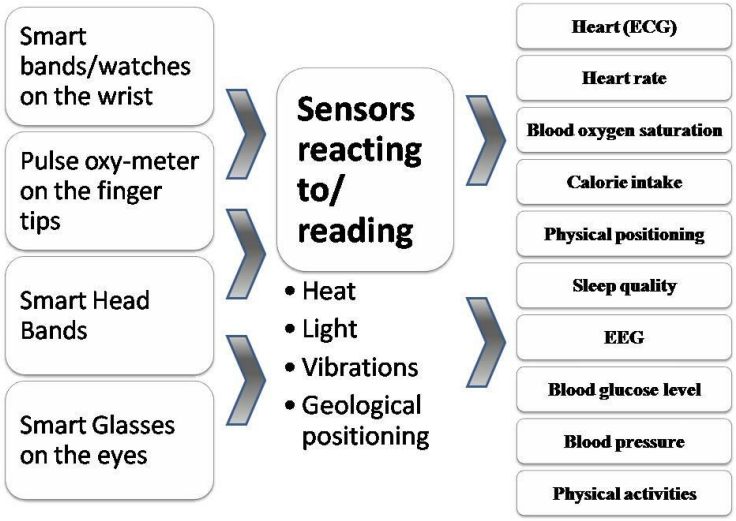

Fig 3:Mode of action ofhealthcare devices

Application in Medical Field:

Like the pathological investigation reports, wearable devices can also provide a solid channel for the health care personnel to thoroughly understand the condition of a person. As these devices can generate a large sample of health monitoring data, it could be helpful for practitioners for diagnosis, as well as management of condition of patient. For example,heart rate can be monitored continuously for a long span in patients with cardiac abnormal conditions. A wearable defibrillator can assess arrhythmia in such patients.Step counting applications or devices, oxygen saturation measuring devices can help the practitioner in assessment of the respiratory system of the patients. In conditions like sleep apnoea, certain neurological or psychological conditions, sleep monitoring devices can provide a thorough history of sleeping patterns. As these devices are easy to use and port, people can simply maintain record of the healthcare parameters[2].

In medical field, data holds a great value. The lab tests performed or medications consumed couple of years back or onset of a disease in the past can crucially provide a specific clue of an illness taking place in the present. Therefore, in a manner, it could be a highest merit of these wearable devices as they can continuously keep tracking activities of a person. The data unknowingly generated in a person can be helpful in identifying fluctuations in the physiology of a person.

Changing lifestyle in 21st century has given a gift of huge number of disorders. Hence, there is an urgent need of day by day monitoring of health to prevent the disease prior to its occurrence. As it is said, “Prevention is better than cure” and being science of life, Ayurved mainly concerns in maintaining the health of healthy person and curing the dis-eased. Wearable devices helps in daily monitoring the health analysing parameters hence preventing the disease to cause by some healthy lifestyle changes or taking treatment at early stage of disease.

In the COVID-19 pandemic period, people all over the worldhave been more alert and cautious towards maintaining health. The disease is mainly concerned with the respiratory system therefore the blood oxygen saturation (SPO2) was one of the initial parameter that could be tracked to assess

the progression of the onset. With the help of pulse oximeter, portable digital blood pressure monitor, infra-red thermometer as well as smart device bound heart rate monitor, people were able to convey the readings to the health care workers. As a result, identification of critical cases became easier.This period has efficientlyproven the reliability and necessity of the wearable & portable devices in healthcare.

Security issues in wearable devices[3]:

1. Physical data access: All kind of wearable devices stored human's body data into local storage devices without encryption. Also it doesn't provide any kind of PIN or password protection. So the unauthorized people can easily access your personal data.
2. Sensitive data exposure:The wearable devices like smart watches, wrist band, contain all kind of information about users. With lack of encryption, hackers can easily access sensitive data like bank account details, contacts, personal body information etc.
3. Insecure wireless connectivity:The wearable devices are connected with smart phones or laptops using Wi-Fi or Bluetooth without using any encryption method, hence there is a threat of leaking of privacy data.

Drawbacks of wearable and non-wearable health devices[4]:

1. Physiological parameters

(Wearable) Devices that can be attached to human body, detects and monitors the health related parameters. The problem arises when collection of data becomes improper and inconsistent.It could be due to errors likeimproper design, lack of knowledge about usage of the device and faulty devices or sensors. A falsely generated and forwarded data will impede the judgment of diagnosis that could extent to be life threatening.

2. Security

Cyber Security can be one of the biggest challenges in the tech-savvy world. Most of the smart devices like mobile phones, smart bands, eye gears have access to the internet. Wide access and a poor cyber security may result in personal data theft or misuse[5,6].

3. High potential cost

Since the innovation of technological interference into health care, cost of the devices have been consistently higher since initial days. Even advancement in the devices takes place regularly.

4. Quality

Quality of the devices its accuracy, design and data analysis are very important factors they should be very accurate malfunction of these devices can cause panic.

Conclusion:

Wearable devices play an important role in preventive medicine, maintaining health, disease diagnosis and its treatment. It is becoming a trend to add wearable devices in health care. In recent years with technological advances in health care we can keep a track on health distantly. It has drawbacks but it can be managed and will decrease with developing technological advances. All these health monitoring devices play a major role in preventive medicine and early diagnoses. Patient can personally monitor the health at home with these devices. There are rapid advances in this area of health monitoring devices. These advances can change the future of the medicine.

Reference:

1. Min Wu, and Jake Luo; Wearable technology application in healthcare: A literature review, Online Journal of Nursing Informatics Contributors. 25 Nov 2019https://www.himss.org/resources/wearable-technology-applications-healthcare-literature-review
2. Hassan Aziz's article on Integration of Wearable Technologies into patient's electronic medical records .1 Aug 2016, https://www.researchgate.net/publication/312652323_Integration_of_Wearable_Technologies_into_Patients%27_Electronic_Medical_Record
3. K Vijayalakshmi's ,A demand for wearable devices in health care, international journal of engineering and technology.February 2018https://www.researchgate.net/publication/323278116_A_demand_for_wearable_devices_in_health_care
4. Lin Lu Et. El.Wearable Health Devices in Health Care:Narrative SystematicReview JMIR mhealth and uhealth,March 2020https://www.researchgate.net/publication/345480827_Application_of_wearable_health_devices_in_the_field_of_health_care_A_narrative_review_Preprint
5. Catherine Dinh-le; Rachel chuang; Sara chokshi; devinnmannWearable Health Technology and Electronic Health Record Integration: Scoping Review and Future Directions, New York University, NYU Wide membership, New York, NY, United States ,Published on 11.9.2019 in **Vol 7, No 9 (2019): September, https://mhealth.jmir.org/2019/9/e12861/**
6. Al-Siddiq W. Hitconsultant. 2018. Medical wearables: how next generation devices will change healthcare URL: https://hitconsultant.net/2018/01/24/medical-wearables-devices/ [accessed 2019-09-05] [WebCite Cache]