

TECHNOLOGY

Wearable Devices to Revolutionize Health Care

by Mokter Hossain



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Portable health technology can improve quality of life for patients. However, they bring some threat to personal data.

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In the last decade, we witnessed a rapid growth of wearable devices—small electronic devices that are worn or carried on the human body. A study by the *Facts and Factors* found that the global Wearable device market size is expected to be over US\$ 380.5 billion by 2028. Wearable devices have become affordable to mass customers. For example, a fitness tracker that can record various health-related issues is available for just US\$20 on the Amazon website. The exponential surge of wearable devices led the International Federation of Sports Medicine to develop a quality assurance standard for wearable devices to test and endorse their commercial claim.

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These small-sized devices can sense, collect, and upload various physiological data to improve our lives (Seneviratne et al., 2017). No doubt, wearable devices are the next frontier for personalized healthcare. The Internet of Things drives wearable devices by integrating electronics, sensors, software, and connectivity enabling the exchange of data with manufacturers, operators, and other connected technologies. These devices have various applications with the prominence of smartwatches and activity trackers. For example, Apple Watch, Samsung Galaxy Gear Sport, and Fitbit are widely used in the fitness industry to monitor for example calories and other health indicators. Amazon UK, for example, has started establishing wearable device stores. Wearable devices are popularly used in healthcare, navigation systems, and textiles. However, wearable devices in healthcare have received the highest attention (Son et al., 2014).

Wearable devices for healthcare

Wearable devices are popularly used to monitor health. These devices can easily track heart rate, calories burned, step counts, blood pressure, the release of biochemical, exercise time, and physical strain. A myriad of technologies related to artificial intelligence and the internet of things enables the ability to implant breasts, monitor infants, and develop smart shoes and socks. Wearable devices show meaningful insights to live our lives comfortably. They are valuable to monitor physical health and physical training along with alerting to severe medical conditions. Wearable devices are soon expected to forecast changes in health, mood, and stress as well as measure blood alcohol content, athletic performance, heart condition, and age-related diseases.

A drawback of wearable devices is that they collect data in aggregate form but they have limitations in analyzing data to derive conclusions. Wearable devices mainly collect data by applying one-size-fits-all algorithms. Wearable devices are also used in corporate health and wellness programs. The Terasaki Institute for Biomedical Innovation developed wearable electronic skin to monitor health. Its ultra-thin e-skin patch can be attached to the human chest area for several days to pick up and record health statuses such as muscle movements and heartbeats. Such e-skin is a springboard to checking chronic health conditions. Wearable devices are used to track and get notifications for heart rate and blood pressure, monitor calorie intake, and monitor training regimens. Fitness trackers monitor steps taken, heart rate, calories burned, and other fitness metrics. A now-bankrupt company called Proteus developed sensor-containing pills to track various health metrics. A person swallows the pills and wears an external device to track data generated inside the body. Smart tattoos are expected of patients to ensure they remember to carry their devices with them. For example, these devices enabled individuals to track their 10,000-step goal and encouraged them to fulfill the target by monitoring steps. Devices can monitor sleeping patterns that result in more sound sleep. Fitbits, for example, are used for checking various important things about our bodies such as heart rate, calorie-burning, and pregnancy. The heart rate of women increases by 10 beats per minute during pregnancy and fit bits can record the heart rate and thereby allow us to understand if someone is pregnant. The importance of self-health monitoring and preventive medicine is growing for elderly people (Haghi et al., 2017). Wearable systems that monitor muscle activity, store data, and deliver feedback therapy are the next frontier in personalized medicine and healthcare

The Covid-19 has accelerated wearable technology adoption in healthcare as people are focusing on self-monitoring their health. A recent estimate pointed out that over 20% of the US population is expected to own wearable technologies in the next few years. Some wearable technologies provide recommendations for health conditions by integrating various information. Wearable technologies have transformed themselves into medically viable devices to monitor health. Wearable ECG monitors are on the cutting edge of consumer electronics and they can measure electrocardiograms or ECGs—helping users track their heart rhythm and rate, as well as measure other vital health conditions, including blood pressure. FDA-cleared AliveCor's KardiaMobile 6L is a portable monitor that can detect atrial fibrillation, bradycardia, and tachycardia in 30 seconds. Wellue's DuoEK can identify early signs of arrhythmia, bradycardia, heart pauses, premature atrial contractions, and tachycardia. Many such devices are available in the market to identify early signs of diseases. Omron Healthcare's HeartGuide can measure blood pressure and daily activity, such as steps taken and calories burned. Withings BPM Connect and LifeSource Upper Arm monitor are used to track heartbeats and blood pressure by medically recognized standards. Wearable biosensors even though are in their early stage of large-scale development and adoption. They are expected to revolutionize telemedicine and distant health service, too. Philips' wearable biosensor measures a whole host of healthcare activities such as heart rate, respiratory rate, skin temperature, body posture, fall detection, single-lead ECG, R-R interval, and step count. Biofourmis BiovitalsHF helps healthcare providers predict and prevent serious medical issues.

Dark Side of Wearable Devices

No doubt wearable devices add comfort and convenience to our lives but they pose threats to our lives. Wearable devices have received such an intensified level of acceptance from the consumer market that their dark side such as health risks, privacy, and security remain limitedly considered. Hence, it is crucial to recognize their dark side so that we can develop the necessary means to deal with it to lessen threats. An increasing number of studies are revealing the dark side of wearable devices. With the exponential growth of wearable devices, privacy and security are key concerns. Wearable devices collect data on our wrists, ankles, foot, and other body parts and store this data in a centralized system. Users of wearable devices do not know how this data is stored and managed. Privacy policy

related to data management is unclear as the policy guidelines of the device companies state that data will not be sold to third parties but also state that data may be shared with business partners to improve service experiences. Hackers may get very detailed information about our personal information such as location, and workplace, and they can frauds, steal credit card information, alter fitness data, and manipulate our insurance policies. Experts have raised concern that such devices are worn throughout the day and some people may have vulnerable health issues. It is pivotal for companies to mitigate the dark side of wearable devices for long-term success. Wearable devices are growingly used in the workplace and that creates security and privacy challenges. In that case, employees feel uncomfortable being tracked their activities and cataloged their data.

Conclusion

Wearable devices inspire healthier lifestyles. They have changed personal healthcare management. As wearable devices are becoming increasingly sophisticated day by day, they will provide more robust personal healthcare. Wearable devices are also getting highly affordable to mass people. However, they bring some threats to our personal data. Nevertheless, wearable devices are significant to manage our personal healthcare.

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