Short Communication

Sensing Mental States: Way Forward

Biswas R*

Applied Optics and Photonics Laboratory, Department of Physics, Tezpur University, India

***Corresponding author:** Rajib Biswas, Applied Optics and Photonics Laboratory, Department of Physics, Tezpur University, Tezpur-784028, Assam, India

Abstract

Flexible electronics has enabled to us reach newer heights. Now, has come the era of wearables. With the advent of advanced fabrication and integration technology, wearables have entered every domain of our life. The ease of use as well as minimal power requirement attract consumer to adopt them more and more as a part of their daily wear regime. These wearables provide direct monitoring many health issues such as sugar level, oxygen level as well as heart pressure etc. Recently, wearables have achieved another feat of sensing the mental state of the wearer. This short communication dwells upon this wearable providing information about the mental health. Along with working principle, the future perspectives are also provided.

Keywords: Wearables; Skin; EDA; Mental state

Introduction

With the rising population of world, numerous ailing issues has been crippling humans. The world population is affected not only by common health diseases, but also some rare ailments. Some diseases have symptoms while some remains asymptomatic. While diagnosis can be performed in both cases, however, the presence of certain aspects helps better diagnosis. Once diagnosed properly, it becomes possible to administer drugs effectively. Nowadays, mental health is one of the challenging issues that a clinician or a physician has to encounter. Sometimes, some issues remain visibly apparent in case of a person having mental issues, while in other cases, there is no transparency. This makes thing worse. As per global report, a major chunk of population is suffering from mental health issues. There is no denial of the fact that a mentally healthy person has a balance life from every nook and corner. However, person having unhealthy mental state usually remains in an instable state with undecisive character and many more. If not treated properly, it may lead to social withdrawn or suicidal tendency in worst cases. Now, the challenge that remains is to diagnose it properly so that remediative measures can be efficaciously administered. So far as monitoring mental health is concerned, considerable developments have taken place [1-7]. Gone are the days when patients frequently visit the physician/consultant to get proper check-up and care. Currently, wearables are slowly smearing into every health monitoring activity. This brief communication dwells upon a smart wearable system which is capable of monitoring mental health.

Wearables

The world of wearables is expanding day by day. It has become a part and parcel of daily activity. Most of the smart phone users now utilize wearable on and often. Wearables work on a variety of principles. They sense, accrue data, and analyse data. If pre-programmed for a set of variables or abnormal pattern, they usually alert the user of these. Starting from blood pressure monitoring, glucose level monitoring, they perform variety of functions. In most of the cases, they act as non-invasive devices [5-10]. The efficient energy storage, wireless data transfer makes them quite attractive as compared to conventional sensors. The sensors mostly rely on biochemical responses, physiological activities. Likewise, the analyte mostly remains the skin [11-14]. Based on skin, new sort of wearables has emerged—targeting inaccessible patterns which eludes the conventional sensor. The recent emergence of skin sensor which will help monitor metal health issues. It is based on the principle of Electro Dermal Activity (EDA). Often, these wearables are backed by strong algorithms which can be presumed to be their backbone.

Sensing Mental States

In a recent report, a researcher built an algorithm to track mental states through the skin. The as-developed algorithm monitors sweet glands. It then tracks brain arousal of the environ *via* the use of non-invasive wearables. The technology can assess mental activity using Electro dermal Activity (EDA). Precisely, EDA is an electrical phenomenon of the skin that is influenced by brain activity related to emotional status and internal stresses. Severe exhaustion or pain may cause such internal stresses. Apart from that, a particularly packed schedule can trigger in EDA which can be directly correlated to metal health. In essence, device would easy way to monitor the user's mental state. While monitoring, it may offer nudges that would help the user to revert to more neutral state of mind. As for instance, if the user is going through a severe work-related stress, the wearable can pick up this with ease and may play some soothing music to appease the user. Earlier methods measuring sympathetic nervous system activation through the skin took minutes to generate results. This is not practicable for wearable devices. Earlier work focused on inferring brain activity through sweat activation and other factors whereas the new study additionally monitors the sweat glands themselves. It has been shown that one can decipher brain signals with reliability. Additionally, the computational power requirement of their new algorithm is minimal and can obtain brain and physiological insights within a second.

Concluding Remarks

Researchers claim that real time wearable device open new opportunities for monitoring and improving mental health and cognitive engagement. Usage of this device includes performance monitoring mental health monitoring, measuring pain and cognitive stress. Mental health tracking can help better manage autism,

post-traumatic stress, excessive irritability, and suicidal tendency. Performance tracking and cognitive stress tracking can help improve individual productivity and quality of life.

References

1. Kang M, Chai K. Wearable Sensing Systems for Monitoring Mental Health. Sensors (Basel). 2022; 22: 994.

2. Report: Mental illness will cost the world $16 trillion (USD) by 2030. Ment. Health Wkly. 2018; 28: 7–8.

3. Alonso J, Codony M, Kovess V, Angermeyer MC, Katz SJ, et al. Population level of unmet need for mental healthcare in Europe. Br J Psychiatry. 2007; 190: 299–306.

4. Rathod S, Pinninti N, Irfan M, Gorczynski P, Rathod P, et al. Mental Health Service Provision in Low- and Middle-Income Countries. Health Serv Insights. 2017; 10: 1178632917694350.

5. Luo M, Guo LX, Yu MZ, Jiang WY, Wang HY. The psychological and mental impact of coronavirus disease 2019 (COVID-19) on medical staff and general public—A systematic review and meta-analysis. Psychiatry Res. 2020; 291: 113190.

6. Pan KY, Kok AAL, Eikelenboom M, Horsfall M, Jorg F, et al. The mental health impact of the COVID-19 pandemic on people with and without depressive, anxiety, or obsessive-compulsive disorders: A longitudinal study of three Dutch case-control cohorts. Lancet Psychiatry. 2021; 8: 121–129.

7. Xiong JQ, Lipsitz O, Nasri F, Lui LMW, Gill H, et al. Impact of COVID-19 pandemic on mental health in the general population: A systematic review. J Affect Disord. 2020; 277: 55–64.

8. Rotenberg S, McGrath JJ. Inter-relation between autonomic and HPA axis activity in children and adolescents. Biol Psychol. 2016; 117: 16–25.

9. Gedam S, Paul S. A Review on Mental Stress Detection Using Wearable Sensors and Machine Learning Techniques. IEEE Access. 2021; 9: 84045–84066.

10. Richter T, Fishbain B, Richter-Levin G, Okon-Singer H. Machine Learning-Based Behavioral Diagnostic Tools for Depression: Advances, Challenges, and Future Directions. J Pers Med. 2021; 11: 957.

11. Finlay WML, Lyons E. Methodological issues in interviewing and using self-report questionnaires with people with mental retardation. Psychol Assess. 2001; 13: 319–335.

12. Biswas R. Wearable bio-sensors: a gigantic leap in health care system. Int J Biosen Bioelectron. 2020; 6: 103–104.