The Journal of Advanced Health Informatics

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JAHI

ISSN: e - 2456-9313 Available from URL: http://mbnc.edu.in/UTUJAHI.html

RESEARCH ARTICLE

NEW DEVICES & TECHNOLOGICAL ADVANCEMENT IN PSYCHIATRY

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ARTICLE INFO

Article History:

Received on
9th Sep 2019
Received in revised form
16th Sep 2019
Accepted on
17th Sep 2019
Published online on
19th Sep 2019

Key Words:

Mentally health, Mental illness, Tourette syndrome, rt-fMRI-NF, galvanic skin response, tDCS, Emo Graphy, rTMS

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ABSTRACT

Mental illness has historically brushed under the carpet and treated as a taboo subject. Thankfully, times are changing and now society is becoming more enlightened about the mental health. Technology is becoming more important part of providing solutions to prevent mental illness and improve mental health.

The following some technologies and devices that are assisting in the treatment of common mental illnesses.

Such as Sensor reads signs of oncoming Aggression in Autism, Tourette Syndrome Treated with Functional MRI, Smart Wrist Band to Monitor Emotions, Women Paint Over Own Digital Avatars to Improve Mental health, Machine learning predicts psychosis, Electric Brain Stimulation, Emo Graphy, Transcranial Magnetic Stimulation etc.

Introduction

Mentally healthy means a state of someone who is "functioning at a satisfactory level of emotional and behavioural adjustment" and Mental illness means a condition that influences the way a person thinks, feels, behaves, and/or relates to others and to his or her surroundings.

Understanding and treating of this mental illness has improved in many ways as a result of technological advancement. The technologies have the greatest potential impact like increase the knowledge of how the brain functions and changes based on interventions, have the potential to personalize interventions based on understanding genetic factors of drug metabolism and pharmacodynamics, and use information technology to provide treatment in the absence of an adequate mental health workforce.

New devices and technologies in psychiatric nursing are as follows:

1. Sensor Reads Signs of Oncoming Aggression in Autism.

North-eastern behavioural scientist Matthew Goodwin from North-eastern University has created a wearable **wrist device** for people with autism that monitors physiological indicators of stress. Many people who suffering from autism, and when autism episode come that time a person become aggressive, something that tends to come out of the blue. And those who taking care of such folks have a hard time managing such episodes, because there is no warning and no time to take mitigating actions. But, now researchers have developed a system, which is wrist-worn device, that can predict aggressive episodes. People with autism are prone to aggressive outbursts because their resting levels of stress are much higher than someone without autism. "Their arousal levels are already at the ceiling,". "It takes very little to cross the tipping point."

About device

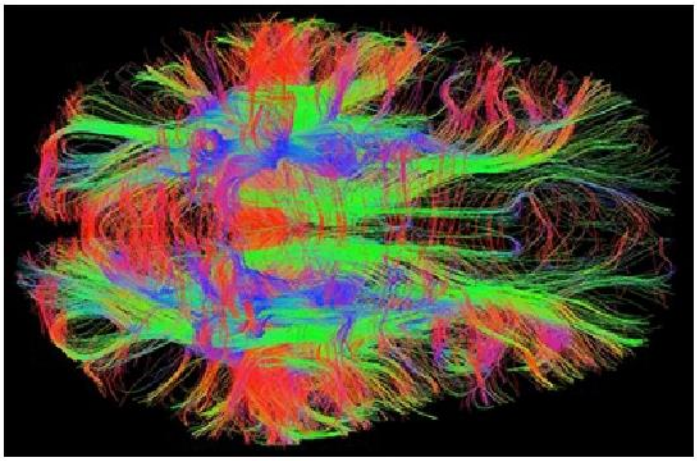
- It is a wrist-worn device, can predict aggressive episodes a minute before they become apparent with nearly 90% accuracy.
- The wearable device collects following information about the patient's heart rate, level of sweating, skin temperature, and body/arm movement.
- This information is collected by a computer and processed to detect the digital biomarkers associated with oncoming emotional outbursts.

Merits

- To alert caretakers when stress levels are nearing the point of an aggressive episode,
- The caretakers of people with autism, knowing what will happen 60 seconds from now could be enough time to prevent an aggressive outburst.

2. Tourette Syndrome Treated with Functional MRI

Yale University researchers have for the first time showed that it is possible to control the symptoms of Tourette Syndrome using functional magnetic resonance imaging (fMRI).



About Functional MRL

rt-fMRI-NF is a relatively new technology, it have the capability to significantly impact on neuropsychiatric conditions.

Tourette syndrome is characterized by multiple motor tics and at least one vocal tic. For that the researchers used real-time fMRI neuro-feedback (rt-fMRI-NF), that lets patients monitor their own brain activity, to control the frequency of tics. In this, research team measured the tic frequency of the volunteers on the Yale Global Tic Severity Scale, and during the study the participants were made to raise and lower their activation of the supplementary motor area, where Tourette Syndrome seems to arise. The volunteers could see the activity of this brain region in real-time via a scrolling graph on a computer screen.

Merits

This led to a substantial reduction in the tic frequency when the participants were trained in this exercise.

3. Smart Wrist Band Helps People with Affective Disorders to Monitor Emotions

University of Lancaster researchers have developed a smart material that can help those with affective disorders, such as anxiety, bi-polar disorder and depression, to monitor their emotions.

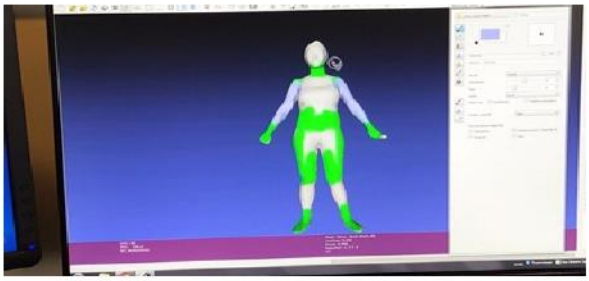
Researchers have developed a range of wearable smart materials that can indicate changes in emotional arousal through a sensor which measures the electrical conductivity of skin. This property, called the **galvanic skin response**, can provide information about changes in someone's emotional state, in real-time. The smart material, worn as a wrist band, can alert the user to a change in emotion in real time, sometimes even if they have not become fully aware, helping them to identify issues and situations that affect their emotions.

The devices are wearable and provide not only visual signals but also can be felt through vibration, a tightening feeling or heat sensation without the need to access other programmes - as a result we believe the prototype devices provide real-time rather than historic data.

Merits

- Participants started to pay attention to their in-the -moment emotional responses, realizing that their moods had changed quickly and understanding what it was that was causing the device to activate.
- The devices helped participants start to identify emotional responses which they had been unable to beforehand, even after only two days.

4. Women Paint Over Own Digital Avatars to Improve Mental



How we view our bodies is often influenced by popular culture and each one of ours social environment. Young women, in particular, tend to suffer from poor "body image," which can result in depression, eating disorders, and all kinds of other mental issues.

The University of Missouri researchers wanted to see whether letting women view their own bodies from a different, more abstract perspective can influence their own body image in a positive way.

The team used an **optical scanner** to whole-body image women between the ages of 18 and 25. Accurate 3D representations were then created, which the women could digitally paint over using a Photoshop-like program. They were asked to used different colors to paint over different are of the body that they tend to appreciate, whether for aesthetic, utilitarian, or other reasons.

Merits

- In digitally painting their avatars, women could think about how, for example, their thighs help them run or how their arms can help hold others in an embrace.
- It provided the participants a way to visual their bodies in a completely different way.
- It allowed the participants to recognize how our bodies are much more than a size or a number on a scale."
- The team evaluated the women before, after, and at three months following the experiment, and they discovered that the participants improved their self-image and had decreased signs of depression and anxiety.

5. Machine learning predicts psychosis from subtle changes in word choices

Emory University and Harvard University researchers have developed a machine learning algorithm that can predict an individual's likelihood for developing psychosis based on their speech patterns. This is an exciting development for those who are at risk of psychosis, and can provide valuable medical information to aid in therapy and disease management.

Merits

- The algorithm is based on an observation that there are specific, very subtle linguistic differences that occur in patients at risk of psychosis. These subtle changes include a reduction in sentence richness, and an increase in words related to sound.
- In a process dubbed "digital phenotyping," the researchers are able to use the machine learning method to analyse a specific patient's word choices and estimate the risk.
- This research is interesting not just for its potential to reveal more about mental illness, but for understanding how the mind works — how it puts ideas together. "Machine learning technology is advancing so rapidly that it's giving us tools to data mine the human mind.

6. **Electric Brain Stimulation Shown to Improve Memory Function**

Our memories often seem ephemeral, coming and going without any obvious reasons. UCLA researchers seem to have come up with a way to bring some memories back that would probably otherwise have gone missing forever.

The team relied on transcranial direct current stimulation (tDCS), a technology that can direct low energy electricity into specific parts of the brain. The team targeted the left rostrolateral prefrontal cortex, which is associated with abstract thought and processing signals coming from other parts of the brain.

Merits

- People who received targeted tDCS were able to recall words presented just the day before much better than those whose brains were not stimulated.
- The folks who received proper stimulation were able to successfully recall various words about 15% better than when those same people got sham treatment.
- The research has potential in helping to treat conditions that affect memory function, but perhaps also to give all of us pretty impressive memory capabilities

7. EmoGraphy by Philips Monitors and Predicts Stress

Philips has recently launched EmoGraphy, a stress management technology to measure someone's stress levels and then predict them an hour into the future. The company worked out the sensing and algorithm calculation methods, and are now licensing their technology to firms that want to expand it into their devices.

The body gets a lot of signals about stress and over-arousal. People tend to ignore those signals that the body gives and this leads to more stress. skin conductance is an accurate measurement of sympathetic nervous system activity, which indicates arousal and stress. The sweat glands are uniquely coupled to the sympathetic nervous system and give very clean measurements. One of the signals of the sympathetic nervous system activity is stress-induced cortisol release, which can negatively impact your cognitive performance. We found a unique algorithm where we can correlate the sweat gland activity to cortisol levels in body. We are focusing mainly with our technology to give the immediate arousal measurements into what we call the stress level and we interpret that signal into what we call the cognitive zone.

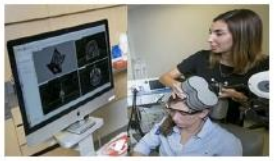
EmoGraphy device work :

It is a wrist-based wearable. It will present two outputs: stress level and cognitive zone. So the user goes in and puts it on first thing in the morning and it takes 30 minutes to calibrate. Hopefully, in the morning it's green and he is in a good position. If a meeting with his boss doesn't go well or his experiment fails, we will output a prediction that says that if he continues to do what he's doing, he will enter a red zone where his cognitive performance will be affected an hour from now. So then he should take a break or go for a walk or have a relaxing activity.

Till now the product not on the market but may next year, you will see it. Because there two things: either as a consumer buying a device in the store, or actually, looking also at pilots with the employee benefits kind of programs.

The device provide the measurements and predictions of high stress, low stress, or medium stress. And it also exploring with apps for meditation, mindfulness, etc.

8. Transcranial Magnetic Stimulation Improves Working Memory



Researchers from Duke University School of Medicine have found that magnetic brain stimulation can help improve working memory. They studied repetitive transcranial magnetic stimulation (rTMS), showing that it improved memory task performance in all ages of adults. Given that individuals with Alzheimer's will more than double by 2050, rTMS may be a potential form of therapy to help improve memory. TMS has been used in patients with psychiatric disorders, including depression and obsessive compulsive disorder, but its applications are probably much more wide-ranging.

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