

## Gen Next Authentication Process Using Brain Print

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### Abstract

Whenever we encounter stimuli like famous celebrities, favorite food, music tone or words they may seem trivial but they reveal lots of information about us. In fact, for all these above mentioned stimuli, our brain produces different types of response, these brain responses can provide you a secure access into heavily restricted areas, as it is one of latest technologies in individual authentication process called as brain print.

A 'brain print' is a next generation authentication method which is the naturally multi-factor and everything is done in one single step. Brain print converts the activity in your brain to a biometric identifier. The same way in which our DNA, fingerprint or retina is unique, the brainwaves generated by your brain seem to be unique and can be used as a means of identifying us.

**Key Words:** DNA, EEG.

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### 1. INTRODUCTION

In the modern age of technology, passwords were introduced to us as a means of protecting our personal information and data from unauthorized access. Today, passwords are used in almost all aspects of our digital life, our emails, bank accounts, address, contact details, credit card numbers, photos and videos of us, our family and other sensitive personal information, exact location where we are right now. All these are protected using a sequence of words and numbers, including mixed case letters and different symbols. Since from the ancient age of information, we were given a 'password', as long as it is elaborated complex and long enough and when having a mix of alphabetical letters, symbols and numeric, is a sufficient means of protecting and safeguarding all our precious and infinitely valuable personal and business data and information.

#### 1.1 Are passwords doing their intended job?

In a time in which advanced computer systems are broken into by hackers and crackers and long lists of user names and passwords are released into the public network of internet for the entire world to see a time where computer systems ranging from the ones sitting at our home to the most secure advanced computer systems on earth. But it has now been indefinitely proven over time that passwords can no longer protect us no matter how complex and how unique, the final verdict is clear

as crystal. Any password can be broken by the modern e-wizards in no time.

#### 1.2 Then what would be the alternative?

As soon as the words 'alternative for a password' is heard, a rather surprising array of options pops up. Products which use a form of biometric technology are among the top in these options. Existing biometric scanners, however, uses single factor authentication and the opinion of experts who have studied this broadly that single factor authentication might not be secure enough. This is where 'multi-factor authentication' comes in. But the problem with multi-factor authentication is that it is not the easiest to develop and certainly does not qualify as the cheapest.

### 2. BACK GROUND

Brain Print's root is derived from the concept of brain fingerprinting where Brain Print is based on a keen observation that our brain generates a unique and different brain wave pattern when a person encountered with familiar stimulus. It is one of the latest computer based technology to identify the perpetrator of a crime accurately and scientifically by measuring brain wave responses to crime relevant words or pictures presented on a computer screen. Brain Fingerprinting is used to determine whether an individual recognizes specific information related to an event or activity by measuring

electrical brain wave responses to words, phrases, or pictures presented on a computer screen.

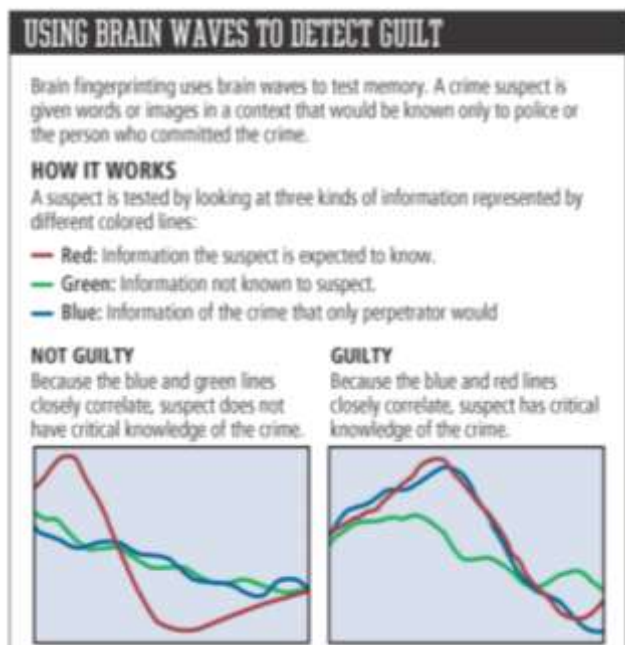


Figure 1. Application of Brain Wave.

### 3. WHAT IS BRAIN PRINT?

A 'brain print' is an authentication method which is the naturally multi-factor and everything is done in one single step. A brain print would be recorded by having a user look at an image while hooked up to an electroencephalogram graph that would record the brain activity in response to the stimulus setting the password.

In this process few images or text patterns are depicted to the user to know the mental state of the user. The user should be in mentally stable state as this authentication process used in high sensitive fields such as defense, central banks etc. On future occasions, the user's identity would be confirmed by exposing them to the stimulus again, recording their response and using pattern classifying computer systems to compare the results.

While such a system would be necessary but more involved, potentially slower and more expensive than many rival biometric identification methods, its reliance on specific stimuli presents some unique advantages. If the biometric fingerprint is stolen, then such person can't just grow a new finger to replace the compromised fingerprint. Fingerprints are 'non-cancellable' but on the other hand brain prints are potentially cancellable. So, in the unlikely event that attackers were actually able to steal a brain print from an authorized user, the authorized user could then 'reset' their brain print.

### 4. WHY BRAIN PRINT AS A PASSWORD??

- ✓ Your Next super-secure password?

A brain print, when fingerprints fail, a map of your brainwaves could help keep your cyber world safe.

- ✓ Your Brain Waves Could Replace Passwords.

After many researches on this technology the researchers have identified that computer can identify person based on the way the person's brain reacts to certain words. This indicates that there is no need of a password as you could simply listen to few words and unlock your super secret files.

- ✓ Brain print: Our Reaction to few words could be Password.

We know a lot about passwords generating using faces, eye retina scan, and fingerprints heart beat and so on, which replace passwords. Your 'brain print' can identify person with 100% accuracy. The researchers used an EEG headset to record brain activity. A biometric "brain print" system is used to identify person with 100% accuracy by considering the results of electroencephalogram(EEG) readings of brain activity.

### 5. HOW DOES THE BRAIN PRINT WORK??

For the brain print technology to work, a group was made consisting of 45 participants each of them were donned with the 3 electrodes that were necessary to carry out EEG test, these generated dozens of acronyms which were read. The researcher's recorded brain's response to each letter generated, mainly they were focusing on how brain reacts related to semantic meaning and signals are generated based upon the results.

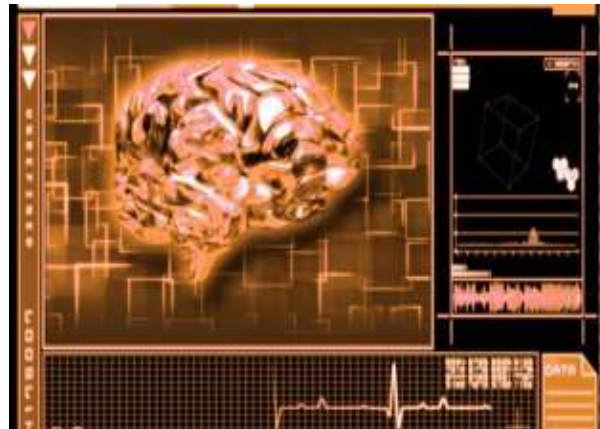


Figure 2. Brain Wave.

Semantic memory records the meaning of particular word. The meaning of words what person analyzes is unique or it differs from person to person which helps in providing a unique pattern. The participants were tested over six month's duration and semantic signals generated were very similar. The subjects were fitted with a cap that had 30 electrodes attached to it, then shown various images and symbols such as celebrity faces, words, pictures of food on a computer screen in 200 millisecond bursts. The brain's reaction was recorded.

The idea, then, is that every time a person needs to use a "password," he or she goes through the same procedure, and

the results are matched with the first time they were shown the images. If the "brain print" is compromised like what happened with the fingerprint records then the system is merely reset by running another set of images and collecting a different set of brain waves.



Figure 3. Recording of Brain Print.

With brainwave EEG system, once a person had the baseline brainwave fingerprint established, he would request access by wearing an EEG cap or other brain device. The system measures the brain activity and if the emotional state matches the baseline, he get access but if he's were in a rage, he won't.



Figure 4. Generating Brain Print for authentication.

## 6. APPLICATIONS

1. Brain print can be used to lock and unlock our computers or smart phones.
2. It also can be used in highest security purposes like for Vault of Central Bank etc.
3. Brain prints offers applications in 3 verticals Health, Security and Business.



Figure5. Major applications of Brain Print.

## 7. ADVANTAGES AND DISADVANTAGES

### 7.1 Advantages

1. Brain print could be very efficient password compared to other passwords.
2. Each person has a unique 'brain print' that a computer could use to identify individuals.
3. Brain prints, on the other hand are potentially cancellable.

### 7.2 Drawbacks

- This technique is not always spot on.
- You need to have your scalp wired with the electrodes.
- This technique will not work due to stress.

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