ENVEX 2010

Engineering For Society

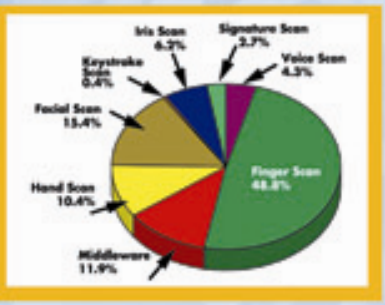
A BIOMETRIC AUTHENTICATION SYSTEM USING BRAIN SIGNATURES FOR INDIVIDUALS

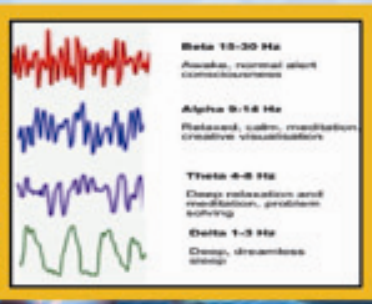
RESEARCHERS

Ms. Hema C.R.
Mr. Adzizul Adzlan Bin Osman

CONTACT ADDRESS

Ms. Hema C.R.
Lecturer
School of Mechatronic Engineering
Universiti Malaysia Perlis
02600, Pauh, Perlis, Malaysia
Email: hema@unimap.edu.my





PROBLEM STATEMENT

Biometric systems have been in existence since 500 B.C., both physiological and behavioral characteristic of human have been used to design biometric systems, however most of the practical modes are not foolproof, identity can be stolen or duplicated. Hence there is a continuous search for failsafe biometrics. Brain signature is a novel promising infallible biometric system more suitable for authentication.

INTRODUCTION

Biometric identification is, simply, the technique of verifying a person by a physical characteristic (physiological) or personal trait (behavior). Biometrics offer automated methods of identity verification or identification on the principle of measurable physiological or behavioral characteristic such as fingerprint or a voice sample. Biometric systems can be used in two different modes. Identity authentication occurs when the user claims to be already enrolled in the system; in this case the biometric data obtained from the user is compared to the user's data already stored in the database. Identification (also called search) occurs when the user's biometric data is matched against all the records in the records in the database as the user can be anywhere in the database or he/she actually does not have to be there at all.

Biometric technology systems available today are not suitable for high security authentication system as they can be easily duplicated. The existing biometrics technology is more suitable for identification rather than authentication.

DISADVANTAGES OF EXISTING BIOMETRICS FOR AUTHENTICATION APPLICATIONS

- Fingerprint – can be easily duplicated
- Iris recognition - changes for people with diabetics
- Hand geometry – not useful in cases of hand injury.
- Facial recognition – can be easily fooled with scanned copies
- Speaker verification – voice changes with age and infections to vocal cords.

PRODUCT DESCRIPTION

The Biometric Authentication system comprises of an acquisition unit, a processing unit and a display unit. Signal Processing and Artificial Intelligence is used to process the brain signatures collected through EEG electrodes. Beta waves are used to extract brain signature of individuals. An authentication algorithm compares the brain signature of a person with the existing database to identify and authenticate the individual for access into a secure environment.

INVENTIVENESS

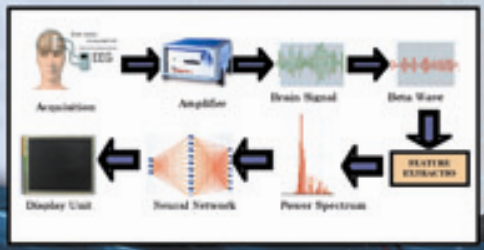
- Only two electrodes are required to capture the brain signal.
- Unique patterns of individuals are recorded in database to avoid duplication
- Accuracy level is 98.5%
- One of its kind in Malaysia and Asia

ADVANTAGES OF THE BRAIN SIGNATURE AS A BIOMETRIC MODALITY

- It is confidential (as it corresponds to a mental task),
- It is difficult to mimic (as similar mental tasks are person dependent),
- It is almost impossible to copy (as brain activity is sensitive to the stress, the mood of the person, an aggressor cannot force the person to reproduce his/her mental pass-phrase).

COMMERCIAL POTENTIAL

- Simplifed signal acquisition techniques
- Very effective for high security facilities such as bank lockers, Government office, Military ...
- Effective protocol, impossible to duplicate



NOVELTY

Parameter	Brain Signature	Iris Recognition	Hand Geometry	Facial Recognition
Uniqueness	Very Unique	Very unique	Less unique	Less unique
Permanence	High	Moderate	Average	Average
Accuracy	Very Accurate	Not accurate with eye infections	Not accurate with hand injuries	Less accurate
Duplication	Impossible	Possible	Possible	Possible