National Aeronautics and Space Administration

HeartBeatID - Heart Electrical Actions as Biometric Indicia

NASA has developed and patented a new biometric technique to verify an individual's identity. This invention, the heartbeat system, provides a method and associated system for authenticating or declining to authenticate an identity asserted by a candidate person. Typically, one or more biometric indicia, such as fingerprints, voice-prints, retinal scans, and facial features may be used to identify, or to authenticate the asserted identity of a user who seeks access to a given resource. The new system can be used in everything from replacing an individual's PC passwords to accessing a bank account.

This invention is available for licensing from NASA's space program to benefit U.S. industry.

Technology Details

Cardiac muscle is myogenic and is capable of generating an action potential and depolarizing and repolarizing signals from within the muscle itself. An Intrinsic Conduction System (ICS), a group of specialized cardiac cells, passes an electrical signal throughout the heart.

Patent

This technology has been patented.
U.S. Patent No. 8,489,181
(Reference No. ARC-16373-1)

Benefits

- Physiological parameters
- Living biometric characteristics
- Accuracy and precision
- Ability to identify if a subject is already in the database
- Friendly Graphical User Interface
- High speed due to C++ code
- Portability to mobile platforms
- Highly secure • High universality
- High Uniqueness

This technology is a method and associated system to identify a person based on the use of statistical parameters, peak amplitudes and/or time interval lengths and/or depolarization-repolarization vector angles and/or depolarization-repolarization vector lengths for PQRST electrical signals associated with heart waves.

The statistical parameters, estimated to be at least 192, serve as biometric indicia to authenticate or to decline to authenticate an asserted identity of a candidate person. There are three "on-line" modes of operation – enrollment, verification, and identification as well as two "off-line" modes – statistics and settings. In enrollment, the raw electrocardiography (ECG) signal is processed and the results, in the form of parameters, are serialized and saved. Verification and Identification procedures use the feature parameters for recognition (classification) of subjects based on the same kind of parameters (features) of heartbeats extracted from the ECG signal of a person to be verified or identified.

Commercial Applications

- Identity verification
- Mobile biometrics
- Network login solution
- Time and Attendance
- Logical access control
- E-commerce and Web applications
- Homeland Security / Airports / National ID documents
- Justice/Law enforcement
- Banks and financial institutions
- PC/Laptop security
- Healthcare biometric

Illustration of electrical activity of the human heart

Contact the Ames Technology Partnerships Office at 1-855-627-2249 or ARC-TechTransfer@mail.nasa.gov