USING BITALINO DEVICE IN ELECTROCARDIOGRAM

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Annotation: *In the article the processing of the results of cardiography by using mathematical methods and computer technology, development of methods, algorithms and software for the expression of cardiogram signals in the form of time functions, their application to accurate cardiography results, spectral analysis of cardiogram signals are implemented.*

Key words: *Biomedical, biosignal, electrical biosignals, bioelectrical signals, EEG, ECG, EOG, EMG.*

Biomedical signals are physical representations of physiological processes occurring in a living organism, which can be measured and presented in a form convenient for processing with the help of information technologies. According to the mechanism of their formation, biosignals of living organisms are divided into two main groups. The first group includes biosignals associated with the formation of physical fields of biological origin in the body. As a rule, they describe the functioning of individual organs and functional systems. The second group includes biosignals associated with changes in the physical properties of biological tissue sites that occur under the influence of physiological processes. Variable biosignals describing the heart, central nervous system, musculoskeletal system, neuromuscular conduction, etc. are of diagnostic importance.

Electrical biosignals, or bioelectrical time signals, usually refers to the change in electric current produced by the sum of an electrical potential difference across a specialized tissue, organ or cell system like the nervous system. Thus, among the best-known bioelectrical signals are:

Electroencephalogram (EEG)

Electrocardiogram (ECG)

Electromyogram (EMG)

Electrooculogram (EOG)

Electroretinogram (ERG)

 Electrogastrogram (EGG)

 Galvanic skin response (GSR) or electrodermal activity (EDA)

EEG, ECG, EOG and EMG are measured with a differential amplifier which registers the difference between two electrodes attached to the skin. However, the galvanic skin response measures electrical resistance and the Magnetoencephalography (MEG) measures the magnetic field induced by electrical currents (electroencephalogram) of the brain.

With the development of methods for remote measurement of electric fields using new sensor technology, electric biosignals such as EEG and ECG can be measured without electric contact with the skin. This can be applied, for example, for remote monitoring of brain waves and heart beat of patients who must not be touched, in particular patients with serious burns.

Electrical currents and changes in electrical resistances across tissues can also be measured from plants.

Biosignals may also refer to any non-electrical signal that is capable of being monitored from biological beings, such as mechanical signals, acoustic signals, chemical signals and optical signals .

Bitalino is created as a complex of modular blocks, consisting of the following autonomous mobile devices with maximum versatility:
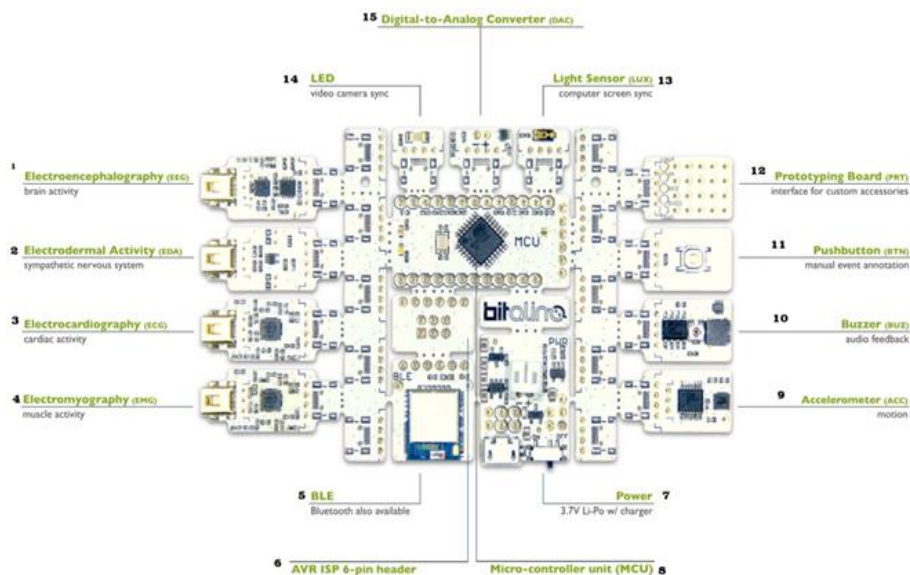

Figura 1.   General scheme of the Bitalino device

1. Electroencephalogram (EEG) - recording of the bioelectrical activity of the brain using an electroencephalograph;

2. Electrodermal activity (EDA) – is a feature of the human body, and it causes continuous changes in the electrical properties of the skin;

3. Electrocardiogram (ECG)– recording the bioelectrical activity of the heart with the help of electrodes placed on the skin as a graph of voltage resistance;

4. Electromyography (EMG) - electrodiagnostic medical method for recording and studying bioelectrical activity through muscles;

5. BLE Bluetooth– wireless data transmission;

6. AVR ISP 6-pin header – six pairs of controllers

7. Power – (on) to like and (off) to delete;

8. Micro – controller unit (MCU) - ATME to 328P digital microcontrollers is a microcircuit designed to control electronic devices

9. Accelerometer (ACC) - movement;

10.   Buzzer (BUZ) - audio feedback;

11.   Pushbutton (BTN) - manual process;

12.   Prototyping Board (PRT) - additional part connection interface;

13.   Light sensor (LUX) - sync computer screen;

14.   LED – video camera;

15.   Digital to Analog Converter (DAC) – converting an analog signal to a digital signal;

Figura 2 . The result obtained from the ECG of the Bitalino device from the bioelectric activity of the heart

This device records biosignals (biocurrents) generated in the human body through a highly sensitive bitalino device equipped with sensors.