

Electromyography is a diagnostic procedure widely used in medicine for muscle performance assessment, however it can be also used for estimation of muscle flexion force, allowing for recognition of movements and gestures performed by the person tested. While a number of research works respective to development of an interface using muscle biopotential exists, they all take the same conservative approach which does not exhaust the subject.

The first, major objective of the described project, is to develop new techniques for analyzing signals from the forearm muscles. The authors of the draft wanting to improve existing methods of gestures detection based on electromyographic signal measurement (muscle activity), determining the strength of muscle contraction and its fatigue, propose for this purpose examination of methods previously used in the analysis of static images and video. This study will help to develop better, more reliable and more responsive human-computer interfaces based on measuring the activity of the muscles of the forearm. Natural alternative way of communication with the computer is to perform gestures with hand, therefore the tests algorithms will focus mainly on the forearm muscles. Moreover, developed algorithms may also be useful in medical diagnosis of skeletal muscle diseases, as well as determining the progress of the patient in the rehabilitation process.

The second objective of the project is to create a publicly accessible database of electromyographic signals collected during the project period and its corresponding positions of the hand/fingers and other data relevant for the measurement. It is planned to create a database containing data collected from 50 participants in the study. Measurement of muscle activity will be performed using a non-invasive method of measuring on the skin surface of the forearm. Position of the hand and fingers will be recorded by a data-glove currently under development by the authors' team, which will determine the bending angle of individual phalanges. The creation of this database type is of particular importance, because today no public forearm activity database with such a broad scope/size exists. Developed data will allow scientists from around the world, for fair comparison of their algorithms and to facilitate the presentation of scientific achievements. Currently, the detection subject matter of hand gestures, by measuring forearm muscle activity is a scope of interest of many academic centers around the world.