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Automatic food intake detection for swallowing sounds

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Obesity may be a reason to generate a number of health problems like heart disease, hypertension, diabetes, cancer and is now also considered a risk for cardiovascular disease. Knowledge can be gained about obesity and eating disorders by looking at the eating behaviors of the individuals. Different types of food intake behavior are recognized. Period of food intake, differentiation between solid and liquid food intake, food type recognition, amount of ingested food are the important parameters to understand the ingestion behavior of a person. Various methods have been suggested to measure food intake which includes observation, weighed food records, estimated records, diet history, food-frequency questionnaires, food recall methods etc. For measuring energy intake indirect method of food intake through the use of doubly-labeled water has been used as a gold standard to assess other methods. People who want to lose weight and monitor their intake would love to have a device that can objectively monitor their ingestive behavior over time and the device also used for behavioral modification programs. A simple and noninvasive system is developed in which piezoelectric sensor is used to acquire swallowing signals in real time by placing over the laryngopharynx. Piezoelectric sensor converts vibration signals from the surface of the skin rather than pick up waves of sound pressure, thus reducing the ambient noise. A Flex sensor is used for recording the hand movement. Coiflet5 wavelet is used for removal of noise. The swallow signal from the human is acquired in real time using the hardware. The recorded swallow signals are directly fed to the sound card of the computer from where the signal is acquired, filtered, processed and analyzed using MATLAB. The developed system is cost effective as no external interfacing circuitry is required. A methodology of studying of ingestive behavior by non-invasive monitoring of swallowing (deglutition) has been proposed based on data from sensors that may be implemented in a wearable monitoring device.

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