

Modern, wearable sensor systems for biomedical engineering require the processing and transmission of an increasing amount of data. Designing such solutions should take into account both energy and teletransmission aspects. The algorithm developed for the smart sensor may be particularly useful, e.g. in rehabilitation systems with real-time data visualization, where slow movements are monitored. Reducing the refresh rate for data representing the rotation of a single smart MoCap sensor, e.g. to a few Hz, is achieved by changing the length of transmitted frames, which saves energy. On the other hand, in the case of monitoring dynamic movements, e.g. sports ones, the algorithm will increase the frequency of refreshing the position of the smart sensor in order to obtain smooth mapping in real time. Regardless of the frequency of sending frames, complete data representing the rotation of the sensor are transmitted, which allows for maintaining measurement precision.

Another developed algorithm - dedicated to the IMU system (sensor glove) - controls data transmission via the WiFi module. Depending on the dynamics of hand movement, the algorithm changes both the number of transmitted frames and their length, while limiting the amount of transmitted information, which reduces the energy demand of the radio module, but also significantly reduces the load on the WiFi network. This data transmission procedure does not deteriorate the quality of the monitored signal. The completed research shows that the new data processing and transmission algorithms used in sensor systems allow for improvement of energy parameters (battery operation time) and teletransmission parameters (reduced network load).

The reduced structure of the smart sensor was also verified. Using only a microcontroller, implemented in the radio module for the acquisition and processing of data regarding motor movements, allows for effective control of the game in a virtual or extended environment.