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WEARABLE MOUSE PROJECT

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The development of rapid prototyping and the availability of low-cost electronic components provide opportunities to create innovative and functional devices in a short period of time that can be used in everyday activities and improve the quality of life. Modification and upgrading of standard devices should be done in a way that provides intuitive operation for users accustomed to typical solutions and allows them to see the benefits of using newly designed devices.

The goal of the project was to design a wireless computer mouse in the form of a wristband, which allows the user to control the cursor on the computer screen by rotating the wrist. The main aims of the project were to create an ergonomic user interface that would allow easy control of the mouse cursor along with button operation, while being made of easily accessible components. The project was developed at the Łukasiewicz Research Network - Krakow Institute of Technology (in Zabrze) as part of a student internship, and the subsequent stages of work were planned over a period of four weeks.

An accelerometer was used to measure the acceleration generated during wrist movement. The selection of a suitable sensor during the design of a wearable computer mouse has a significant impact on the precision of cursor control by hand movements. A comparison of the performance of two sensors was made: BNO550 - which includes an accelerometer, gyroscope and magnetometer, and LSM6DS3 - which allows the measurement of values from the accelerometer and gyroscope. The signal obtained from the two accelerometric sensors was analyzed in terms of the noise level and the reconfigurability of the sensor. After comparing the parameters of the sensors and the received signals, the LSM6DS3 sensor was used in the project, which was characterized by the presence of lower noise and lower current consumption than the BNO550.

During the experiments, it was noted that the optimal way to control is to use the acceleration values measured by the sensor, taking into account the range of movement of the wrist when controlling the cursor, adjusting the speed of cursor movement to the change in the angle of the hand with respect to the transverse plane.

The mechanics of the device are designed to minimize the limitation of the hand's grasping ability when using the designed interface to move the cursor, focusing on maintaining an intuitive operation. The final result of the project was the creation of a wearable mouse. Designed device can enable and facilitate cursor control for people with disabilities or partial paresis of the upper limbs.