

ABSTRACT

The use of inertial sensors in gait analysis has become popular, but there is often noise in the data recorded by inertial sensors. Therefore, it is necessary to use digital filters to remove the noise and improve the accuracy of the analysis. One of the filters used is the Butterworth Filter. Butterworth filters are able to dampen irrelevant high frequency components in inertial sensor data. This research aims to implement Butterworth filter for gait analysis. Tests were conducted on three trials, namely adults, elderly, and stroke patients. Roll and pitch data were measured before and after filtering using the Butterworth filter. The test results showed significant improvement in data stability after the filtering process. In the pre-filtered test, the results for adults showed roll values ranging from 19.05° to 19.80° and pitch ranging from 3.71° to 5.14°. For the elderly, roll values ranged from -3.79° to -12.78° and pitch between 4.74° to 6.03°. In stroke patients, roll values ranged from -12.87° to -11.79° and pitch between -9.16° to -7.93°. After filtering using Butterworth, the roll and pitch values for adults became more stable with roll values ranging from 12.11° to 14.40° and pitch between 13.69° to 15.19°. For the elderly, roll values ranged from -1.95° to -3.13° and pitch between 8.93° to 11.36°. In stroke patients, roll values ranged from 2.39° to 3.62° and pitch between -5.65° to -6.46°. These results show that the use of Butterworth Filter is effective in reducing noise and stabilizing the signal compared to before filtering.

Keywords: *Gait analysis, Butterworth, Inertial Sensor, Stroke*