Device for Movement Analysis Using Inertial Sensors

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Abstract

Currently, the inertial sensors are more widely used, and their price is decreasing. The lower price allows creating new solutions with lower costs. Some examples can be found in wearable devices, mobile phones, navigation or control systems. There are several devices for various use cases on the market.

These devices usually cover their use cases and do not have any additional features like power independence, enough logging memory or openness for user code. The remaining hardware that fulfills all the conditions above is usually expensive.

I have developed a new wearable independent device for capturing and processing the measured data. The independence means no external wires and no external power supply here. The device is able to work outdoors, to log the measured data and to provide a direct output based on internal computations. The user can choose between completely wireless communication or wired connection to other electronics. The sensors measure inertial, attitude, position and atmospheric values.

For outdoor testing of the device I have selected the task about movement analysis of a horse. I placed the devices on the horse's body as wearable devices and I was developing algorithms for determination of the basic types of its movement – stand, walk, trot, canter or gallop.

In general, the developed device can be used for capturing data from sensors, onboard data processing, navigation or control of moving mechanics. The electronics work independently, so it is easy to install it on the measured or controlled objects.

Keywords

Electronic Device, Printed Circuit Board, Inertial Sensors, Inertial Measurement Unit, Internet of Things, Movement Analysis, Horse