Improvement Position Calculation in IMU Sensors

Proposal Text

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I. Introduction

Motion capture systems operate in many sectors. These systems are basically divided into two as optical systems and inertial systems. This study, which will be done using IMU sensors under the title of inertial systems, aims to provide computational improvements in sensor fusion systems. The study will include a data collection station which include one 10 DOF IMU, a WiFi-connected microcontroller and a SD card reader. After data collection, data will be processed over MATLAB.

II. Data Collection Station Design

There will be a microcontroller able to Wi-Fi connection, and SD card reader in a plastic box. There will be 10 DOF IMU sensors, a led and a button on the box. The data collection station will have two modes.

The first mode will read data from the sensor and write to the SD card. Meanwhile, the status led will blink red. It will write the time, accelerometer, gyroscope, compass and pressure data to the file which is csv data format in the SD card.

In the second mode, the data collection station will act as a Wi-Fi server. A researcher connected to this server will be able to download csv data files from a web interface page.

III. Originality of the Study

Unlike the algorithms available in the literature, it is expected to calculate the position data closer to the real position by including the different calculations to be applied and the offset values to be determined in the location calculation process. After the positive results that can be obtained, the system will be able to work with less errors for a longer period of time. The factors that will have a positive effect will be, additions sensors, sensor fusion algorithm improvements and Kalman filtering.

IV. Method

Sensor fusion algorithm will be run on the acceleration, angle and compass data obtained from the IMU sensor. The algorithm to be obtained as a result of the study will add the displacements to the previous position and return the new position as output, depending on the operating speed of the IMU sensor. In this system will try to obtain the best result by correcting the data with auxiliary sensors and Kalman filtering. These calculations will be made with the MATLAB program.

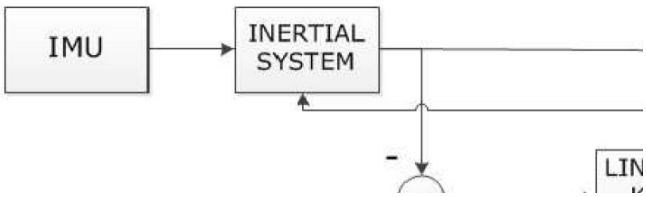

Figure 1. Planned algorithm

V. Widespread Effect

The widespread effect of this study is that the use of IMU sensors will become more common, as IMU sensors used in many areas work with less error and get good results even in low-cost versions.

The fact that computer interactions will increase and the quality of life will increase with the better operation of the IMU sensor technology, as well as contributing to better detection of treatment methods such as physical therapy, constitute the widespread impact added values of this research.