Pedestrian Dead Reckoning System based on multi-sensor data fusion

Pedestrian dead reckoning system (PDR) based on inertial and magnetic measurement units is currently a research hotspot. Compared with the Global Positioning System (GPS), PDR has unique advantages. It can provide navigation information in an environment where satellite signals are blocked. The accuracy of the sensor, drift, deviation error and the local magnetic field all affect the accuracy of the PDR. In this study, a data fusion method based on multi-sensor and Kalman filtering is proposed. This method uses the data collected by the dual foot-mounted sensors to detect the gait cycle, and realizes the accurate extraction of the gait cycle at different motion speeds (walking, running, etc.); uses the inertial navigation system to calculate the kinematic parameters such as speed, position and heading, and combines Kalman filter performs error compensation, so as to achieve accurate calculation of motion parameters and achieve pedestrian trajectory tracking. Experimental results show that the proposed method can effectively extract the gait period at different speeds and achieve accurate calculation of parameters.

老师修改后：

Pedestrian Dead Reckoning System Based on Multi-Sensor Data Fusion

Nowadays, pedestrian dead reckoning system (PDR) based on inertial and magnetic measurement units （IMU） is a research hotspot. Compared with the Global Positioning System (GPS), PDR has advantages of not being limited by environmental conditions. It can provide navigation information where satellite signals are blocked. However, the position accuracy of the PDR is easily affected by the error of the IMU sensors (e.g. drift, deviation error, etc.)and local magnetic field. In this study, a Kalman Filter based multi-sensor data fusion method was proposed to realize accurate indoor pedestrian dead reckoning. This method used the data collected by the dual foot-mounted sensors to detect the gait cycle, and realized the accurate extraction of the gait cycle at different motion speeds (walking, running, etc.). In order to achieve accurate calculation of motion parameters and achieve pedestrian trajectory tracking, first, the inertial navigation system was used to calculate the kinematic parameters including speed, position and heading, then a Kalman Filter was used for error compensation, finally, the parameters calculated by the system are compared with the data output by the optical motion capture system (VICON). Experimental results showed that the proposed method can effectively extract the gait cycle at different speeds and achieve accurate calculation of position parameters.