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. Experimental results showed that the proposed method can effectively extract the gait period at different speeds and achieve accurate calculation of position parameters.