

Low-Cost High-Precision GNSS: Challenges and Opportunities

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Mass-market applications, ranging from self-driving cars, unmanned aerial vehicles to handheld smartphones, are increasingly demanding high-precision from GNSS and GNSS/INS integrated navigation systems. This expectation is driven by increased availability of carrier phase measurements from very low-cost GNSS chipsets and modules that are widely used in mass-market applications and the advance of low-cost MEMS inertial sensors. While with great opportunities, precise GNSS positioning using low-cost GNSS sensors faces some significant challenges as current high-precision GNSS techniques, either based on real-time kinematic (RTK) or precise point positioning (PPP) techniques, are based on high-end GNSS receivers. In addition to precision, high availability and reliability requirement in mass-market applications presents further challenges to precise positioning with low-cost GNSS sensors. The application of low-cost MEMS inertial sensors for integration with GNSS faces similar challenges due to such as large sensor errors and biases. This presentation will discuss challenges and opportunities of low-cost precision GNSS and GNSS/INS integrated navigation systems to mass-market applications along with latest progresses in technology development in the area with a focus on the efforts made by the Positioning and Mobile Information Systems group at The University of Calgary.