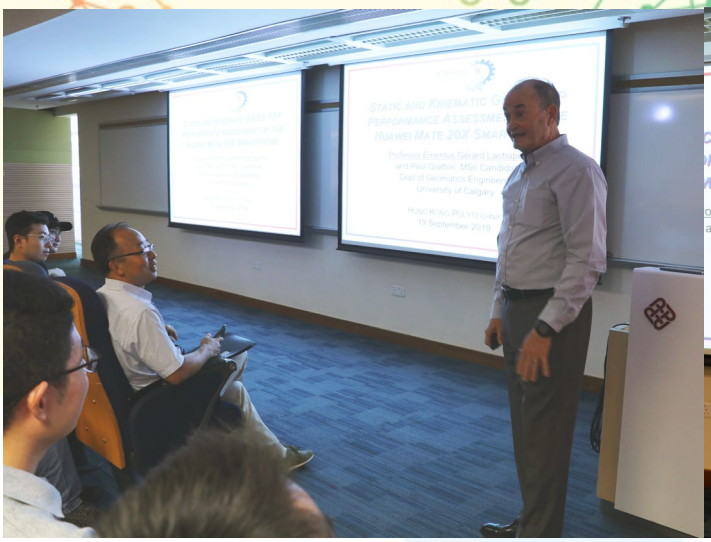
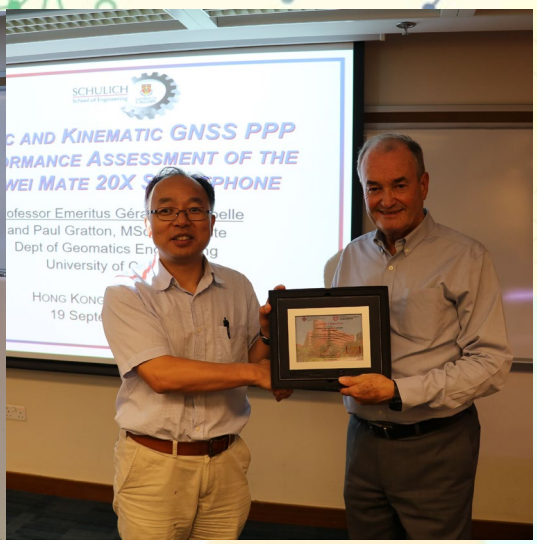
LSGI Distinguished Lecture Series

"Static and Kinematic GNSS PPP Performance Assessment of the Huawei Mate 20X Smartphone"

Overview

It was our pleasure to invite Professor Emeritus Gérard Lachapelle, Department of Geomatics Engineering, University of Calgary, Canada, to deliver a seminar of the LSGI Distinguished Lecture Series on 19 September 2019.





Biography

Professor Lachapelle has been involved in GNSS R&D since 1980. He worked in industry for eight years and was a founding member and Executive VP of Nortech (Surveys) Canada Inc. and Norstar Instruments whose pioneering efforts with GNSS technologies were a major part of Canada's success and strong international presence in the development, and manufacturing of GNSS products and services. He became a professor at the University of Calgary in 1988 and was department head from 1995 to 2003. He held research chairs in wireless location for 14 years. He and his colleagues created the PLAN Group, which developed numerous novel algorithms, processes, software and patents that were licensed worldwide. He is now professor emeritus. He trained 140 MSc and PhD students who are contributing to the GNSS industry and academia worldwide. He has received numerous awards for his contributions, including the Institute of Navigation Johannes Kepler Award in 1997 and is Fellow of IEEE, the Royal Society of Canada, the Institute of Navigation, the Royal Institute of Navigation, the International Association of Geodesy and the Canadian Academy of Engineering. He holds degrees for Laval University, the University of Oxford, the University of Helsinki and the Technical University at Graz.

Static and Kinematic GNSS PPP Performance Assessment of the Huawei Mate 20X Smartphone

Android smartphones with raw GNSS data recording capability is now available from many manufacturers. Code and carrier phase measurements continue differ in quality between units. In March 2019, a new Huawei unit, namely the Mate 20X, became available. The Mate 20X outputs GPS L1 and L5, GLONASS L1, Galileo E1 and E5a, Beidou B1, and QZSS L1 and L5. Two units (to test repeatability) was procured and assessed by the author and his colleague, MSc candidate Paul Gratton

during Spring and Summer. While code measurements were found to be relatively noisy and prone to multipath in view of the limitations of the inverted planar antenna, which is used in all smartphones till now, the carrier phase measurements were found to be impressive in quality. The performance assessment results reported in the presentation consist of the following: (1) Code noise and multipath using the code-minus-carrier (CMC) method under low and high multipath, (2) same as above using an external geodetic antenna, (3) use of GPS and Galileo dual-frequency measurements to estimate the effect of the ionosphere with internal and external antennas, (4) static PPP using GPS and GPS/GLONASS as a function of measurement time, and (5) kinematic PPP using GPS and GPS/GLONASS. All tests reported in the presentation were conducted simultaneously with a high-end geodetic receiver (Leica GS16) in order to independently assess the measurements. Two important conclusions are that (i) the Mate 20X carrier phase data continuity and accuracy are excellent, (2) and the impact of using an external geodetic antenna on code measurement quality is major.