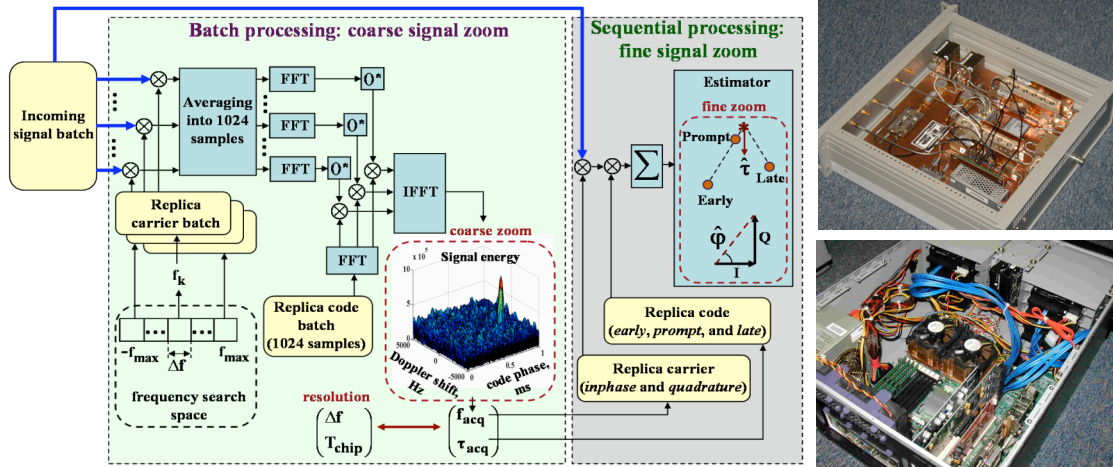


Transform-Domain Instrumentation GPS Receiver (TRIGR)

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Sponsor: Federal Aviation Administration (FAA)



Transform-Domain Instrumentation GPS Receiver (TRIGR). Left: Architecture for GPS C/A Code Acquisition and Tracking. Top right: Dual-frequency front-end. Bottom right: TRIGR host computer with Field-Programmable Gate Array and RAID array storage.

A Transform-Domain Instrumentation GPS Receiver (TRIGR) is under development for high performance GPS measurements. The receiver is currently capable of precise (mm-accurate) reconstruction of dynamic motion trajectories at a high update rate (e.g. 100 Hz). The TRIGR has a dual-frequency (L1/L2) front-end with a full 24-MHz bandwidth at each frequency as well as a high dynamic range without automatic gain control (AGC) made possible by 14-bit samples. This enables TRIGR to process interference and jamming signals without the need for AGC adjustments. Furthermore, no short-cuts have been taken in the radio frequency (RF) front-end design. All RF samples can be streamed continuously to disk at data rates of up to 108 megabytes per second. The latter enables realtime playback of the collected samples. Processing is performed in both time and frequency domains as well as the joint time/frequency domain. Demanding operations are implemented on a Field-Programmable Gate Array, while logic control is implemented on the host computer. Some applications for TRIGR are: SAR motion compensation, deep GPS/INS integration, Ladar stabilization and motion compensation, signal quality monitoring, aircraft flexure compensation, ionospheric scintillation monitoring, satellite signal testing, truth trajectory systems, precision guidance and control.

Further reading: A. Soloviev, S. Gunawardena and F. van Graas, "Development of High Performance High Update Rate Reference GPS Receiver," Proceedings of the Institute of Navigation Satellite Division GNSS05 Meeting, Long Beach, CA, September 2005.