Complete Hardware and Software Solutions for the Design & Development of Advanced GPS Systems

Software Suite

CRS has developed entirely software based single and dual frequency GPS receivers, a GPS signal simulator and various other associated software modules and hardware units. The software modules allow easy configuration of improved GPS receiver architecture design and development. A graphical user interface is provided for ease in designing and developing new and improved architectures.

The modules are based on CRS's Windows based Impulse Software System for development of complex systems. It offers high fidelity, rapid execution, scalability, interface to doctrinally correct modules, and built-in analysis.

The Software GPS modules can be configured as an excellent simulator for the development of new and improved GPS receivers. Once the simulation is completed, the software modules (in tuned C) can be directly implemented in host processors (PC, DSP, FPGA or ASIC) for real-time applications. All the necessary modules are available.

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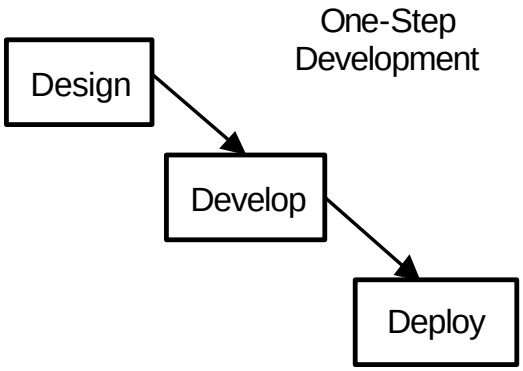
Developed under SBIR funding for ONR, the Open Architecture Receiver allows the use of building block hardware and software modules to construct full functioning GPS receivers in matter of minutes. This allows rapid prototyping and production in a one-step process.

Features

- Fully open architecture.
- C/A code, P code, codeless or semi codeless operation.
- Single, dual or multiple frequency (L5 capable)
- Multiple Antennas allow STAP type processing (for multipath, interference etc.)
- Ability to visualize signals from any module
- Building blocks based on tuned C code, allowing real-time implementation (PC, DSP, FPGA or ASIC)



In conjunction with CRS GPS Signal Simulator, the Software Receiver allows developers to rapidly design and test new GPS algorithms and techniques. Starting from supplied model receiver, or from scratch, the user can quickly implement any development idea and test it in the same software. A software GPS receiver can also be directly used for non-real time receiver applications. Various improved front ends for single, dual and triple frequencies are available. A Front End with multiple antennas allows beamforming, space-time adaptive processing (STAP), interference mitigation, and multipath mitigation.

Advantages/Software GPS Receiver

- Rapid transition from design to implementation
- Easily adapted for new applications
- Immediate comparisons of different architectures during development
- Simplified upgrades

Various hardware modules compatible with the software-based system are available.

These include:

1. GPS Receiver Front Ends: Available for single, dual and multiple frequencies. Multiple antennas.
2. GPS Data logging system: RAM or disk based data recording at up to 120 MBPS on L1 and L2.
3. Hardware pre-processors (FPGA correlators, DSP pre-processors etc.) for real time Receivers

Hardware modules are highly modular allowing the users to mix and match various building blocks to optimize the desired performances. The modularity offers flexibility, compatibility, future upgrades and prevents obsolescence.

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A software based signal simulator is also available

The open-architecture software system allows simulation of GPS signals under a variety of conditions in an extremely convenient manner. The schematic based system can be used to simulate signals from multiple satellites. It can be used to synthesize the signals at any location on Earth or in space. Multiple antennas can be simulated. It can be used to model various effects, such as:

Scintillation, Interference and jamming; narrow-band, wide-band and directional, High-dynamics; specified orbits, Wavefront Simulation at multiple antenna locations, Plasma re-entry bodies, Obscuration, Multi-path effects, Ocean scattering

The full GPS constellation is available, for both L_1 and L_2. M-code simulators will be available in September, 2001. All the necessary modules for user-defined systems are provided.

Hardware implementation is under development.

Some Applications

- Simulation and development tools
- Design and testing of new hardware
- Development of new frequencies, waveforms
- Adapt to special applications (anti-jam, snapshot processing, anti-scintillation, high dynamics, etc.)
- Fast acquisition in FFT, multipath monitoring and mitigation, STAP processing, joint detection and tracking, covert operation degraded S/N, Direct Y code acquisition
- Controlled testing using the software simulator
- Allows precise simulation of conditions not possible with conventional systems

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Advancing Technology

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