GPSTk: An Open Source Toolkit for Working With GPS Data

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Abstract
Applied Research Laboratories, The University of Texas at Austin (ARL:UT) has established a open-source software project called the GPS Toolkit (GPSTk). In this paper we present an overview of GPSTk focusing on architecture. Emphasis is given to the design and implementation of the virtual architecture. The GPSTk is designed in such a way that it can be extended easily, providing the user with the flexibility required to address diverse GPS-related problems. The virtual architecture is one of the key design principles in the GPSTk. A virtual architecture is a design in which software is not bound to a specific hardware platform. This means that it is possible to build software that can run on different hardware platforms.

What is the GPSTk?

The GPSTk is an open source toolkit for working with GPS data. It provides a comprehensive set of tools for processing and analyzing GPS data. The toolkit includes applications for processing GPS raw data, generating TEC maps, and more. The GPSTk is designed to be flexible and extensible, allowing users to add new functionality as needed.

Why is the GPSTk Licensed?

The GPSTk is released under the terms of the Lesser General Public License (LGPL). This license allows users to use the software for both commercial and non-commercial purposes. The LGPL is designed to encourage software sharing and collaboration by ensuring that software can be freely distributed.

What is the advantage of an object-oriented design?

Object-oriented design is a programming paradigm that allows for the creation of classes and objects. It is an advantage because it allows for code reuse and easier maintenance. In the GPSTk, the virtual architecture is an object-oriented design, which makes it easier to extend the toolkit and add new functionality.

A Cycle Slip Detection and Estimation Example

Cycle slips occur when a GPS receiver loses lock, which can happen due to signal anomalies or changes in the receiver's environment. In the GPSTk, cycle slips are estimated using a chi-square minimization algorithm. This algorithm is used to identify cycle slips and estimate their magnitude.

Total Electron Content (TEC) Maps

TEC maps are used to visualize the total electron content in the ionosphere. In the GPSTk, TEC maps are generated using a dual frequency model and ionosphere correction. The maps are then used to estimate the total electron content and provide an indication of the ionosphere's health.

What do I need to use GPSTk?

To use the GPSTk, you need to have some basic knowledge of GPS technology and programming. The toolkit is written in the C programming language, so familiarity with C is required. Additionally, you will need to have a C compiler and a development environment set up.

What’s in the Future for GPSTk?

The GPSTk is an ongoing project, and future plans include adding new features and improving existing ones. The team is continually working on new research problems and looking for ways to make the toolkit more useful for a wide range of users.

Where can I get GPSTk?

The GPSTk is available for download from the project's website. The website contains documentation, user guides, and other resources to help get started with using the toolkit. Additionally, the website includes a forum where users can ask questions and share experiences.