



華南農業大學

本科毕业设计

基于虚拟仪器技术的 GPS 信息采集系统

摘 要

近几年，以全球定位系统（Global Positioning System，GPS）为代表的定位与导航技术迅速发展，已经进入国民经济的各相关领域中，尤其是在农业相关研究领域获得越来越广泛的应用。GPS 以其高精度、全天候和高效率的特点完全可以胜任设备定位以及数据传输的需求，因此，如何合理、高效的获取 GPS 定位信号是目前定位与导航技术领域中研究的热点课题，也是本设计的研究目标。

本文阐述了目前国外定位与导航技术的发展现状、研究成果以及存在的问题，并详细介绍了在此基础上针对应用系统开发中 GPS 设备与 PC 的联机通信及信息提取问题。在分析 NMEA-0183 协议的基础上，探讨了 GPS 信息采集与解析的关键技术与方法，并利用虚拟仪器技术和 LabVIEW 软件编写了 GPS 信号采集程序建立了 GPS 设备与 PC 间的串行通信。

本研究设计的 GPS 信息采集系统使用 LabVIEW 软件采集 Trimble 5700 GPS 接收机输出的定位信息。GPS 接收机与计算机的串口相连，LabVIEW 程序从计算机串口读取 GPS 信息并实时、准确的显示出来。在定位数据动态、实时可视化的同时，将原始数据进行保存用于后续进一步分析。实验结果表明，设计的 GPS 信息采集系统能够实时采集 GPS 定位信息并显示其运动轨迹，其功能达到了最初的设计目标。

本设计对 GPS 应用系统开发、工作状态监测、信号质量评估、导航仪性能分析等具有实用价值，也可作为定位结果优化处理的数据源。

关键词：虚拟仪器 GPS LabVIEW 采集系统

GPS Information Acquisition System Based on Virtual Instrument Technology

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Abstract: In recent years, the rapid development of positioning and navigation technology, represented by Global Positioning System (GPS), has entered in the relevant fields of the national economy. Especially, GPS has been widely used in agriculture related research fields. With the characteristics of high precision, all-weather and high efficiency, GPS is fully capable of positioning and data transmission requirements. Therefore, the reasonable and efficient introduction of GPS positioning technology is a hot topic in the research field of positioning and navigation, and is also the objective of this design.

This paper described the development status at home and abroad, research achievements and existing problems of the positioning and navigation technology, and introduced the GPS -based on-line communication and information acquisition of GPS equipment and PC system. The key technology and method of GPS information collection and analysis was discussed based on the analysis of NMEA 0183 protocol. Virtual instrument technology and LabVIEW software was used to develop a GPS signal acquisition program to establish the serial communication between PC and GPS equipment.

The GPS information acquisition system designed in this study reads the positioning information from a Trimble 5700 GPS receiver by using LabVIEW software. The GPS receiver connects with the serial port of a computer. A LabVIEW program reads GPS information from the serial port and display accurate track on a real time basis. With the dynamic, real-time visualization of positioning data, the original data can be saved for further analysis. Experiments results show that, the GPS information acquisition system can collect real-time GPS positioning information and display the trajectory, which meets the original goals.

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