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A HYBRID EMBEDDED DEVELOPING AND DEBUGGING SYSTEM FOR HIGH-PRECISION SATELLITE NAVIGATION TERMINAL DESIGN

Abstract

The embedded system developing tools are necessary to the process of designing and developing satellite navigation terminal. However, it is often time-consuming and labor-intensive for traditional developing way to debug the embedded system, which would increase the cost of the navigation applications.

This paper proposes an efficient manner by establishing a hybrid simulation and testing platform and apply it to a high-precision GNSS receiver design. Firstly, it turns to acquire data at the speed as high as 380MB/s based on the AD data from USB3.0 data acquisition board. Secondly, it realizes integrated embedded function without actual circuit by setting up the hybrid simulation environment, which is comprised of the data acquired, Hardware Description Language (HDL) and C language. The efficiency of developing and debugging could be multiple increased, with the illustration of loss and reacquisition efficiency improvement. Thirdly, a high-precision GNSS Software-defined Receiver (SDR) is built with combination of the data, Matlab and C language. It could accelerate the iteration and debugging of the algorithm, with the instance of channel tracking.

The system described above could record the running data for a long time, restore any scene at the PC end and add new functions, which has shifted most of the work from the embedded end to the PC end. It might greatly shorten the period of product development and debugging.

At last, the results of 12 channels tracking of GPS L1 and BDS B1 show that the proposed approach is cost-effective and multifunctional, making it suitable for satellite navigation terminal design.