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基于Pcap01芯片的高精度微电容检测系统设计

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摘　要：

本文介绍了一种基于Pcap01的微弱电容检测系统的硬件、软件设计和实验测试。系统硬件主要由微电容测量芯片Pcap01、单片机STC12LE5A60S2最小系统以及供电电路构成。系统软件包括下位机的C程序和基于Labview软件实现的上位机。下位机实现了电容数据采集、Pcap01与单片机之间的SPI通信以及将数据发送给上位机的功能。上位机可实现数据处理、实时显示以及测试数据的存储。实验测试结果表明，该系统的数据检测均误差可低至2.9093fF。系统具有精度高，抗干扰性强，实时性的特点，实现了电容式生物传感器与接口电路的集成。

关键词：电容式生物传感器；微弱电容检测；Pcap01；STC12LE5A60S2；C程序；Labview

Design of High-precision Micro-capacitance Detection System Based on Pcap01

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Abstract:

The hardware and software of micro-capacitance detection system based on Pcap01 is designed and tested in the paper. The hardware is made of micro-capacitance detection chip Pcap01, the minimum system of microcontroller STC12LE5A60S2 and the power supply circuit. The software system consists of lower computer written using C program and host computer written using Labview program. The lower computer can realize the acquisition of capacitance data, the SPI communication between Pcap01 and the microcontroller, and send the data to the host computer. The host computer can realize the data processing, real-time display and data storage. Based on the experiments, the average detection error is as low as 2.9093fF. The detection system has the characteristics of high precision, high anti-interference and real-time. The system promotes the integration between the capacitive biosensor and the interface circuit.

Keywords: capacitive biosensor; micro-capacitance detection; Pcap01; STC12LE5A60S2; C program; Labview

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