

## 基于SOPC的复合式生理信号检测系统设计

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摘要：

设计完成了一种多生物电信号采集能力并能完成生物电信号模式识别和辅助诊断的复合式生物电信号检测系统。系统通过具备双通道的低噪声高共模抑制比的前置采集放大电路，可实现心电信号和表面肌电信号两种体表生物电信号的检测。通过FPGA硬件化实现的小波分解模块和在NiosII软核中实现的FFT和BP神经网络算法，可以完成对采集到的心电信号心率监测、QRS波群的检测和ST段形态识别反馈监护者的健康信息；并通过提取表面肌电信号活跃段数据和时频域参数为运动性肌肉疲劳评估提供参考。系统通过LCD屏、音频输出和SD卡存储能够完成对信号实时波形和监护参数显示、报警输出和长时间监护数据的存储。

关键词：片上可编程系统；表面肌电信号；心电信号；小波分析；BP神经网络；ST段形态识别

## Design a Composite Bio-signal Monitoring System Based on SOPC

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**Abstract:**

Design a composite bio-signal monitoring system, which is characterized with multi-signal acquisition capabilities and can complete biological signals pattern recognition and aided diagnosis. Clear surface EMG and surface ECG waveform can be detected via different channels of the pre-acquisition amplifier circuit with low noise and high common mode rejection ratio. The wavelet decomposition module integrated in FPGA are used for heart rate and QRS complex detection, and the BP neural network on NiosII soft core has realized the identification of ST segment morphology. The extracted time-frequency domain parameters of surface EMG active segment can provide assessment of muscle fatigue. The system can complete display of the signal waveform and real-time monitoring parameter on the LCD screen, and alarm people by audio speaker, and store prolonged monitoring data on SD card.

**Keywords:** system on programmable chip (SOPC); SEMG (surface electromyography); ECG (electrocardiogram); Wavelet analysis; BP neural network; Identification of ST segment

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