

两足外骨骼机器人足底压力测量系统

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摘要:

为实现两足外骨骼机器人行走过程中的步态识别, 需精确、可靠的获取其足底压力载荷的分布情况。研制一种高灵敏度具有强抗偏载能力的小型轮辐式足底压传感器, 并针对该传感器输出电压只有几十微伏的微弱信号特点设计制作了具有斩波自稳零功能的多路前置信号放大调理电路板。为减小温度等因素产生的非线性差, 设计了传感器恒电流源供电模块。系统采用基于PC的控制器, 多通道信号高精度同步采样, 通过实际样机试验表明电路实现增益放大的同时输出噪声峰峰小于3mV, 且长时间样机试验, 信号几乎不存在零漂, 具有较好的稳定性。系统结构合理, 可靠性高, 可适用于仪表信号的处理。

关键词: 外骨骼机器人, 足底压力, 斩波稳零, 前置放大, 同步采样

Measurement system for plantar pressure of biped exoskeleton robot

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Abstract:

To identify the gait of exoskeleton robot in walking, the information of plantar pressure should be obtained with high precision and reliability. A miniature structure of sensor with high sensitivity is presented, which can avoid being influenced by offset load. Considering the extremely weak sensor signal, A pre-amplification circuit based on chopper-stabilized technology is designed and produced. By the constant current power supplying, sensor's nonlinear error caused by temperature is maximally reduced. Measurement system is based on PC controller, and it allows multi-channel to be sampled simultaneously with high precision. It has been shown by experimentation that the noise of final signal output is only 3mV P-P, and Zero Drift is almost nonexistent. This design can be applied to instrument signal conditioning.

Keywords: Exoskeleton robot; Plantar pressure; Chopper-stabilized; Pre-amplification; simultaneous sampling

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