

基于多传感器集成的仿人机器人足部感知系统

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摘要：

足部是仿人机器人本体支撑的基础，也是唯一与地面接触并发生相互作用的主要部件，其各种地面信息获取能力是机器人实现仿人的自然性稳定行走控制的关键。本文基于六维力传感器、惯量测量单元和柔性触觉阵列传感器，设计了一种新型仿人机器人集成化足部感知系统(IPFS)，具备对各种地面环境识别和足部姿态获取、足底与外界接触位置的实时感知和估计、有效支撑区域、地面反力以及姿态等信息的感知能力。实机实验结果表明足部感知系统较好的满足仿人机器人理论化和实用化需求，为促进仿人机器人理论研究、控制技术、仿生步态规划及其体系结构的创新提供了实验研究平台。

关键词：仿人机器人, 足部感知系统(IPFS), 六维力传感器, 惯量测量单元, 柔性阵列力传感器

A Perceptual Foot System of Humanoid Robot based on the Integration of Multi-sensors

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Abstract:

It is well known that the foot of humanoid robot serves as not only the main part contacting with the ground but also the unique foundation for supporting the body. The capability of various kinds of ground information detection is certainly used as the key control of walking steadily and naturally for humanoid robot. A new-type perceptual foot system with perceive ability to detect and process various kinds of information (such as foot posture, support area, ground force and position, etc.) in complicated environments was designed on the integration of 6-axis force sensor, inertial measurement unit(IMU) and flexible array sensor. Theoretical analysis and simulation results have proved the feasibility of the design, which provides research platform in promoting the innovation of humanoid robot for theoretical research, control technology, bionic gait planning and system structure.

Keywords: Humanoid robot, IPFS, F/T sensor, IMU, flexible force array sensor (FFAS)

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