Humanoid Group Technology report

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Outline

- Why humanoid robot
- MIH-1 overview
- MIH-1 hardware
- MIH-1 software
- Current Status & Problems
- Short-term goal
Why humanoid robot?

- Work in highly polluted environment
- Use tools, vehicles and so on
- Interact with human naturally
- Test what we have learnt from psychology and cognitive science
- The dream
MIH-1 Overview

- Height 798mm
- Width 385mm
- Depth 208mm
- Weight 26kg
- DOF 25 (12 of legs, 1 of waist, 10 of arms, 2 of head)
- OS Windows2000/XP
- Sensor Not yet
- Power 1600W DC power on line
MIH-1 Hardware-Framework
MIH-1 Hardware

主控制板

- 图像传感器
- USB-CAN卡
- 话筒及麦克风

CAN总线

- 左手控制器
  - 驱动电路及关节电机
  - 压力，角度，加速度传感器

- 左腿控制器
  - 驱动电路及关节电机

- 头部控制器
  - 驱动电路及关节电机

- 右腿控制器
  - 驱动电路及关节电机
  - 压力，角度，加速度传感器

- 右手控制器
  - 驱动电路及关节电机
MIH-1 Hardware – Motion Controller
MIH-1 Hardware – Motion Controller
MIH-1 Hardware – Motion Controller

- Power
- CAN bus
- DSP
- TMS320LF2818
- RAM
- CPLD
- 电源
- 复位电路
- 看门狗
- 关节驱动器接口
- 传感器
- 传感器
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MIH-1 Hardware – Motion Controller

- Power-On
- Manual
- DSP
- WDT

- Power

- DSP

- CAN bus

- CPLD

- RAM

- Joint Driver Interface

- Sensor

- Sensor
MIH-1 Hardware – Motion Controller

- PWM Controller to Driver
- FR Controller to Driver
- Enable Controller to Driver
- Break Controller to Driver
- Dir Driver to Controller
- Speed Driver to Controller
MIH-1 Hardware – Motion Controller
MIH-1 Hardware – Motor Driver

Driver MC3003

Motor controller MC33035

MC3486 & 74LS74

Motor Speed adapter MC33039
MIH-1 Hardware – Motor Driver
MIH-1 Software
Current Status & Problems

- Mechanism framework implemented
- Motion Controller without memory extend and RS232 expand implemented
- Motor Driver implemented
- Motion Controller code
- Software without control algorithm implemented
Current Status & Problems

- **Mechanism**
  - Two DOF in hipbone failed
  - The weight, transmission clearance
  - ...

- **Motor Control**
  - Position control static error
  - ...

- **Software**
  - Real-time
  - Synchronization
  - ...
Short-term goal

- For mechanism (D.P. Xing, Nuo Wang)
  - Fix potential problems
- For hardware (Yi Zhang)
  - Motor controller methodology (the board, the code)
  - Install sensors: Force (A/D), Angle/Angle acceleration(RS232), Location (RS232)
  - Memory extended
  - RS232 extended
- For software (Breen Yang)
  - Real-time & synchronization problem
  - Server-client structure?
- Algorithm (D.P. Xing)
  - Bipped control algorithm
Thanks!