

Humanoid Soccer Robot Design by TKU Team for Humanoid League of RoboCup 2011

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A humanoid soccer robot named HIWIN MAN and designed by the TKU team with HIWIN Company to attend the humanoid league of RoboCup 2011 is described. A platform for the study of biped walking control is designed and implemented. First, a mechanical structure with 23 DOF (degrees of freedom) for this humanoid robot is described. The architecture and electronic components for system are also presented, webcam, gyro and accelerometer can help robot to obtain the information from the environment, communicate with other robots by wireless network. In order to design the robot locomotion control, a human-machine interface is implemented to study the locomotion control design of biped robot. From the practical experiments, HIWIN MAN can be a soccer robot to decide some actions to get up from a fall, find a ball, walk to an appropriate position, and kick a ball autonomously. The specifications of HIWIN MAN are described in Table 1.

Table 1. Specifications of the HIWIN MAN

Specifications							
Name	HIWIN MAN						
Height	55 cm						
Weight	3.7 kg						
Walking Speed	15cm/sec						
Mechanism System							
		Number of DOF	Actuator Torque(kg/cm)	Actuator Speed (sec/60°)			
Head	Neck	2	16.5	0.196			
Trunk	Waist	3	37.7	0.126			
Legs	Hip	3 (×2)					
	Knee	1 (×2)	64.4	0.188			
	Ankle	2 (×2)	38.52	0.129			
Arms	Shoulder	2 (×2)	16.5	0.196			
	Elbow	1 (×2)					
	Wrist	1 (×2)					
Total		23					
Electronic System							
Sensors	Webcam		320x240 resolution				
	Accelerometer		3-axis				
	Gyro		300 degree/sec				
Processor	RoBoard		Intel Pineview-D510 Processors, 45nm process				
Power	Lithium battery		1 DC Power Jack with 9-24V Power Input				