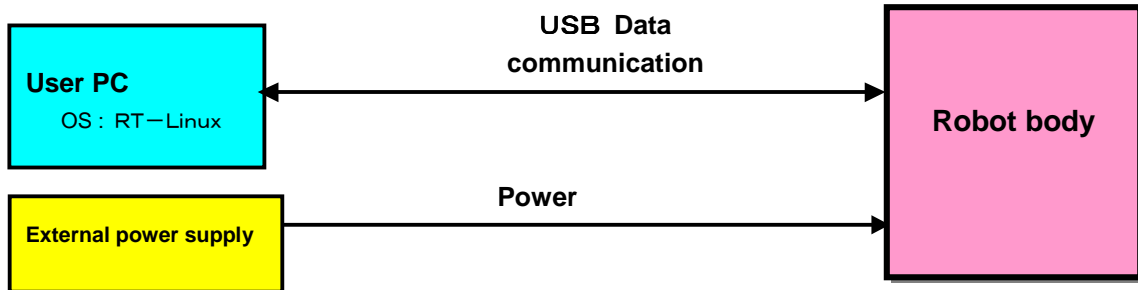


HOAP-2 Design Specification

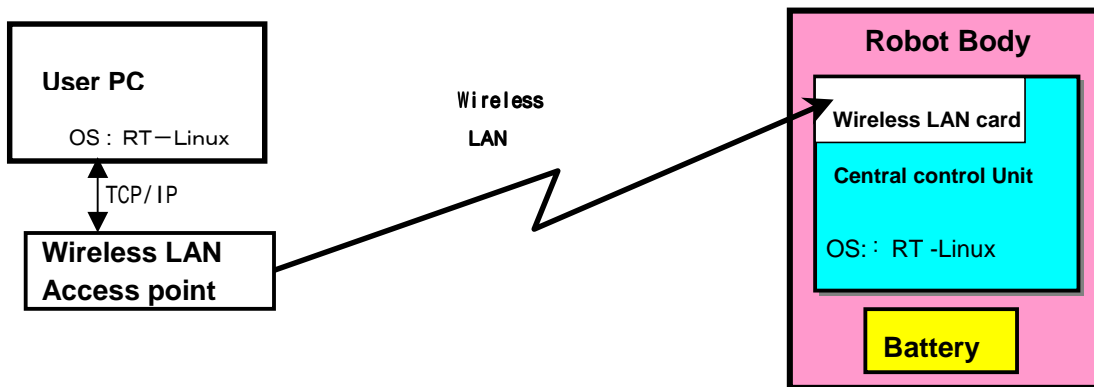
1. System

1.1 System configuration

The following illustration shows both available forms of configuration, the wired mode and the wireless modem (wireless mode is available as an option). In the case of the wired mode, the controlling host computer is a separate, user PC and the power source is an external power supply unit. In case of wireless mode, CPU unit inside of robot body is used as control host computer, command transmission is done from user PC via wireless LAN. Power supply is used internal battery.



Drawing 1 Wired mode configuration



Drawing 2 Wireless mode configuration (In case using wireless option)

1.2 Connection/communication system between Robot and User PC

Wired mode : USB Cable USB - 1.0 - 12Mbps

Wireless mode: Wireless LAN 2.4GHz band Wireless LAN 11Mbps
(Refer: Transmission distance 50m)

1.3 Real time control host computer of Robot

Wired mode - User PC

Wireless mode - CPU unit internal robot body

1.4 OS

RedHat Linux7.3

RT-Linux3.2 pre1

Linux kernel 2.4.18

1.5 Internal buss system of robot

USB - 1.0 - 12Mbps

1.6 Robot whole control cycle

1m sec (max.)

*Data transmission and reception cycle between real time control host and all local CPU

*Due to system configuration at the time of shipping

1.7 Joint reckless safety countermeasure

Local CPU reckless System re-set by watch-dog timer

Other Joint motion condition decision firm inside local CPU

Emergency switch inside of robot body is co-used with power switch of motors

1.8 Battery

Form : NiMH

Voltage - 24VDC

Capacity - 2150mAh

Charging system - Off-line charging at outside body by exclusive charger

1.9 Outer power supply

DC24VDC – 6.5A

2. Robot

2.1 Robot weight

Less 7.0 kg include battery

2.2 Robot size

Height - Less than 500mm (nominal 500mm)*

* Excepting Antenna for Wireless LAN Card

Width - less 250mm (nominal - 245mm)

Depth - less 160mm (nominal 157mm)

2.3 Joint freedom degree and joint composition

Total 25 degree of freedom

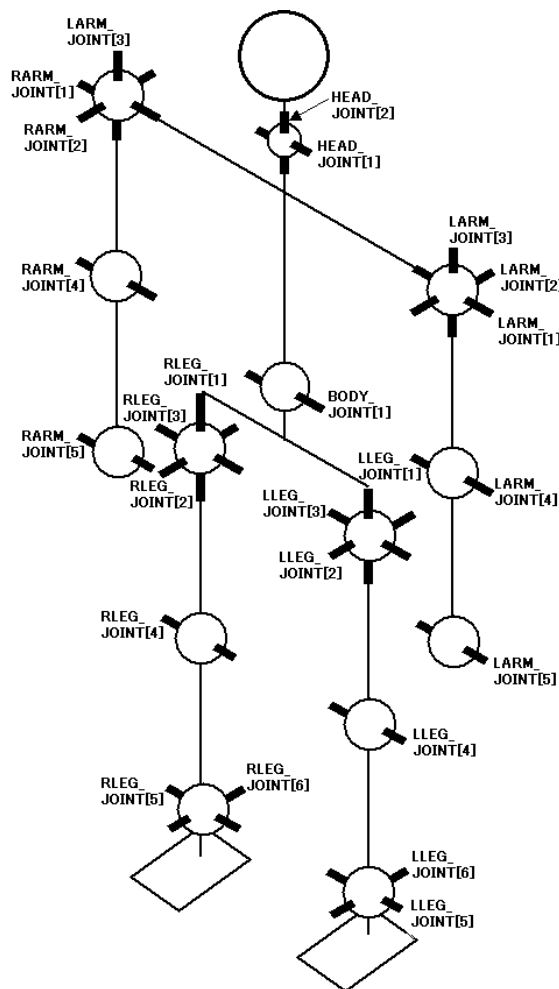
Waist: 1 degree of freedom

Legs: 6 degrees of freedom x 2

Arms: 4 degrees of freedom x 2

Hands: 1 degree of freedom x 2

Neck: 2 degree of freedom



Drawing 3

2.4 Joint absolute angle standard

Data pre-set that robot install on joint

Initialization jig.

2.5 Joint location and kinds of actuators, also motion range

Table 1.Joint location and allowance motion

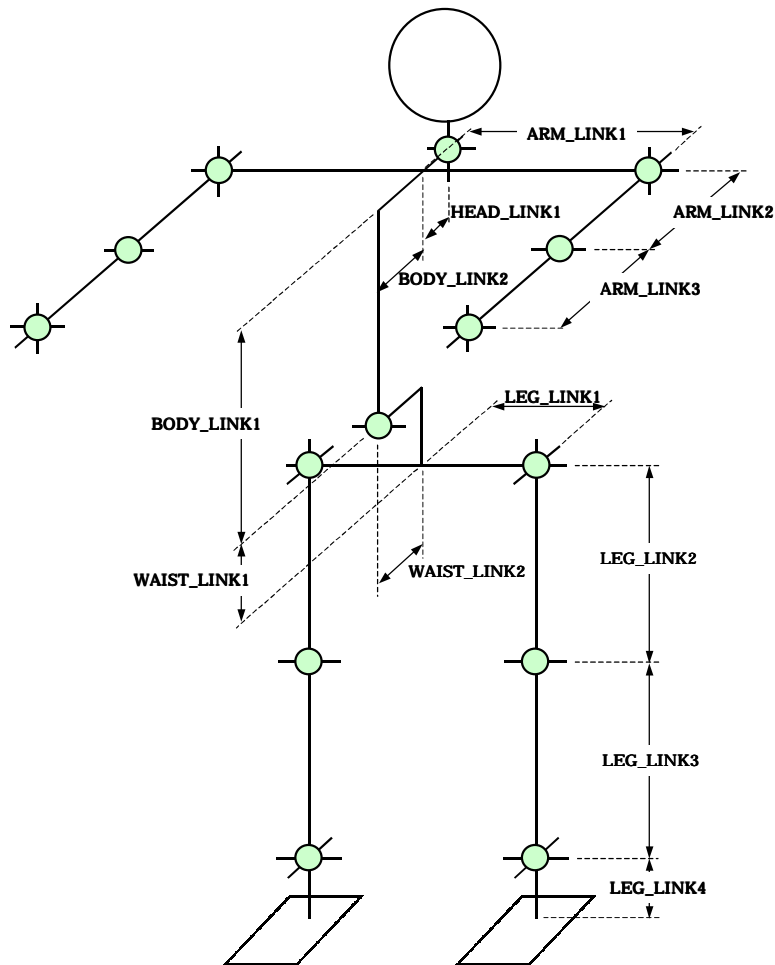
Part	Joint name	motion	Motor ID No.	Application actuators	Motion range[deg]	
					Min.	Max.
Right leg	RLEG_JOINT[1]	right thigh joint twist	M01	Type-2 motor	-91	31
	RLEG_JOINT[2]	Right thigh joint left & right	M02	Type-3 motor	-31	21
	RLEG_JOINT[3]	Right thigh front & back	M03	Type-2 motor	-82	71
	RLEG_JOINT[4]	Right knee	M04	Type-3 motor	-1	130
	RLEG_JOINT[5]	Right ankle front & back	M05	Type-2 motor	-61	61
	RLEG_JOINT[6]	Right ankle left & right	M06	Type-2 motor	-25	25
Left leg	LLEG_JOINT[1]	Left thigh joint twist	M11	Type-2 motor	-31	91
	LLEG_JOINT[2]	Left thigh joint left & right	M12	Type-3 motor	-21	31
	LLEG_JOINT[3]	Left thigh front & back	M13	Type-2 motor	-82	71
	LLEG_JOINT[4]	Left knee	M14	Type-3 motor	-1	130
	LLEG_JOINT[5]	Left ankle front & back	M15	Type-2 motor	-61	61
	LLEG_JOINT[6]	Left ankle left & right	M16	Type-2 motor	-25	25
Right arm	RARM_JOINT[1]	Right shoulder front & back	M07	Type-2 motor	-91	151
	RARM_JOINT[2]	Right shoulder left & right	M08	Type-2 motor	-96	1
	RARM_JOINT[3]	Right shoulder twist	M09	Type-2 motor	-91	91
	RARM_JOINT[4]	Right elbow	M10	Type-2 motor	-115	1
	RARM_JOINT[5]	Right finger open & close	-	Radio control servo motor	-60	60
Left arm	LARM_JOINT[1]	Left shoulder front & back	M17	Type-2 motor	-91	151
	LARM_JOINT[2]	Left shoulder left & right	M18	Type-2 motor	-1	96
	LARM_JOINT[3]	Left shoulder twist	M19	Type-2 motor	-91	91
	LARM_JOINT[4]	Left elbow	M20	Type-2 motor	-115	1
	LARM_JOINT[5]	Left finger open & close	-	Radio control servo motor	-60	60
waist	BODY_JOINT[1]	Waist front & back	M21	Type-3 motor	-3	90
head	HEAD_JOINT[1]	Neck twist	-	Radio control servo motor	-60	60
	HEAD_JOINT[2]	Head front & back	-	Radio control servo motor	-15	60

Caution 1 This table becomes the basic setup value of movement range limit of software.
Operation inside this 1deg is assured by the actual joint movement.

2.6 Foot sole sensor

Four separation loads are detected as the AD change data by a in resistance change of FSR of 4 pcs/leg set up at the foot sole.

These data are changed into the load and the ZMP data by using the fixed operation.



Drawing 4 Parameter definition of HOAP-2 link length

2.7 Link Parameter

Table2.Ling length

Link	Length
ARM_LINK1	0.100m
ARM_LINK2	0.101m
ARM_LINK3	0.146m
LEG_LINK1	0.039m
LEG_LINK2	0.100m
LEG_LINK3	0.100m
LEG_LINK4	0.037m
BODY_LINK1	0.090m
BODY_LINK2	0.0315m
HEAD_LINK1	0.0025m
WAIST_LINK1	0.055m
WAIST_LINK2	0.034m