Intelligent Robot

High-Speed Stand-alone Embedded System mounted
Intelligent Biped Robot

ROBONOVA AI 3

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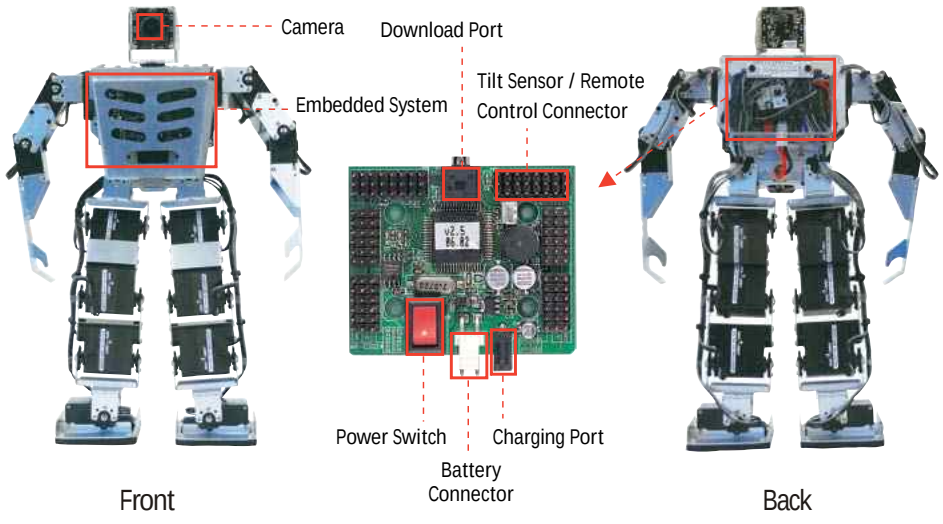
ROBONOVA AI 3

ROBONOVA AI 3 is an intelligent 16-joint biped robot with an MR-C3024 controller board capable of controlling 32 servo motors simultaneously. It has an Amlogic embedded processor for high-resolution image acquisition, image processing and intelligence algorithms.

By equipping the existing biped robot with a brain board and a visual module, it is possible to perform intelligent actions as well as perform simple robot operations that were previously made and stored in the PC.

ROBONOVA AI 3 is an intelligent motion robot that processes video and vision algorithms. It is an optimal platform to provide future intelligent robot education environment.

Configuration and name of each part



Main exercise

Intelligent Robot control test through 64bit embedded system

- Embedded system programming exercise based on Linux Kernel Ver 3.16.57
- Image data processing and recognition processing through visual module
- Intelligent control through UART (communication with robot control board by UART)
- Image processing and robot vision algorithm exercise
- Real-time image processing, tracking and recognition algorithm exercise using OpenCV Library

Color Recognition

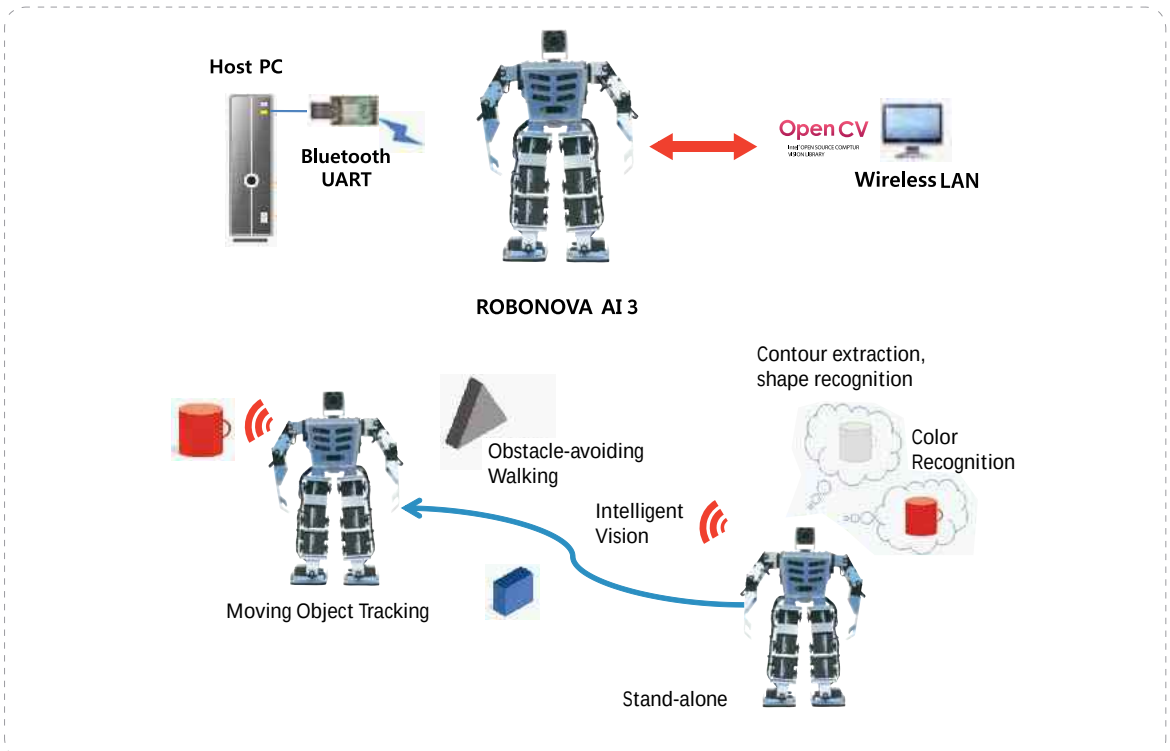
Edge Extraction

Brightness Recognition

Object Recognition

Bipedal Robot intelligence control project exercise with cognitive ability

- Embedded system programming, motor control, image processing, and machine vision
- Project exercise and capstone course application for robot contest platform (Taekwon Robot, etc.)

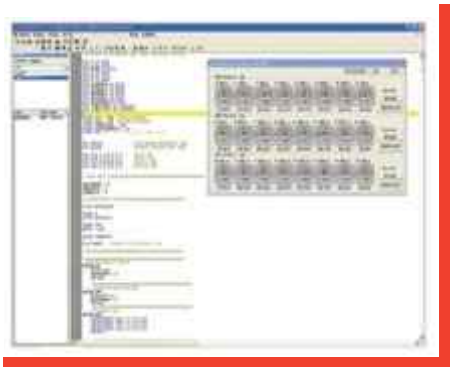


Main exercise

Biped Robot basic control exercise using control board (MR-C3024)

- Basic operation control test using ROBOBASIC and ROBOSCRIPT(ROBOBASIC v2.6 includes its own commands for robot control in addition to BASIC language and provides real time motor control program for multi-joint robot control for easy programming of robot operation)
- Robot operation control exercise using remote controller

Robo basic motor control



Robo basic real-time servo motor control

Training contents

Contents

Controlling Intelligent Biped Robot with Robonova AI 3

1. Introduction to Robot
2. Structure of Intelligent Biped Robot
3. Development Environment of Intelligent Robot
4. Brain of Intelligent Robot
5. Controlling Operation of Intelligent Robot
6. Vision of Intelligent Robot
7. Image Processing for Intelligent Robot
8. Robot Control by Brightness
9. Color Recognition Robot
10. Moving Object Tracking Robot
11. Shape Recognition Robot using Circularity
12. Position finding Robot
13. Taekwon Robot

Product configuration

ROBONOVA AI 3 Body

User Manual and CD

Remote Controller

Charger

Stereo Cable

AC Adapter

Bluetooth Master

Hardware Specifications

Module	Specifications
Robot Body	HSR-8498 Digital Servo Motor x 17r
	Control Pulse neutral : 1500us/0~180o, ±1100 ~ 1900
	Pulse Cycle : 12 ~ 26ms (common : 21ms)
	Dimensions / Weight: about 310x180x90mm / about 1.3kg
	Power Source: Li-ion 2900mA rechargeable battery 1 EA
Operation Control Board	24 servo motors
	32 input/output ports (I/O)
	3 PWM signal ports
	8 channel A/D conversion function
	Serial control function (VB, VC++ controllable)
	LCD module drive command function
	High-speed serial communication (UART) function
	Built-in flash memory
	Using ROBOBASIC V2.5 or higher
	Serial I.F cable downloading
	RC wireless remote control available
	Built-in wireless remote control
	Apply tilt sensor
Brain Board	CPU : Amlogic ARM Cortex-A53 1.5GHz quad core
	GPU : Mali-450
	Memory : 2Gbyte DDR3 SDRAM
	Gigabit Ethernet
	eMMC5.0 HS400 Flash Storage slot / UHS-1 SDR50 MicroSD Card slot
	HDMI 2.0 4K/60Hz display
	40pin GPIOs + 7pin I2S
Visual Module	Video pixel: 1920x1080
	Output image format: YUV2/MJPEG
	Frame rate: 1280x720@30fps MJPEG, 1920x1080@30fps MJPEG

Software Specifications

Module	Specifications
Operation Control Board	ROBOBASIC 2.6
Brain Board	OS : Ubuntu 16.04
	Kernel : Linux 3.16.57
	Bootloader : U-Boot 2015.01
	OpenCV : 3.4.2
	Remote Viewer : VNC

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- Robust frame / high-efficiency motor technology integration
- Speed control by PWM technology / RC motor compatible
- Provide optimal robot motion program environment using ROBOBASIC and ROBOSCRIPT
- High resolution camera (Robot vision)
- 1.5GHz Quad Core CPU (Robot Brain) based on ARM Cortex-A53
- Linux 3.16.57 and Ubuntu program development environment
- Real-time image acquisition and image processing
- Real-time video monitoring using wireless LAN
- Robot vision using OpenCV image processing and machine vision algorithm
- Dimension of Humanoid Robot (in mm) - 310 x 180 x 90 approximately

Subject to change - Version 2.0

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