

>>Intelligent Robot

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



HBE-ROBONOVA-AI II

- Use of Robust frame/High-efficiency Motor technology
- Speed Control/RC motor compatibility by PWM technology
- Optimized Robot Motion program environment using ROBOBASIC and ROBOSCRIP T
- High-resolution CCD camera (Robot Vision)
- SamSung Cortex™-A8, S5PV210 based Embedded Board(Robot Brain)
- Linux 2.6.32 Program Development Environment
- Real Time Image Acquisition and Pre-Processing using FPGA
- Real Time Image Processing and Monitoring using Wireless LAN
- Robot Vision Test using OpenCV Library
- Various Motion operations(dance, fighter, game, soccer, obstacle mode)

Introduction

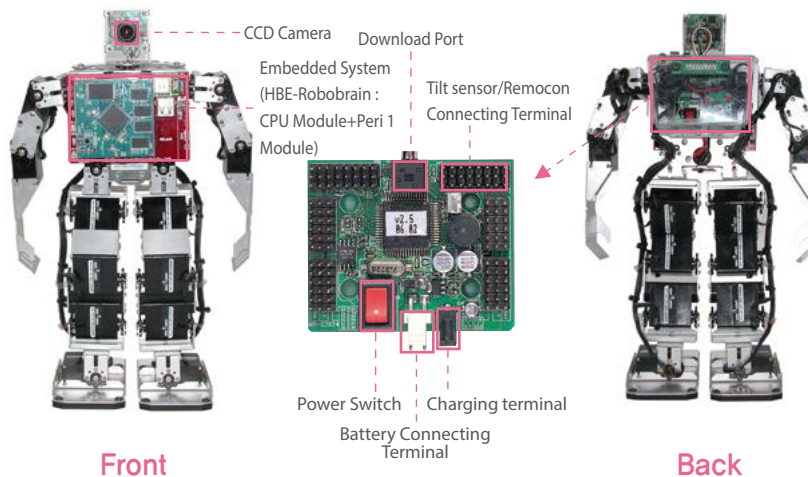


HBE-ROBONOVA-AI II is Intelligent 16-joint Biped Robot which includes S5PV210 embedded processor executing intelligent algorithm, FPGA recognition board of high-resolution CCD image acquisition and Image Processing, and MR-C3024 controller board controlling 32 servo motors simultaneously.

By mounting Brain Board and Vision Module on existing Biped Robot, this can have not only simple operations which have been inputted from PC also intelligent operations.

HBE-ROBONOVA-AI II is optimized Platform which provides Robot intelligent motions and future Intelligent Robot Education environment from image and vision algorithm processing.

Configuration and Names



Hardware Specifications

• Robot Body



Robot Body

MRS-D2009SP digital servo motor x 17EA
Control pulse neutral : 1500μs/0~180o, ±1100~ 1900
Pulse cycle : 12~26ms (common : 21ms)
Dimension/Weight : about 310* 180 * 90mm / about 1.3kg
Power : Nickel-Hydrogen(Ni-MH) 1000mA charger x 1EA



Operation Control Board : MR-C3024

24EA servo motor simultaneous control and 32EA Input/Output port(I/O)
3EA PWM signal port and 8 channel A/D conversion
Serial Control(VB, VC++ controlled)
LCD module operating command and high-speed serial communication(UART)
Program over ROBOBASIC V2.5
Serial I.F cable downloading
RC wireless controller and wireless Remote Controller
Tilt sensor

• Vision Module



CCD Camera

Total Pixels : 542(H) x 492(V) (270,000 pixels)
Electronic Iris(NTSC: 1/60~1/100,000, PAL :1/50~1/100,000)
Auto white balance and digital signal processing
Applied Lens : 3.6, option other lens
Imaging Device : 1/3" Interline Transfer CCD

• Brain Board



HBE-Robobrain

CPU module and Peri- modules of HBE-ROBONOA-AI II brain board platform are mounted for the use.
Use of FPGA for high-speed Image Processing and Image Recognition
Composite Video Input Port of External Camera
Conversion from Analog Video to Digital Video
UART communication Port for Robot Control
Image Data Check by Wireless LAN
CPU console Check with Bluetooth wirelessly
Linux 2.6.32 operating system

※ Specifications can be changed without notice

Intelligent Robot

Autofly_Spring
HBE-RoboEX Series
HBE-SmartCAR
HBE-RoboCAR-Embedded II
HBE-ROBONOA-AI II
HBE-RoboCAR
HBE-MCU-Robot
HBE-RoboBuilder-MSRDS

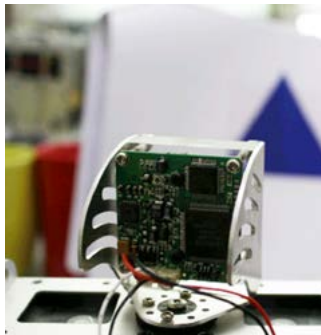
Intelligent Robot

>>HBE-ROBONOVA-AI II

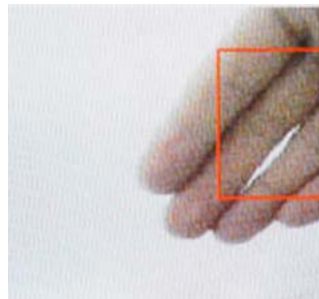
Main Test

• Intelligent Robot Control Test by 32bit Embedded System

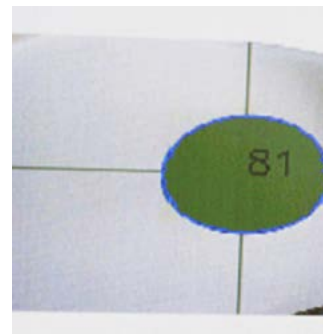
- Linux Kernel Ver.2.6.32 operating system based Embedded System Programming Test
- Pre-Processing and Recognition Processing Test of Image Data inputted via FPGA (Image pre-Processing Processor)
- Intelligent Control of Robot by UART(communication with Robot Control Board by UART)
- Image Processing and Robot Vision Algorithm Test
- Real Time Image Processing, Tracking and Recognition Algorithm Test using OpenCV Library



Color Recognition



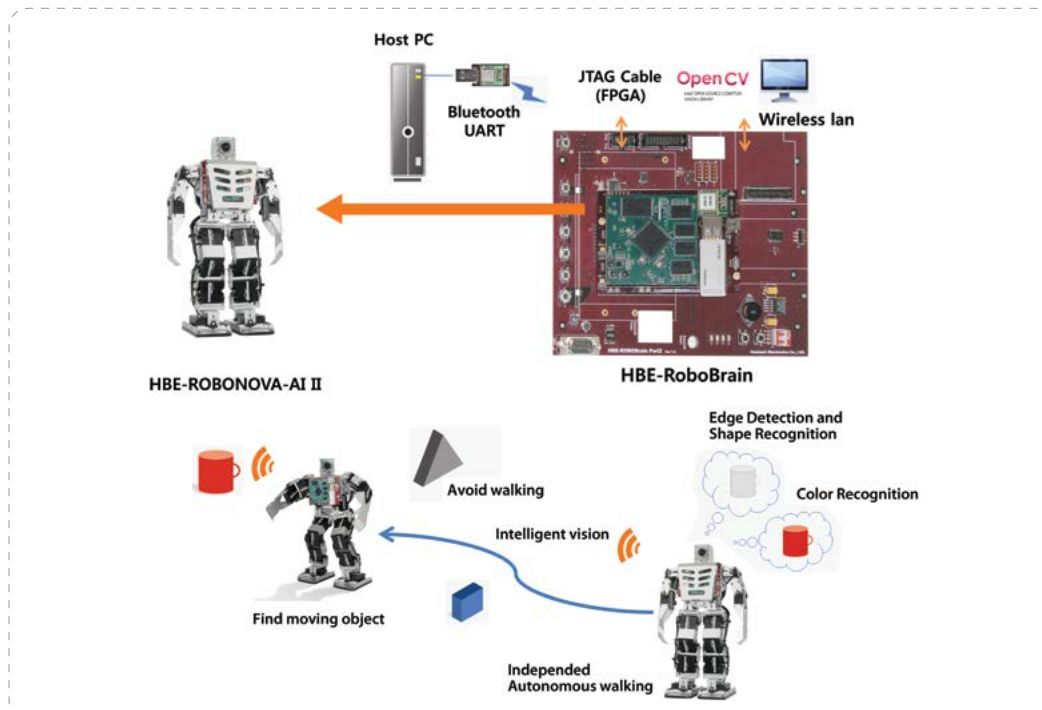
Object Recognition



Shape Recognition

• biped Robot Intelligent Control Project Test including Recognition Ability

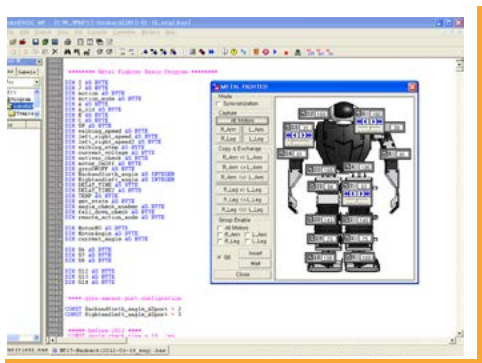
- Embedded system programming, Motor control, Image Processing and Machine Vision combined Intelligent Robot Control Test
- Application to Project Test and Capstone Subject for Robot Contest Platform(Taekown Robot)



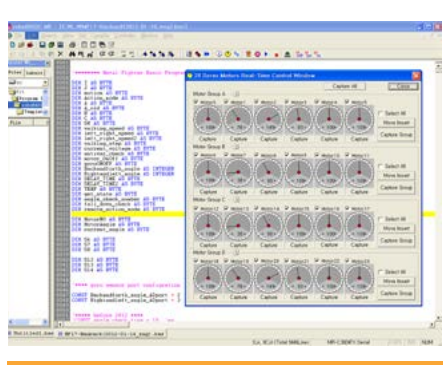
Main Test

• Biped Robot Basic Control Test using Control Board(MR-C3024)

- Basic operation control test using ROBOBASIC and ROBOScript(ROBOBASIC v2.8 includes its own commands for Robot control in addition to BASIC language and provides real time Motor Control Window for multi-joint Robot control for easy programming of robot operation)
- Robot Operation Control Test using Remote Controller



ROBOBASIC Motor Control



ROBOBASIC real time Servo Motor Control

Intelligent Robot

Autofly_Spring
HBE-RoboEX Series
HBE-SmartCAR
HBE-RoboCAR-Embedded II

HBE-ROBONOVA-AI II

HBE-RoboCAR
HBE-MCU-Robot
HBE-RoboBuilder-MSRDS

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With HBE-ROBONOVA-AI II,
Controlling Intelligent Bipeded

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Components



HBE-ROBONOVA-AI II



User's Manual and CD



Remote Controller



Charger



Bluetooth Master Module



Stereo Cable



AC Adapter