GOOGOL TECHNOLOGY

TECHNOLOGY 6DOF industrial robotic arm is a typical industrial robot that is used in automatic pick and place, installation, welding, painting, etc. The new GRB serial industrial robot combines the motion control technology together with advanced educational concept and fulfills both the industrial needs as well as the education and research needs in motion planning and industrial system design.

The robot uses 6-joint in serial design. Each joint uses absolute encoder and high precision harmonic gearbox to ensure the accuracy. Camera, pneumatic tools and some other interfaces are preserved at the end effecter for user to extend the robot for other usage. The robot is controlled by the newly developed VME bus controller which integrates PC, image processing technology, logic control and motion control to achieve high speed, high

#### **Main Features**

#### **Open Architecture Experimental Platform:**

- Based on VME bus open architecture high performance industrial motion controller
- VC++ software and CoDeSys realtime control software
- Visual display for teaching and training makes programming the robot easier
- Detailed operation manual and lab manual

## **Industrial Standard Design**

- In serial structure, absolute encoder and high precision harmonic gearbox
- · Module design, simple and compact
- Preserved extension interfaces
- · High payload, high speed, large work space

#### **Control Software**

**CoDeSys**: Support IEC61131 standard with 6 standard programming languages. The standard is supported by over 150 machine producer. CoDeSys provides user with abounded extensions, e.g. program support different bus types, PLC programming, drivers, display devices etc. The main features of the CoDeSys are:

- Support IEC 61131-3 standard
- RTE (Real Time Extension for Window XP), soft PLC is implemented in XP
- HMI (Human Machine Interface), integrates the display function for PLC programming
- Motion Control Function Block, integrates the motion control and PLC
- ENI (Engineering Interface) Server, interface for auto-manufacturing

# **Suggested Experiments**

- Robot Coordinates Setup
- Forward Kinematics
- Inverse Kinematics
- Motion Planning

### **Research Work**

- Robot Torque Control
- Motion Planning Based on Intelligent Control System and Software
- Vision Servoing
- Remote Network Control, Multi Robot



6DOF Robotic Arm Software Based on CoDeSys



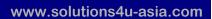
**6DOF Robot Controller** 



Software Interface for C++ Version (English

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Tor	hnical	l Sne	cific	atior

Item         Value           Arm Length         J3 to J2         720 mm           J5 to J3         0.46 mm           J4 to J3         150 mm           Rage of Motion         Radius         R3         356 mm           Range of Motion         J1         ± 180 deg           J2         -100s, +175 deg           J4         ± 180 deg           J4         ± 180 deg           J5         -40, +220 deg           J6         ± 360 deg           Be End Effecter Speed         >80000 mm/s           J1         140 deg/s           J2         180 deg/s           J3         225 deg/s           J4         450 deg/s           J5         450 deg/s           J6         545 deg/s           J3         1310720 pulse /r           J6         555 deg/s           J4         65300 pulse /r           J5         665300 pulse /r           J5         65300 pulse /r           J6         65300 pulse /r				Technical Specification	
Arm Length  J2 to J1 J5 to J3 J4 to J3 J5 to J3 J5 to Mm  Radius  Angle  J1	Item			Value	
Arm Length  J5 to J3  J645 mm  J4 to J3  Radius  Angle  J1  L10  L10  L10  L10  L10  L10  L10			J3 to J2	720 mm	
Second Parameter   Second Para	Arm Length		J2 to J1	150 mm	
Radius   R3   356 mm   356 mm   356 mm   356 mm   356 mm   31   ± 180 deg   32   -105, +175 deg   32   -105, +175 deg   34   ± 180 deg   35   40, +220 deg   36   ± 360 deg	Am Lengui		J5 to J3	645 mm	
Radius   R3   356 mm		J4 to J3		150 mm	
Range of Motion  Range of Motion  Angle  J3  Angle  J3  Angle  J4  J5  J6  J6  J8  J8  J8  J8  J8  J8  J8  J8		Radius	P to J1	1537 mm	
Range of Motion   Angle			R3	356 mm	
Range of Motion		Angle	J1	± 180 deg	
Angle J4 ± 180 deg  J5			J2	-105, +175 deg	
J5	Range of Motion		J3	-235, +85 deg	
B			J4	± 180 deg	
End Effecter Speed			J5	-40, +220 deg	
Max. Speed   J2   180 deg/s   180 deg/s			J6	± 360 deg	
Max. Speed   J3   180 deg/s		End Effecter Speed		>8000 mm/s	
Max. Speed         J3         225 deg/s           J4         450 deg/s           J5         450 deg/s           J6         545 deg/s           J1         2048000 pulse /r           J2         1638400 pulse /r           J2         1638400 pulse /r           J3         1310720 pulse /r           J5         655360 pulse /r           J6         540672 pulse /r           J6         540672 pulse /r           Repeatability         XYY/Z         ± 0.08 mm           J4         0.3 kg*m²           J6         0.2 kg*m²           J8         0.2 kg*m²           Payload         6 kg           Mass         140 kg           VME Controller         PC         X86 Architecture, Celeron 1.6G, USB2.0, 10M/100M Ethernet, Keyboard, Mouse, VGA, CF Card Slot           Umage Processing (Optional)         Dual video input, PAL, NTSC           Temperature: 0-45° C         Humidity: 20-80%RH (No dew.)           Vibration: below 0.5g         Avoid contact with inflammable and corrosive liquid or gas.		J1		140 deg/s	
J4		J2		180 deg/s	
J5	Max. Speed	J3		225 deg/s	
Second		J4		450 deg/s	
Description		J5		450 deg/s	
Payload   Payl		J6		545 deg/s	
Resolution		J1		2048000 pulse /r	
Resolution		J2		1638400 pulse /r	
J4	Resolution	J3		1310720 pulse /r	
Sepentability	resolution	J4		655360 pulse /r	
Repeatability		J5		655360 pulse /r	
Allowable Moment  J5  0.3 kg*m²  0.2 kg*m²  J6  Payload  6 kg  Mass  Axis No.  8-Axis Servo / Stepper Motor  X86 Architecture, Celeron 1.6G, USB2.0, 10M/100M Ethernet, Keyboard, Mouse, VGA, CF Card Slot  Image Processing (Optional)  Installation  Environment  J5  0.3 kg*m²  0.2 kg*m²  8 kg  Axis No.  8-Axis Servo / Stepper Motor  X86 Architecture, Celeron 1.6G, USB2.0, 10M/100M Ethernet, Keyboard, Mouse, VGA, CF Card Slot  Temperature: 0~45° C  Humidity: 20-80%RH (No dew.)  Vibration: below 0.5g  Avoid contact with inflammable and corrosive liquid or gas.		J6		540672 pulse /r	
Allowable Moment  J5  J8  O.2 kg*m²  Payload  Rass  Axis No.  VME Controller  PC  Image Processing (Optional)  Installation  Environment  J5  O.3 kg*m²  O.2 kg*m²  Raybard  Raybard  Raybard  Raybard  Servo / Stepper Motor  X86 Architecture, Celeron 1.8G, USB2.0, 10M/100M Ethernet, Keyboard, Mouse, VGA, CF Card Slot  Dual video input, PAL, NTSC  Temperature: 0~45° C  Humidity: 20-80%RH (No dew.)  Vibration: below 0.5g  Avoid contact with inflammable and corrosive liquid or gas.	Repeatability	X/Y/Z		± 0.08 mm	
Payload 6 kg  Mass 140 kg  Axis No. 8-Axis Servo / Stepper Motor  X86 Architecture, Celeron 1.6G, USB2.0, 10M/100M Ethernet, Keyboard, Mouse, VGA, CF Card Slot  Image Processing (Optional) Dual video input, PAL, NTSC  Temperature: 0~45° C Humidity: 20-80%RH (No dew.)  Vibration: below 0.5g  Avoid contact with inflammable and corrosive liquid or gas.		J4		0.3 kg*m²	
Payload Mass  Axis No.  PC  Image Processing (Optional)  Installation  Payload  Axis No.  Axis No.  B-Axis Servo / Stepper Motor  X86 Architecture, Celeron 1.6G, USB2.0, 10M/100M Ethernet, Keyboard, Mouse, VGA, CF Card Slot  Dual video input, PAL, NTSC  Temperature: 0~45° C  Humidity: 20-80%RH (No dew.)  Vibration: below 0.5g  Avoid contact with inflammable and corrosive liquid or gas.	Allowable Moment	J5		0.3 kg*m²	
Mass  Axis No.  8-Axis Servo / Stepper Motor  X86 Architecture, Celeron 1.6G, USB2.0, 10M/100M Ethernet, Keyboard, Mouse, VGA, CF Card Slot  Image Processing (Optional)  Dual video input, PAL, NTSC  Temperature: 0~45° C  Humidity: 20-80%RH (No dew.)  Vibration: below 0.5g  Avoid contact with inflammable and corrosive liquid or gas.		J6		0.2 kg*m²	
Axis No.  8-Axis Servo / Stepper Motor  X86 Architecture, Celeron 1.6G, USB2.0, 10M/100M Ethernet, Keyboard, Mouse, VGA, CF Card Slot  Image Processing (Optional)  Dual video input, PAL, NTSC  Temperature: 0~45° C  Humidity: 20-80%RH (No dew.)  Vibration: below 0.5g  Avoid contact with inflammable and corrosive liquid or gas.		Payload	d	6 kg	
VME Controller  PC  X86 Architecture, Celeron 1.6G, USB2.0, 10M/100M Ethernet, Keyboard, Mouse, VGA, CF Card Slot  Image Processing (Optional)  Dual video input, PAL, NTSC  Temperature: 0~45° C  Humidity: 20-80%RH (No dew.)  Vibration: below 0.5g  Avoid contact with inflammable and corrosive liquid or gas.		Mass		140 kg	
VME Controller  PC Keyboard, Mouse, VGA, CF Card Slot  Dual video input, PAL, NTSC  Temperature: 0~45° C Humidity: 20-80%RH (No dew.)  Vibration: below 0.5g  Avoid contact with inflammable and corrosive liquid or gas.		Axis No.		8-Axis Servo / Stepper Motor	
Keyboard, Mouse, VGA, CF Card Slot  Image Processing (Optional)  Dual video input, PAL, NTSC  Temperature: 0~45° C  Humidity: 20-80%RH (No dew.)  Vibration: below 0.5g  Avoid contact with inflammable and corrosive liquid or gas.	∨ME Controller	D.C.	X86 Architecture, Celeron 1.6G, USB2.0, 10M/100M Ethernet,		
Temperature: 0~45° C Humidity: 20-80%RH (No dew.)  Vibration: below 0.5g  Avoid contact with inflammable and corrosive liquid or gas.		PC		Keyboard, Mouse, VGA, CF Card Slot	
Humidity: 20-80%RH (No dew.)  Vibration: below 0.5g  Avoid contact with inflammable and corrosive liquid or gas.		Image Processing (Optional)		Dual video input, PAL, NTSC	
Installation Environment Vibration: below 0.5g  Avoid contact with inflammable and corrosive liquid or gas.	Installation	Environment		Temperature: 0~45° C	
Avoid contact with inflammable and corrosive liquid or gas.				Humidity: 20-80%RH (No dew.)	
				Vibration: below 0.5g	
Keep away from electrical noise sources.					
				Keep away from electrical noise sources.	

**Ordering Guide** 

Model Number	Product Name	Package
GRB-3016-06	6DOF Robotic Arm	<ul> <li>6DOF Robotic Arm Body (Payload 6kg)</li> <li>8-Axis VME Bus Motion Controller</li> <li>Electronic Module</li> <li>Pneumatic Gripper</li> <li>Parts for Pick and Place</li> <li>Software with Source Code</li> </ul>
GRB-3016-06	6DOF Robotic Arm	<ul> <li>6DOF Robotic Arm Body (Payload 6kg)</li> <li>8-Axis VME Bus Motion Controller</li> <li>Electronic Module</li> <li>Pneumatic Gripper</li> <li>Parts for Pick and Place</li> <li>Software with Source Code</li> </ul>

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Remarks: Vision system is available as per requested.