Final-Part B

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DH Table:

i	θ	d	a	α
1	θ_1	d_1=10	0	90°
2	$\theta_2 = \theta_{2a} + 90$	0	a_2=6.7	0
3	θ_3	0	a_3=12	0

Hardware:

AX-12 motor

- Weight : 53.5g (AX-12/AX-12+), 54.6g (AX-12A)
- Dimension : 32mm * 50mm * 40mm
- Resolution : 0.29˚
- Gear Reduction Ratio : 254 : 1
- Stall Torque : 1.5N.m (at 12.0V, 1.5A)
- No load speed : 59rpm (at 12V)
- Running Degree
  - § 0˚ ~ 300˚
  - § Endless Turn
- Running Temperature : -5℃ ~ +70℃
- Voltage : 9 ~ 12V (Recommended Voltage 11.1V)
- Command Signal : Digital Packet
- Protocol Type : Half duplex Asynchronous Serial Communication (8bit,1stop,No Parity)
- Link (Physical) : TTL Level Multi Drop (daisy chain type Connector)
- ID : 254 ID (0~253)
- Communication Speed : 7343bps ~ 1 Mbps
- Feedback : Position, Temperature, Load, Input Voltage, etc.
- Material : Engineering Plastic

Parameters:

Area	Address (Hexadecimal)	Name	Description	Access	Initial Value (Hexadecimal)
EEPROM	0 (0X00)	Model Number(L)	Lowest byte of model number	R	12 (0X0C)
	1 (0X01)	Model Number(H)	Highest byte of model number	R	0 (0X00)
	2 (0X02)	Version of Firmware	Information on the version of firmware	R	-
	3 (0X03)	ID	ID of Dynamixel	RW	1 (0X01)
	4 (0X04)	Baud Rate	Baud Rate of Dynamixel	RW	1 (0X01)
	5 (0X05)	Return Delay Time	Return Delay Time	RW	250 (0XFA)
	6 (0X06)	CW Angle Limit(L)	Lowest byte of clockwise Angle Limit	RW	0 (0X00)
	7 (0X07)	CW Angle Limit(H)	Highest byte of clockwise Angle Limit	RW	0 (0X00)
	8 (0X08)	CCW Angle Limit(L)	Lowest byte of counterclockwise Angle Limit	RW	255 (0XFF)
	9 (0X09)	CCW Angle Limit(H)	Highest byte of counterclockwise Angle Limit	RW	3 (0X03)
	11 (0X0B)	the Highest Limit Temperature	Internal Limit Temperature	RW	70 (0X46)
	12 (0X0C)	the Lowest Limit Voltage	Lowest Limit Voltage	RW	60 (0X3C)
	13 (0X0D)	the Highest Limit Voltage	Highest Limit Voltage	RW	140 (0XBE)
	14 (0X0E)	Max Torque(L)	Lowest byte of Max. Torque	RW	255 (0XFF)
	15 (0X0F)	Max Torque(H)	Highest byte of Max. Torque	RW	3 (0X03)
	16 (0X10)	Status Return Level	Status Return Level	RW	2 (0X02)
	17 (0X11)	Alarm LED	LED for Alarm	RW	36(0x24)
	18 (0X12)	Alarm Shutdown	Shutdown for Alarm	RW	36(0x24)
RAM	24 (0X18)	Torque Enable	Torque On/Off	RW	0 (0X00)
	25 (0X19)	LED	LED On/Off	RW	0 (0X00)
	26 (0X1A)	CW Compliance Margin	CW Compliance margin	RW	1 (0X01)
	27 (0X1B)	CCW Compliance Margin	CCW Compliance margin	RW	1 (0X01)
	28 (0X1C)	CW Compliance Slope	CW Compliance slope	RW	32 (0X20)

	29 (0X1D)	CCW Compliance Slope	CCW Compliance slope	RW	32 (0X20)
	30 (0X1E)	Goal Position(L)	Lowest byte of Goal Position	RW	-
	31 (0X1F)	Goal Position(H)	Highest byte of Goal Position	RW	-
	32 (0X20)	Moving Speed(L)	Lowest byte of Moving Speed (Moving Velocity)	RW	-
	33 (0X21)	Moving Speed(H)	Highest byte of Moving Speed (Moving Velocity)	RW	-
	34 (0X22)	Torque Limit(L)	Lowest byte of Torque Limit (Goal Torque)	RW	ADD14
	35 (0X23)	Torque Limit(H)	Highest byte of Torque Limit (Goal Torque)	RW	ADD15
	36 (0X24)	Present Position(L)	Lowest byte of Current Position (Present Velocity)	R	-
	37 (0X25)	Present Position(H)	Highest byte of Current Position (Present Velocity)	R	-
	38 (0X26)	Present Speed(L)	Lowest byte of Current Speed	R	-
	39 (0X27)	Present Speed(H)	Highest byte of Current Speed	R	-
	40 (0X28)	Present Load(L)	Lowest byte of Current Load	R	-
	41 (0X29)	Present Load(H)	Highest byte of Current Load	R	-
	42 (0X2A)	Present Voltage	Current Voltage	R	-
	43 (0X2B)	Present Temperature	Current Temperature	R	-
	44 (0X2C)	Registered	Means if Instruction is registered	R	0 (0X00)
	46 (0X2E)	Moving	Means if there is any movement	R	0 (0X00)
	47 (0X2F)	Lock	Locking EEPROM	RW	0 (0X00)
	48 (0X30)	Punch(L)	Lowest byte of Punch	RW	32 (0X20)
	49 (0X31)	Punch(H)	Highest byte of Punch	RW	0 (0X00)

DOF:3

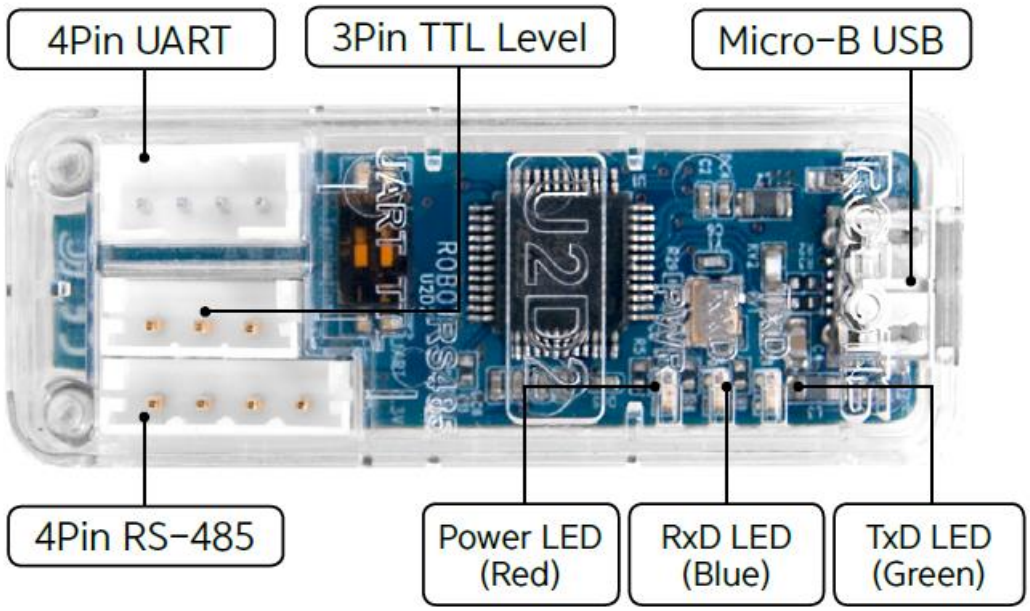
Motor Parameters Setup:

- ID:1 to 4
- Baud Rate: 1000000 bps
- GoalPosition(L):512(150°) [for center position]

U2D2 Spec:

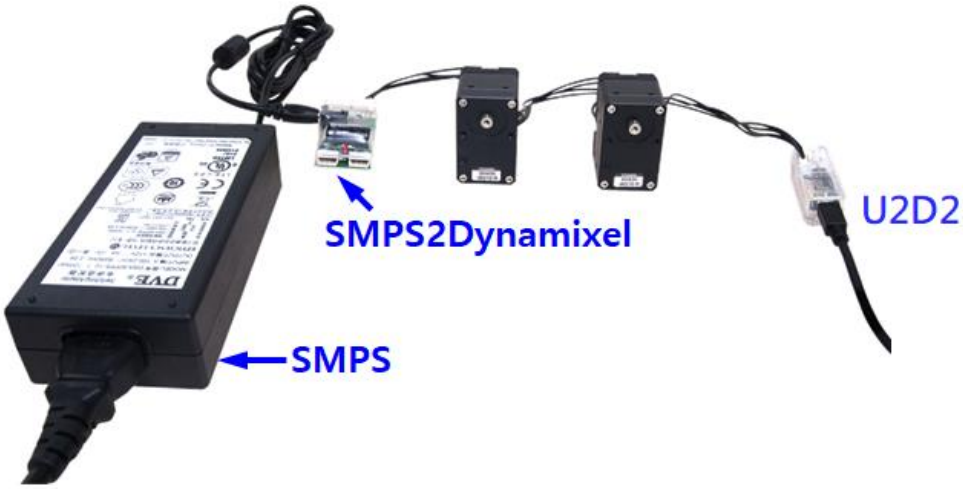
Item	Description
Weight	9g
Dimensions	48mm x 18mm x 14.6mm
Ports	3Pin TTL Level(TTL Communication supported DYNAMIXEL) 4Pin RS-485(RS-485 Communication supported DYNAMIXEL) 4Pin UART(Controllers that support 4Pin UART(such as CM-150 and CM-200)
Baudrate	Maximum 6Mbps

U2D2 Layout:



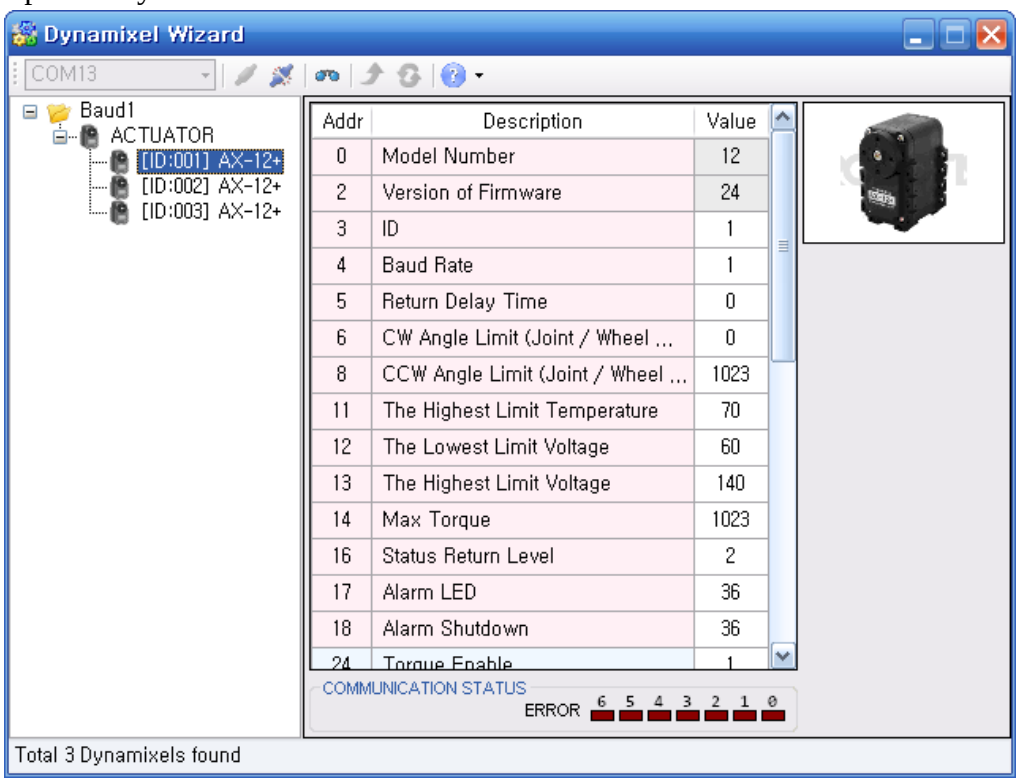
Connect to PC via U2D2:

Connection:

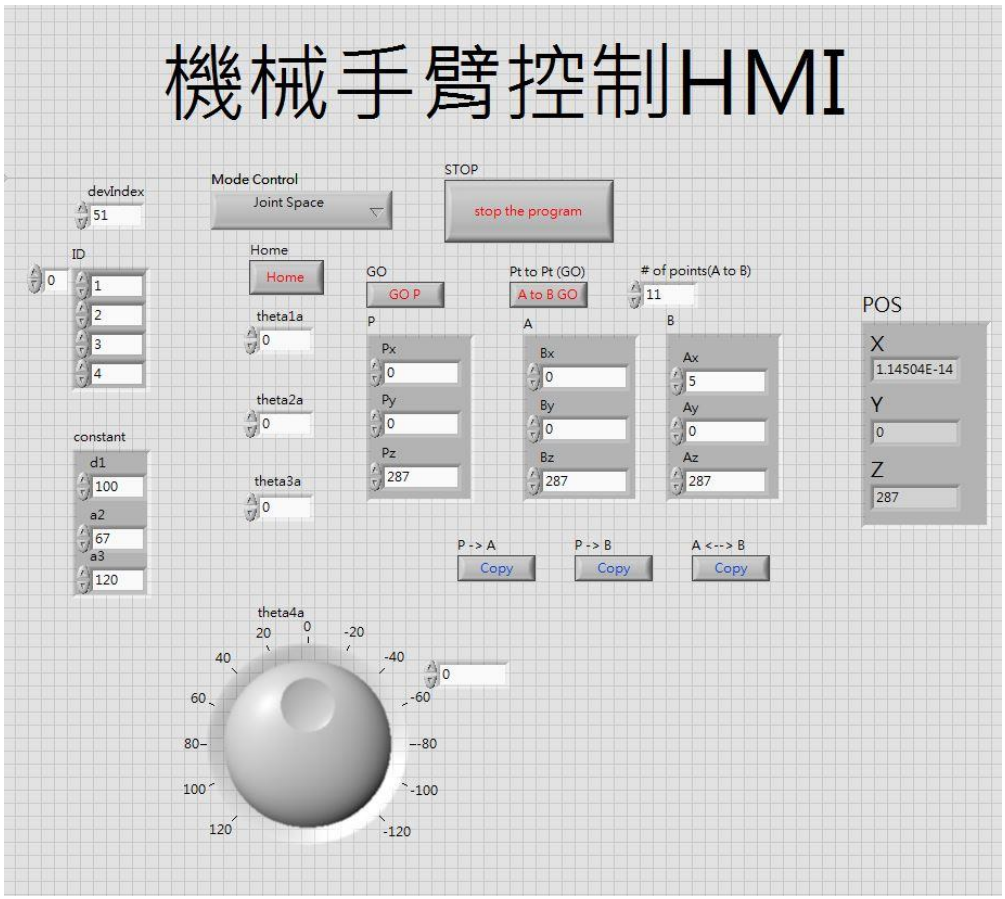


Software:

Roboplus>>Dynamixal Wizard

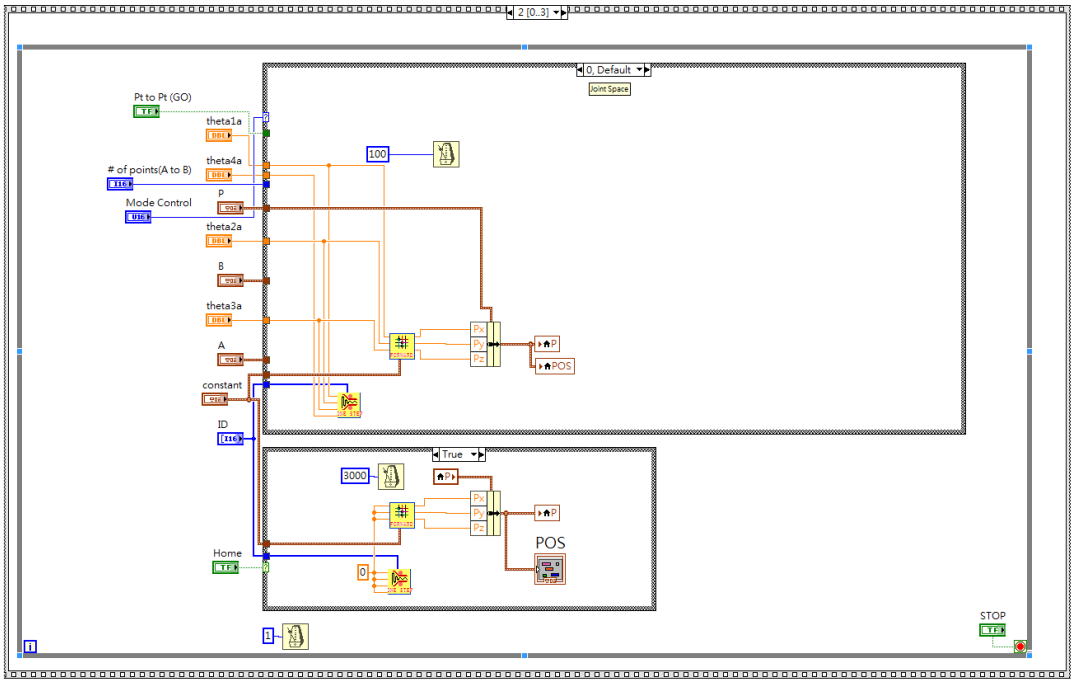


LabVIEW

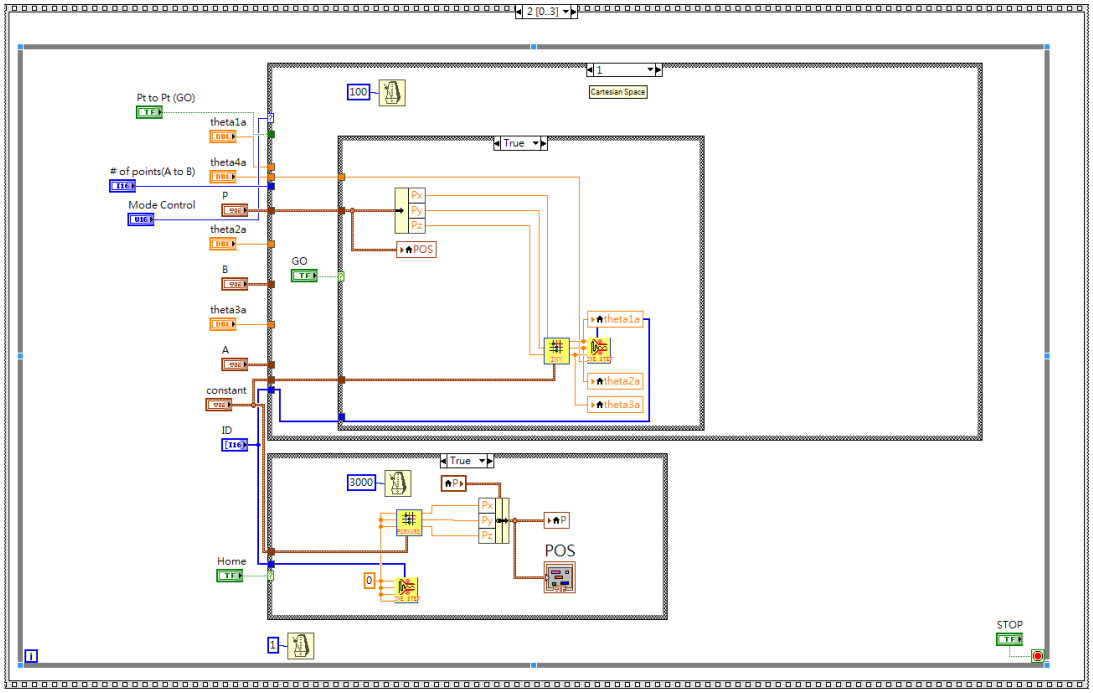


程式

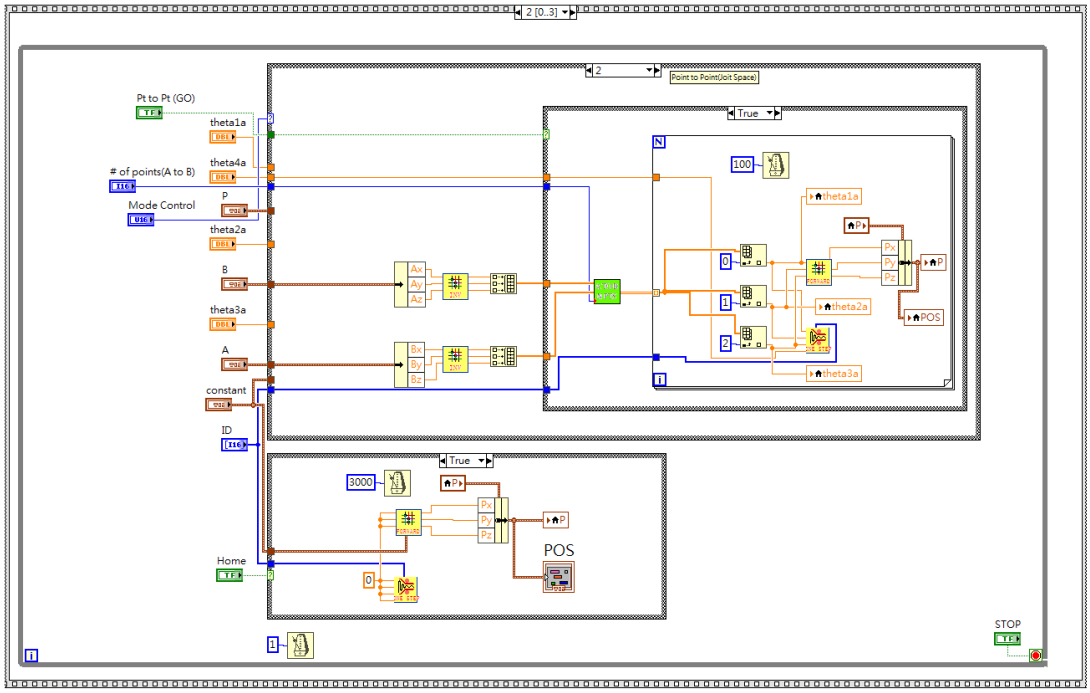
Joint Space



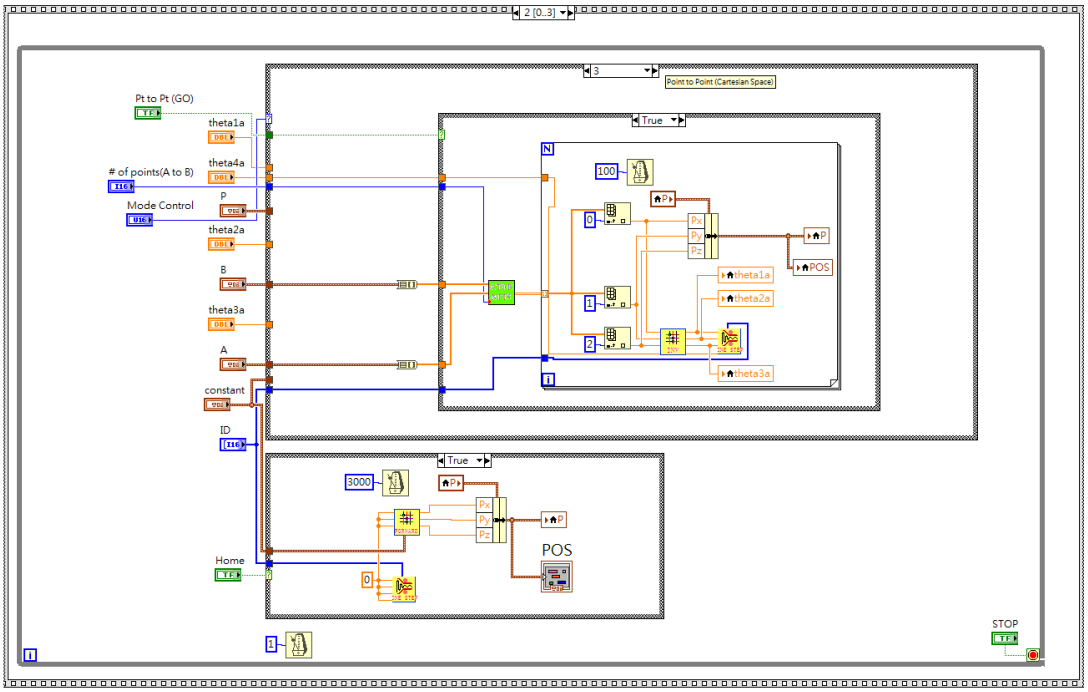
Cartesian Space



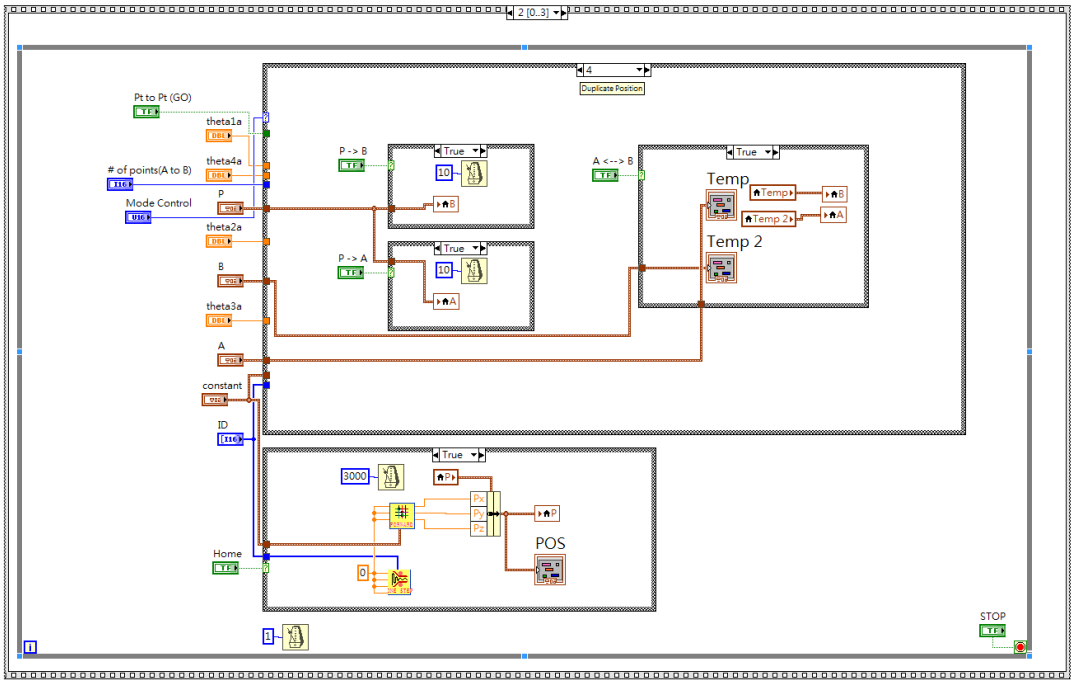
P2P(joint)



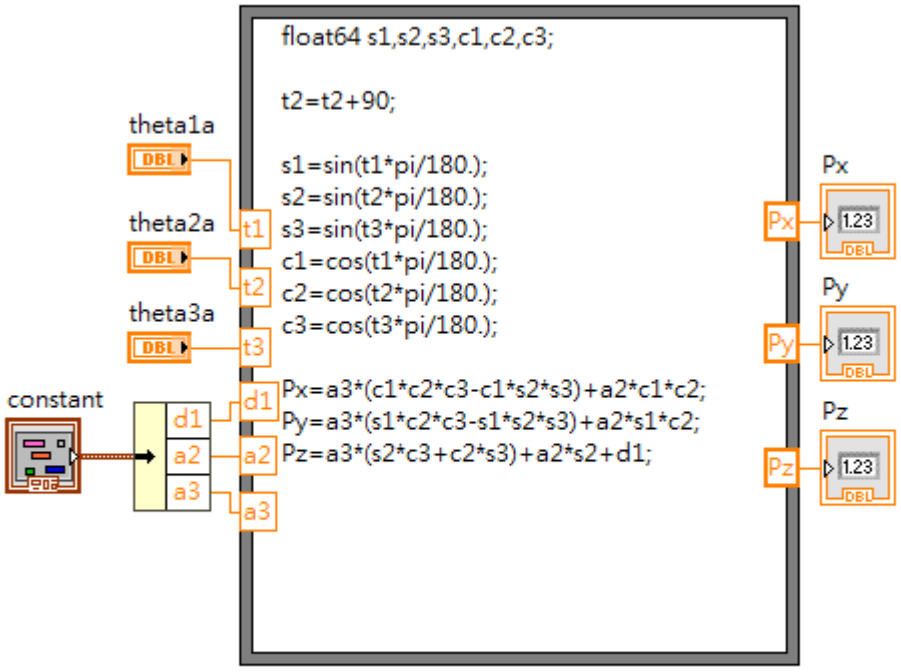
P2P(Cartesian)



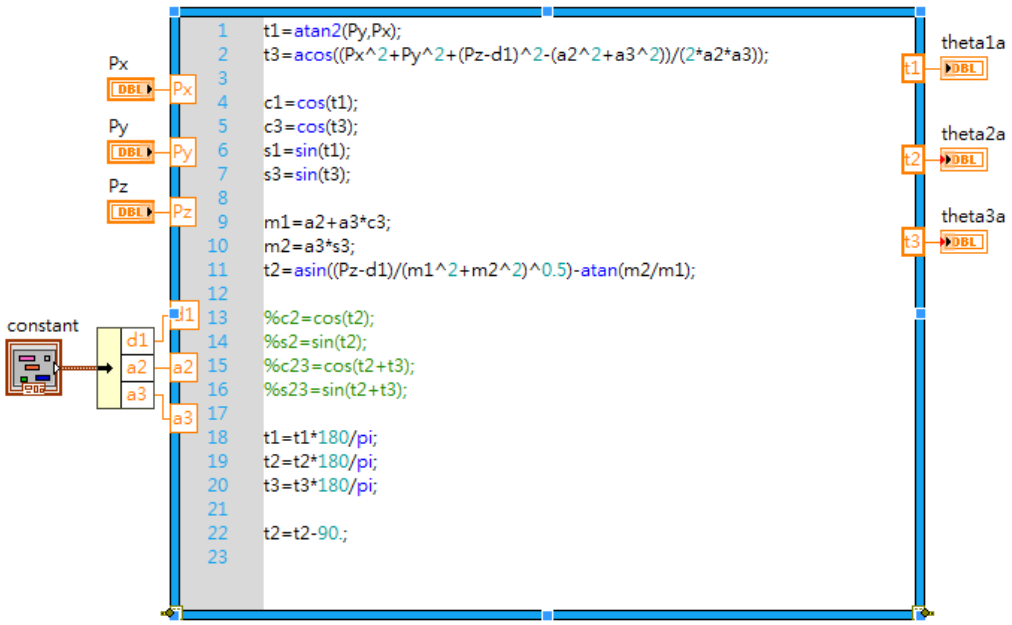
Duplicate



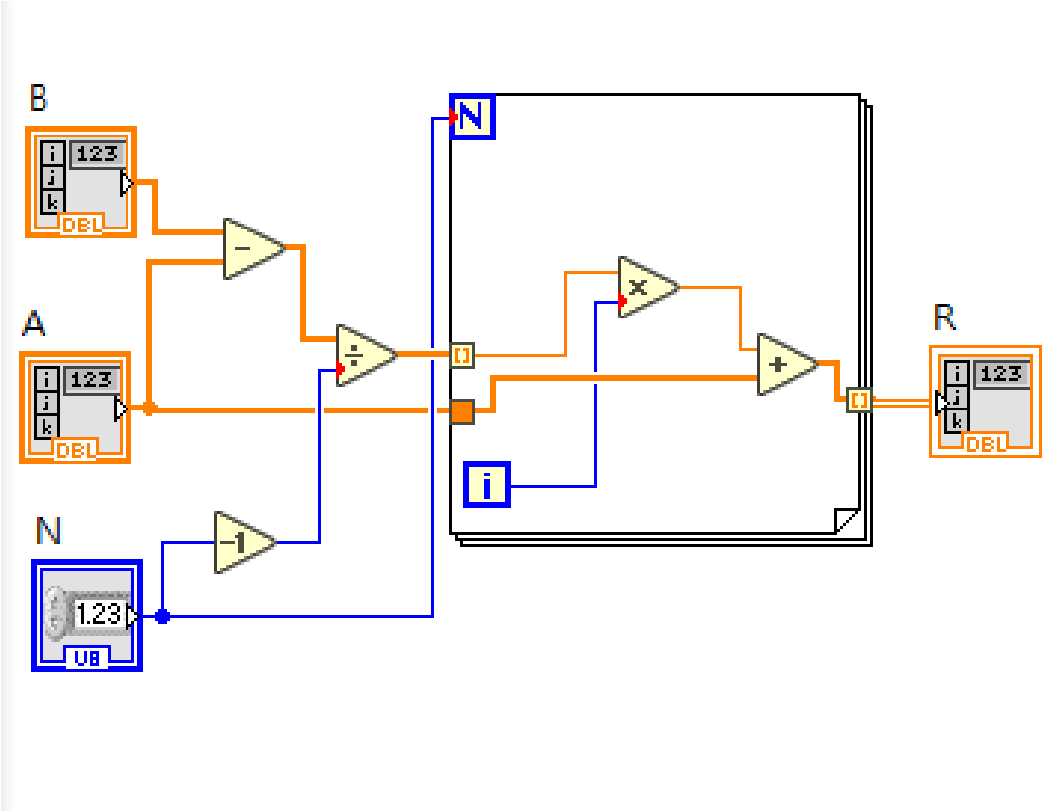
正向運動學



逆向運動學

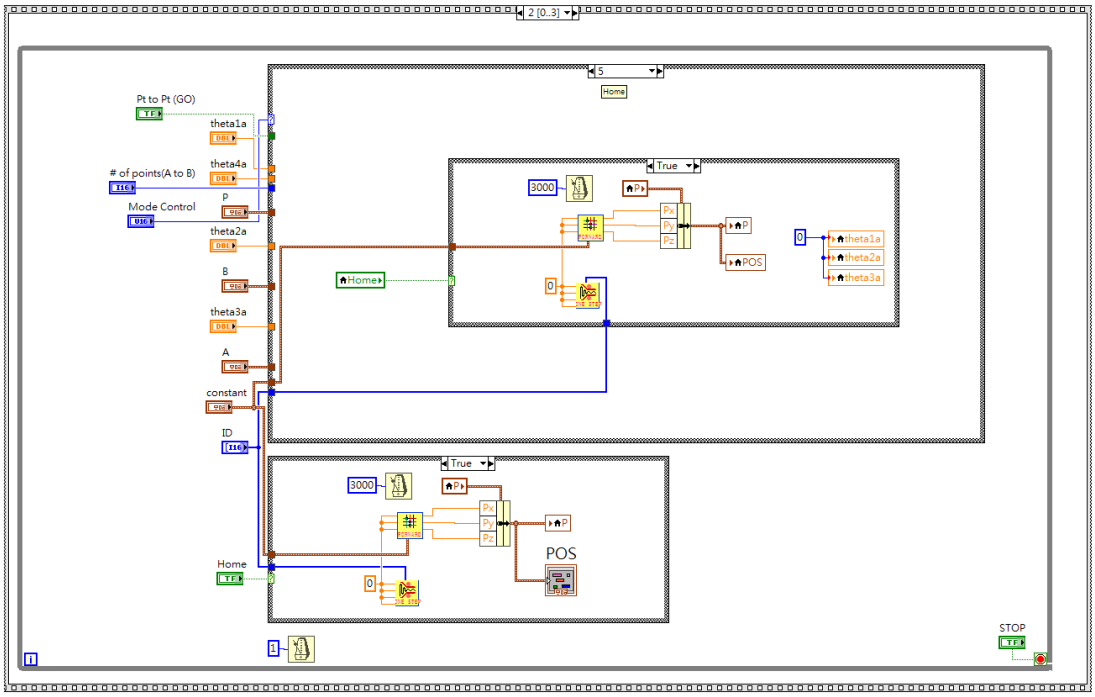


A to B N Points (分點)

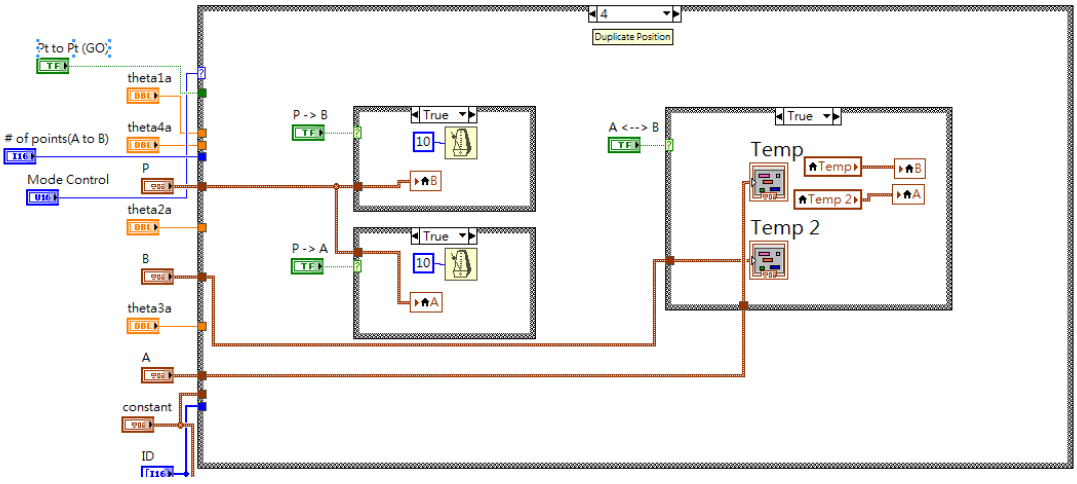


程式改良

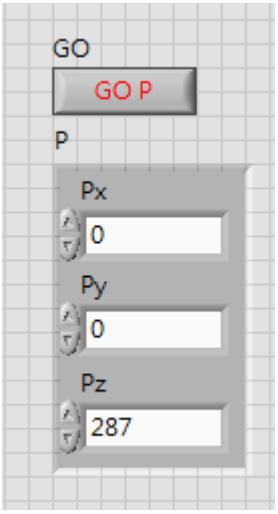
1.新增復歸模式



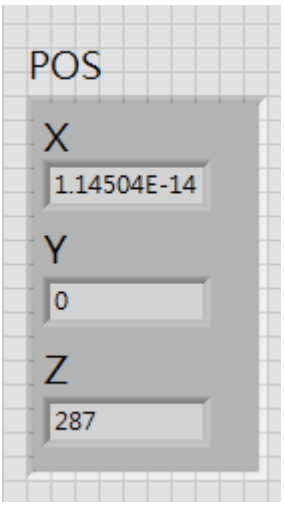
2.複製模式新增AB互換，使其可回到上一點



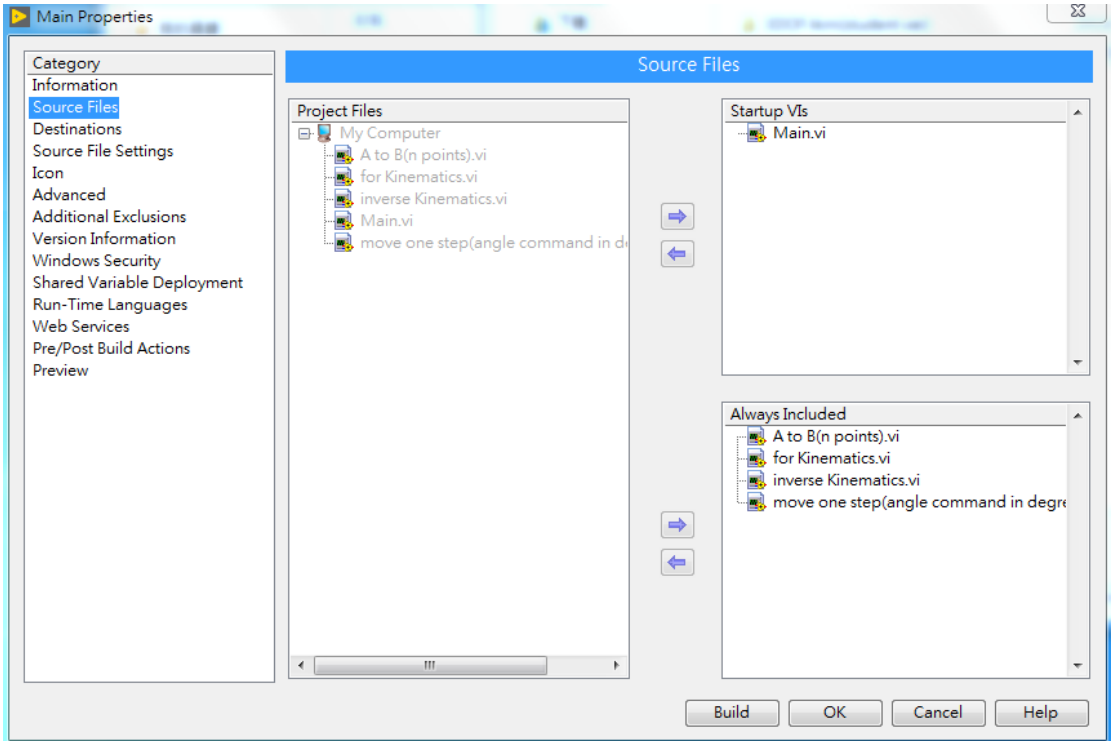
3.於卡式空間須按下GO才會移動到目標點

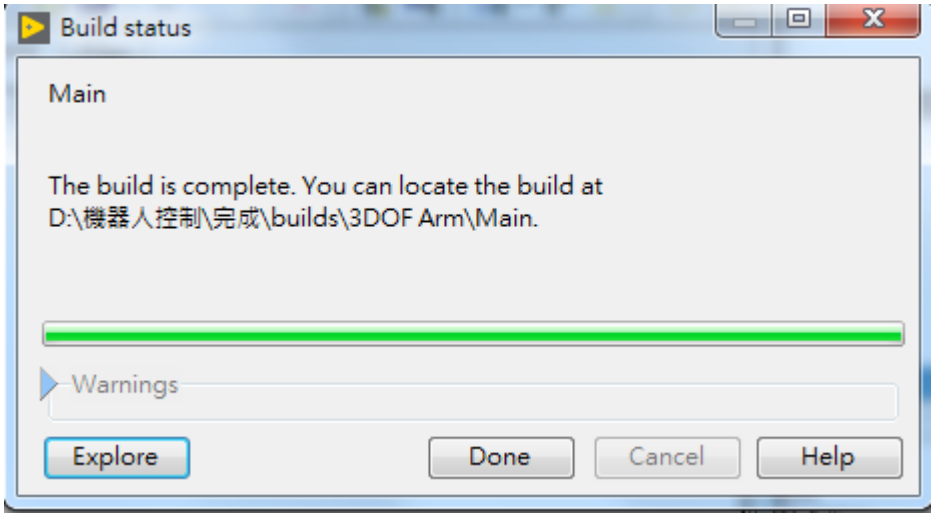


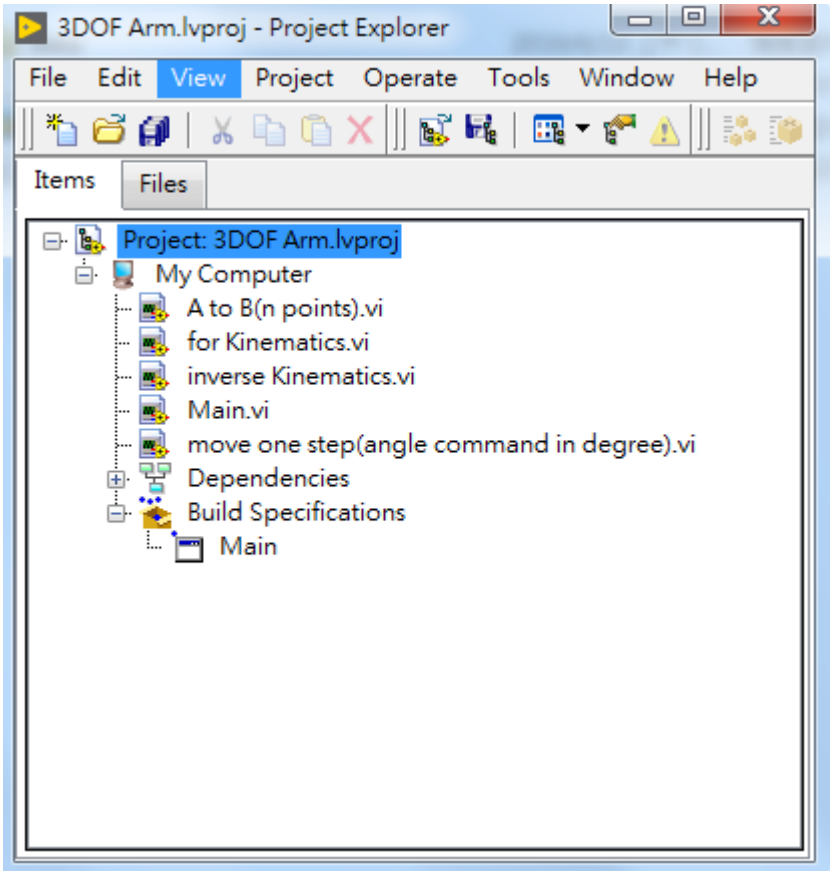
4.顯示當前位置



Package


Main Properties
Category
Information
Source Files
Destinations
Source File Settings
Icon
Advanced
Additional Exclusions
Version Information
Windows Security
Shared Variable Deployment
Run-Time Languages
Web Services
Pre/Post Build Actions
Preview
Source Files
Project Files
My Computer
A to B(n points).vi
for Kinematics.vi
inverse Kinematics.vi
Main.vi
move one step(angle command in d
Startup VIs
Main.vi
Always Included
A to B(n points).vi
for Kinematics.vi
inverse Kinematics.vi
move one step(angle command in degr
Build
OK
Cancel
Help


Build status
Main
The build is complete. You can locate the build at
D:\機器人控制\完成\builds\3DOF Arm\Main.
Warnings
Explore
Done
Cancel
Help


3DOF Arm.lvproj - Project Explorer
File
Edit
View
Project
Operate
Tools
Window
Help
Items
Files
Project: 3DOF Arm.lvproj
My Computer
A to B(n points).vi
for Kinematics.vi
inverse Kinematics.vi
Main.vi
move one step(angle command in degree).vi
Dependencies
Build Specifications
Main

完成圖