

DARWIN-OP INTRODUCTION [DASL-104]

WEEK 2

INSTRUCTOR: JEAN CHAGAS VAZ



Tuesday, April 11, 2017, 09:41

Summary

Dynamixel

Robo-Plus

Dynamixel's Calibration

DARwIn-OP & Ubuntu

Monitoring Dynamixels
through DARwIn-OP

References

- **Dynamixel;**
 - Overview;
- **Robo-Plus;**
 - Robo-Plus characteristic;
 - Dynamixel Wizard walkthrough;
- **Dynamixel's Calibration;**
 - PID controller;
 - Hands-On;
- **DARwIn-OP & Ubuntu;**
 - Walkthrough;
- **Monitoring Dynamixels through DARwIn-OP;**
 - Walkthrough;

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➤ Dynamixel;

• Overview;



Source: <http://support.robotis.com>



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➤ Dynamixel;

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- Specifications;

MX-28 Stats			
Operating Voltage	14.8V	12V	11.1V
Stall Torque*	31.6 kg·cm	25.5 kg·cm	23.4 kg·cm
	439 oz·in	354 oz·in	325 oz·in
	3.1 N.m	2.5 N.m	2.3 N.m
No-load Speed	67 RPM	55 RPM	50 RPM
Weight	72g		
Size	35.6 x 50.6 x 35.5 mm		
Resolution	0.088°		
Reduction Ratio	193 : 1		
Operating Angle	0° ~ 360° or Continuous Turn		
Max Current	1.4A @ 12V		
Standby Current	100 mA		
Operating Temp	-5°C ~ 80°C		
Protocol	TTL Asynchronous Serial		
Module Limit	254 valid addresses		
Com Speed	8000bps ~ 3Mbps		
Position Feedback	Yes		
Temp Feedback	Yes		
Load Voltage Feedback	Yes		
Input Voltage Feedback	Yes		
Compliance/PID	Yes		
Material	Metal Gears & Engineering Plastic Body		

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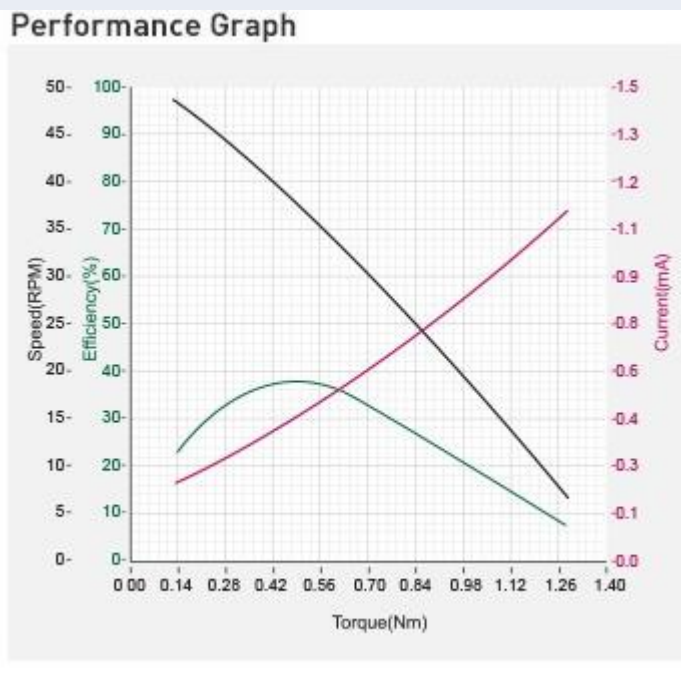
Monitoring Dynamixels

through DARwin-OP

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➤ Dynamixel;

- Overview;
- Performance Graph;



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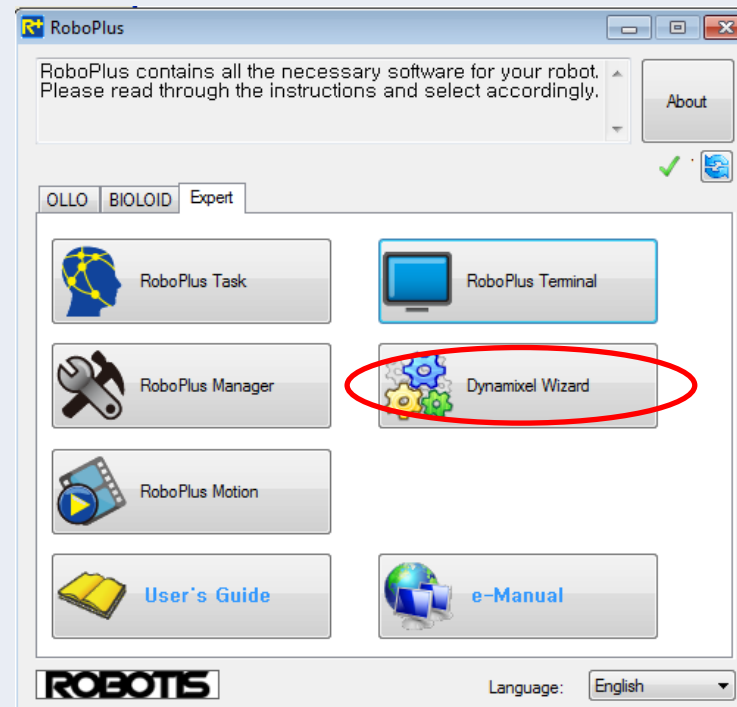
DARwin-OP & Ubuntu

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➤ Robo-Plus;

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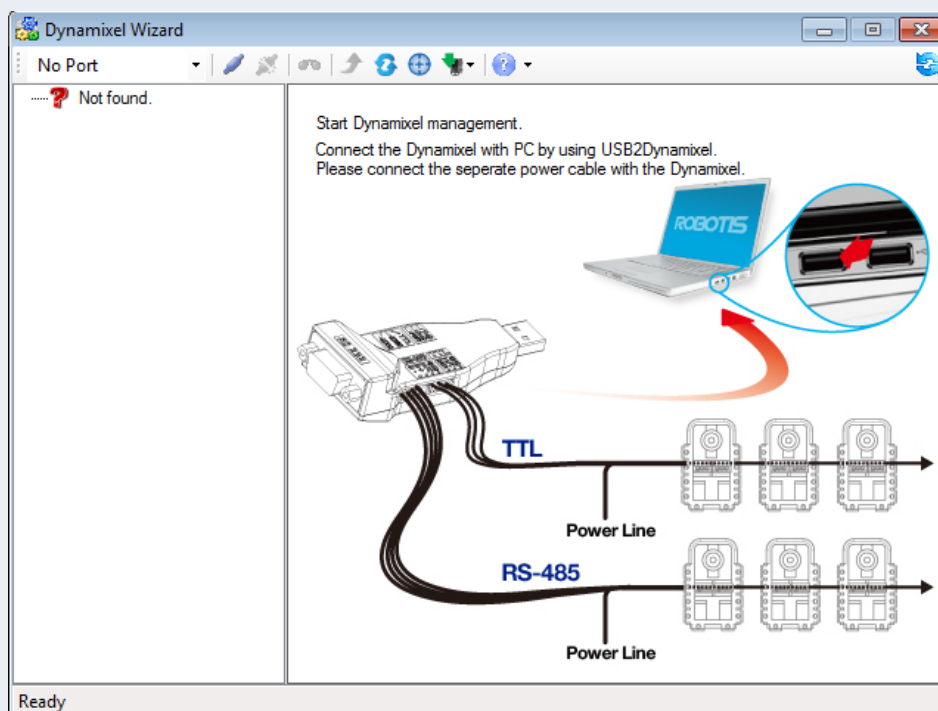
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- Robo-Plus characteristic;



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➤ Dynamixel's Calibration;

- **PID controller;**

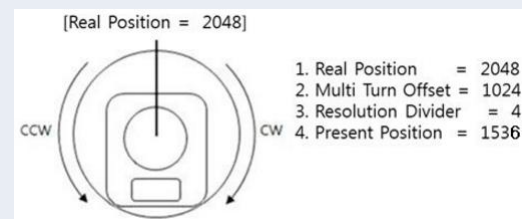
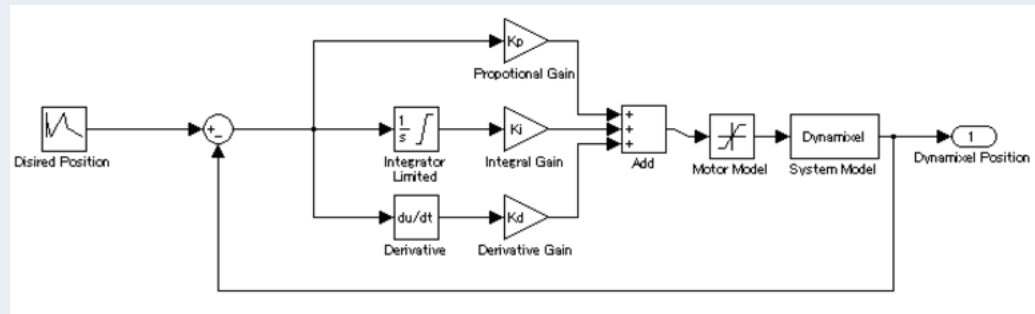
MX series will use the PID controller as a main control method.

P gain refers to the value of proportional band.

I gain refers to the value of integral action.

D Gain refers to the value of derivative action.

Gains values are in between 0~254.



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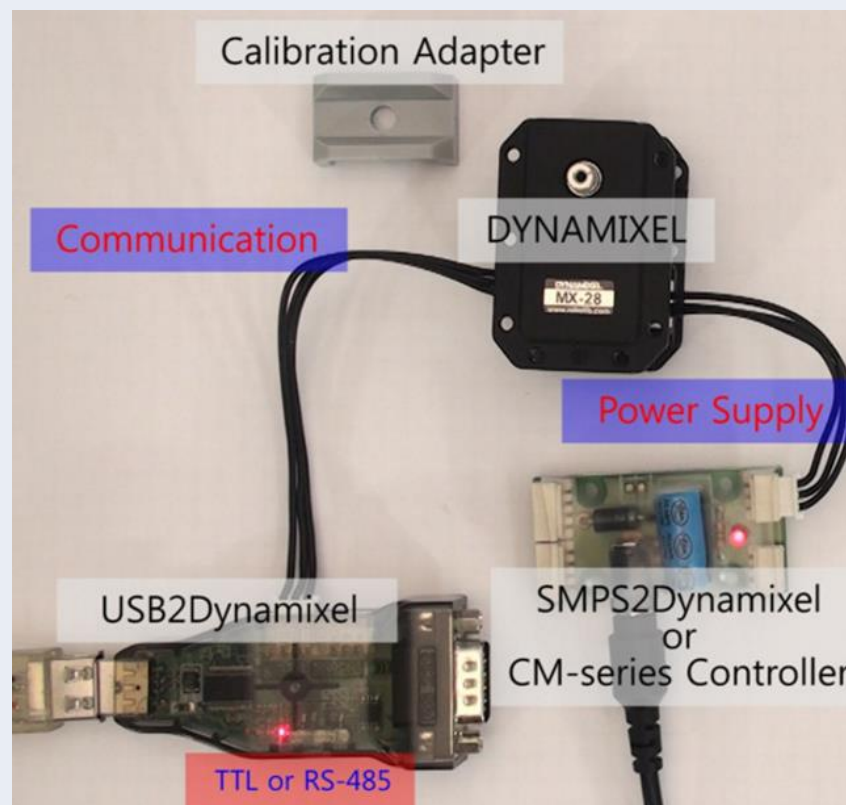
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➤ Dynamixel's Calibration;

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➤ DARwIn-OP & Ubuntu;

- Walkthrough;

```
Terminator
darwin@darwin: ~
dasl@soyleche:~$ ssh darwin@192.168.0.190
darwin@192.168.0.190's password:
Welcome to Ubuntu 12.04.2 LTS (GNU/Linux 3.5.0-23-generic i686)

 * Documentation:  https://help.ubuntu.com/

System information as of Wed Feb 11 12:36:17 EST 2015

System load:  0.01               Processes:    78
Usage of /:   65.9% of 2.51GB    Users logged in: 0
Memory usage: 4%                IP address for wlan0: 192.168.0.190
Swap usage:  0%

Graph this data and manage this system at https://landscape.canonical.com/

New release '14.04.1 LTS' available.
Run 'do-release-upgrade' to upgrade to it.

Last login: Wed Feb 11 12:28:34 2015 from 192.168.0.100
darwin@darwin:~$
```



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```
Terminator
darwin@darwin: /
darwin@darwin: /109x39
dasl@soyleche:~$ ssh darwin@192.168.0.190
darwin@192.168.0.190's password:
Welcome to Ubuntu 12.04.2 LTS (GNU/Linux 3.5.0-23-generic i686)

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Last login: Wed Feb 11 12:28:34 2015 from 192.168.0.100
darwin@darwin:~$ cd /
darwin@darwin:/$ ls
bin      DARwIn-OP_ROBOTIS_v1.6.0.zip  home      lib          mnt      root  selinux  usr  vmlinuz
boot    dev                          hubo-ach  lost+found  opt      run   srv      var
etc     etc                          initrd.img media       proc     sbin  sys      var
darwin@darwin:/$
```



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➤ Monitoring Dynamixels through DARwIn-OP;

- Walkthrough;

The screenshot shows a terminal window titled 'Terminator' with a dark background. The user is logged in as 'darwin' on a machine named 'darwin'. The terminal displays the output of an SSH session from 'dasl@soyleche' to 'darwin@192.168.0.190'. It shows the Ubuntu 12.04.2 LTS login banner, system information (load, memory, swap, processes, users, IP), and a list of files in the current directory. A red arrow points to the 'initrd.img' file in the 'etc' directory. The file listing shows various system files and directories, including 'bin', 'boot', 'dev', 'etc', 'home', 'lib', 'mnt', 'root', 'selinux', 'usr', and 'vmlinuz'. The 'etc' directory contains 'initrd.img' and 'media'. The 'usr' directory contains 'bin', 'lib', 'share', and 'src'. The 'vmlinuz' file is a kernel image. The terminal also shows the output of the 'ls' command in the 'darwin/Linux/project/tutorials' directory, listing files like 'action_script', 'camera', 'duc', 'head_tracking', 'read_write', and 'TrackHead'.

```
darwin@darwin: /darwin/Linux/project/tutorial
darwin@darwin:~$ ssh darwin@192.168.0.190
darwin@192.168.0.190's password:
Welcome to Ubuntu 12.04.2 LTS (GNU/Linux 3.5.0-23-generic i686)

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darwin@darwin:/$ ls
bin      DARwIn-OP_ROBOTIS_v1.6.0.zip  home      lib      mnt      root      selinux  usr      vmlinuz
boot     dev                          hubo-ach  lost+found  opt      run      srv      var
etc      etc                          initrd.img  media      proc     sbin     sys
darwin@darwin:/$ cd /darwin/Linux/
darwin@darwin:/darwin/Linux/project/tutorials$ ls
action_script  camera      duc  head_tracking  read_write  TrackHead
ball_following  color_filtering  fsr  JeanColorDetection  Sanju_headTracking
darwin@darwin:/darwin/Linux/project/tutorials$
```



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- http://support.robotis.com/en/software/roboplus/dynamixel_wizard/mx_calibration.htm
- <http://www.trossenrobotics.com/dynamixel-mx-28-robot-actuator.aspx>