

# Dynamixel

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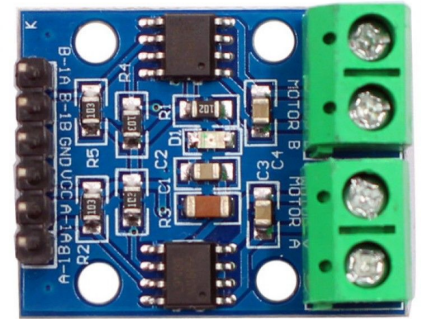
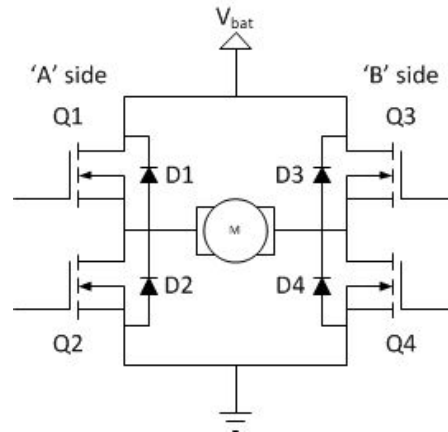
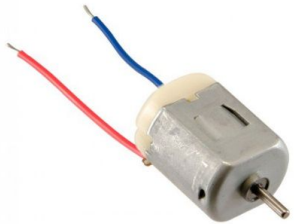
Daniel Kang

[dspxpert@gmail.com](mailto:dspxpert@gmail.com)

OROCA Pangyo

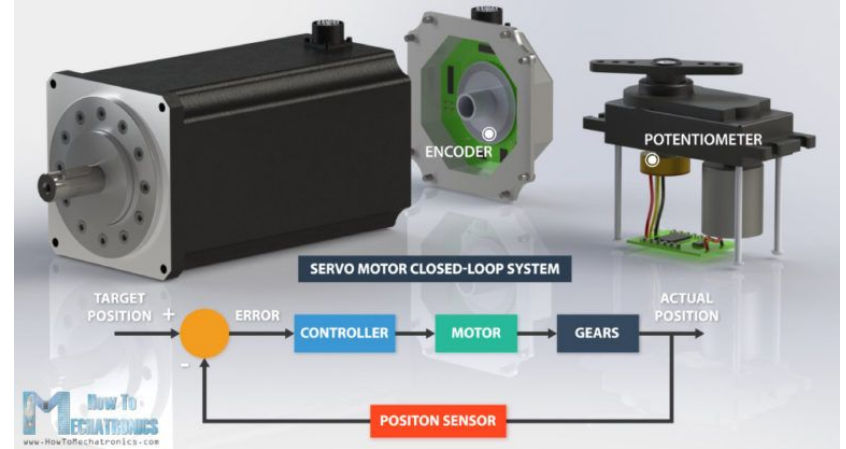
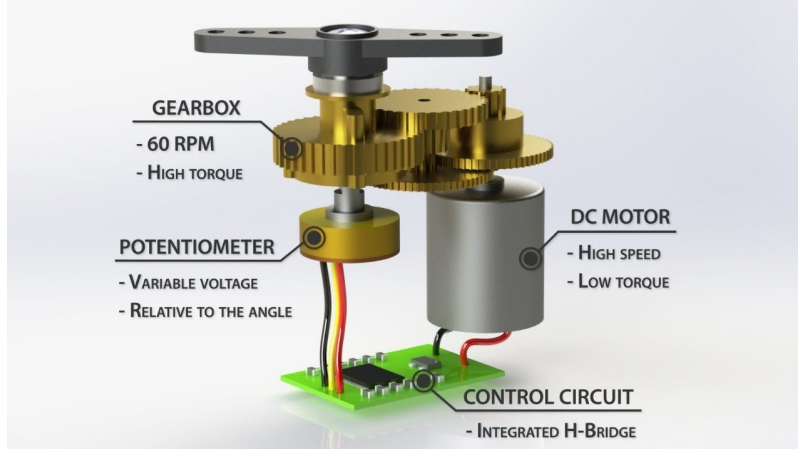
# DC motor (brushed)

- Direction control: by H-Bridge
- Speed control : by PWM



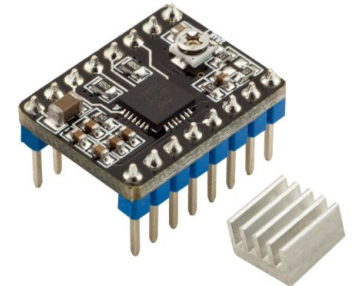
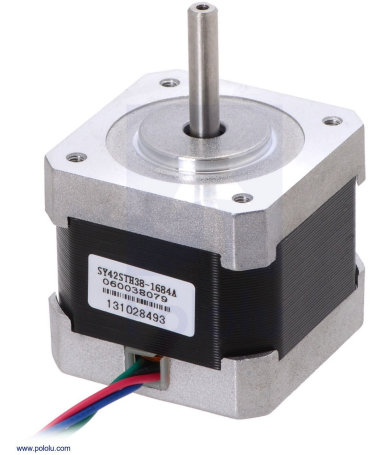
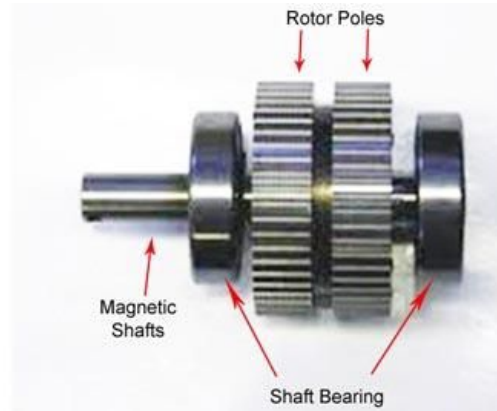
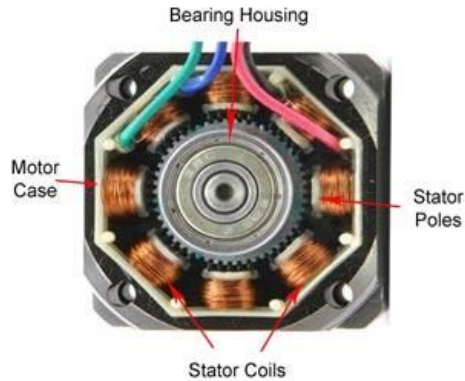
# Servo motor

- <https://www.wikiwand.com/en/Servomotor>
- <https://howtomechatronics.com/how-it-works/how-servo-motors-work-how-to-control-servos-using-arduino/>
- Control by PWM (e.g. 1500us center, 500us ~ 2500us)



# Stepper motor

- No position feedback - need position calibration at startup(set to known position with limit switch)
- [BLDC vs Stepper Motor](#)



# Dynamixel

- DC Motor + Reduction Gearhead + Controller + Driver + Network
- Control by Serial Communication (Protocol 1.0, 2.0)
- [http://www.robotis.com/service/selection\\_guide.php](http://www.robotis.com/service/selection_guide.php)



풀사이즈 로봇용 사이클로이드 기반 액추에이터

**DYNAMIXEL PRO**



다관절 로봇 구축용 차세대 액추에이터

**DYNAMIXEL X**



디지털 통신 기반 로봇 전용 일체형 액추에이터

**DYNAMIXEL**

# Dynamixel Hardware

- Input Voltage : 7.4V, 11.1V, 12V, 24V
- Interface : **Half-Duplex Serial (57600bps default)**, **TTL Level** or **RS-485** Multi Drop Bus
- Wheel mode, Joint mode, Multi-turn mode
- Dynamixel ID

- **MX-28T/R/AT/AR** <http://emanual.robotis.com/docs/en/dxl/mx/mx-28/>

비접촉식 애플루트 엔코더를 적용하여 내구성, 정밀도, 제어 범위 증가

데드 구간없이 360° 전 영역의 위치제어 가능

360°를 0.088° 단위로 4096단계에 걸쳐 제어 가능

Endless Turn Mode에서 속도 제어 가능

PID 제어를 통해 위치제어 신뢰성 및 정확성 증가

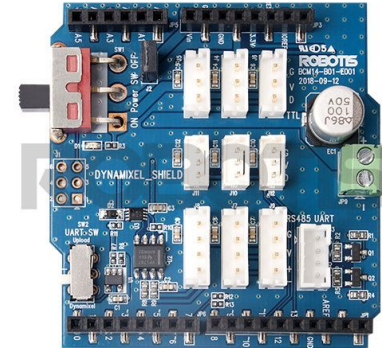
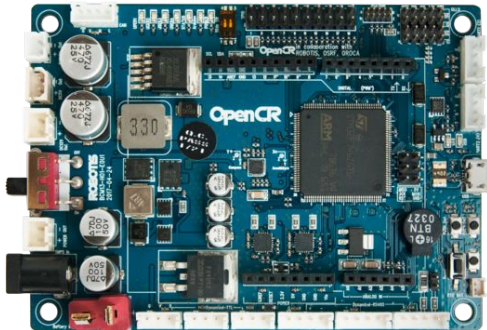
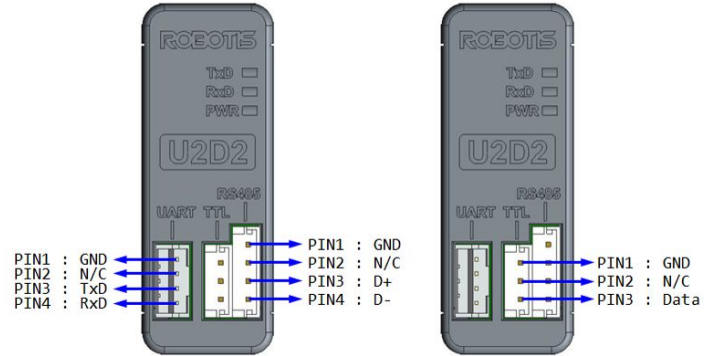
4.5Mbps의 고속 통신을 지원



항목	TTL	RS-485
핀 번호	<div> <div>1</div> GND                 <div>2</div> VDD                 <div>3</div> DATA             </div>	<div> <div>1</div> GND                 <div>2</div> VDD                 <div>3</div> DATA+                 <div>4</div> DATA-             </div>
다이아그램		
하우징	 MOLEX 50-37-5033	 MOLEX 50-37-5043
PCB 헤더	 MOLEX 22-03-5035	 MOLEX 22-03-5045
Crimp 터미널	MOLEX 80-70-1039	MOLEX 80-70-1039
Wire Gauge	21 AWG	21 AWG

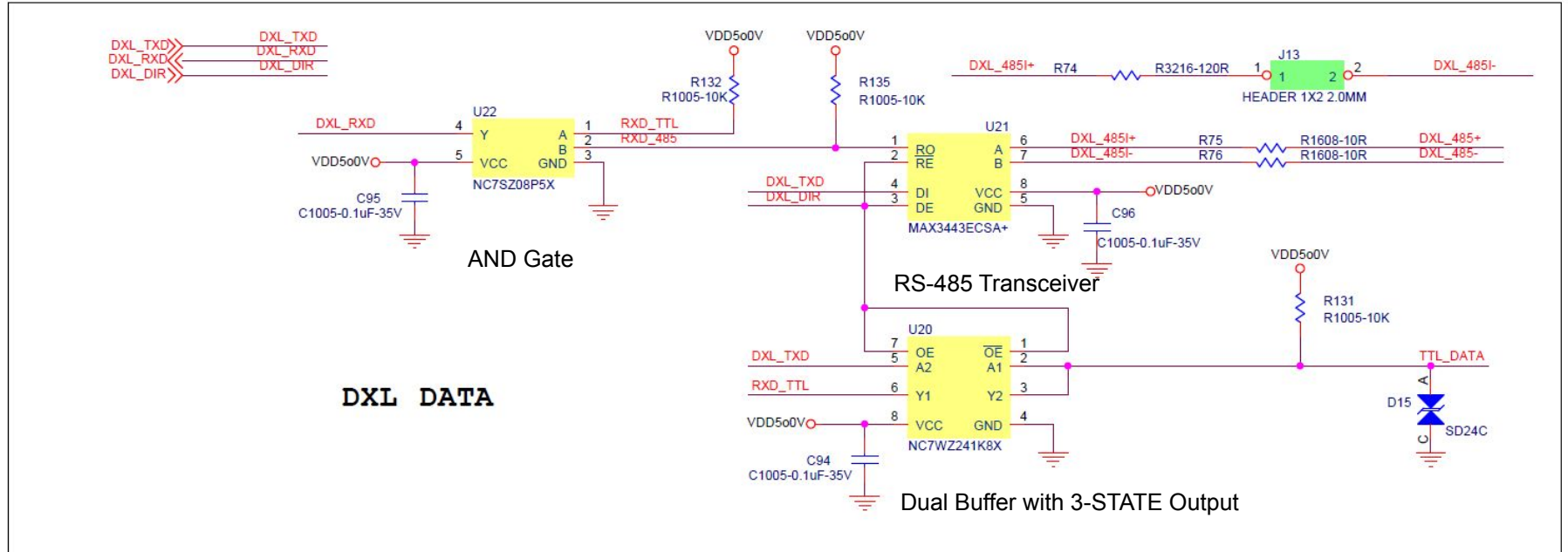
# Dynamixel Hardware Interface

- PC : USB2Dynamixel, U2D2, SMPS2Dynamixel
- Controller : OpenCR 1.0, OpenCM 9.04, Dynamixel Shield ...





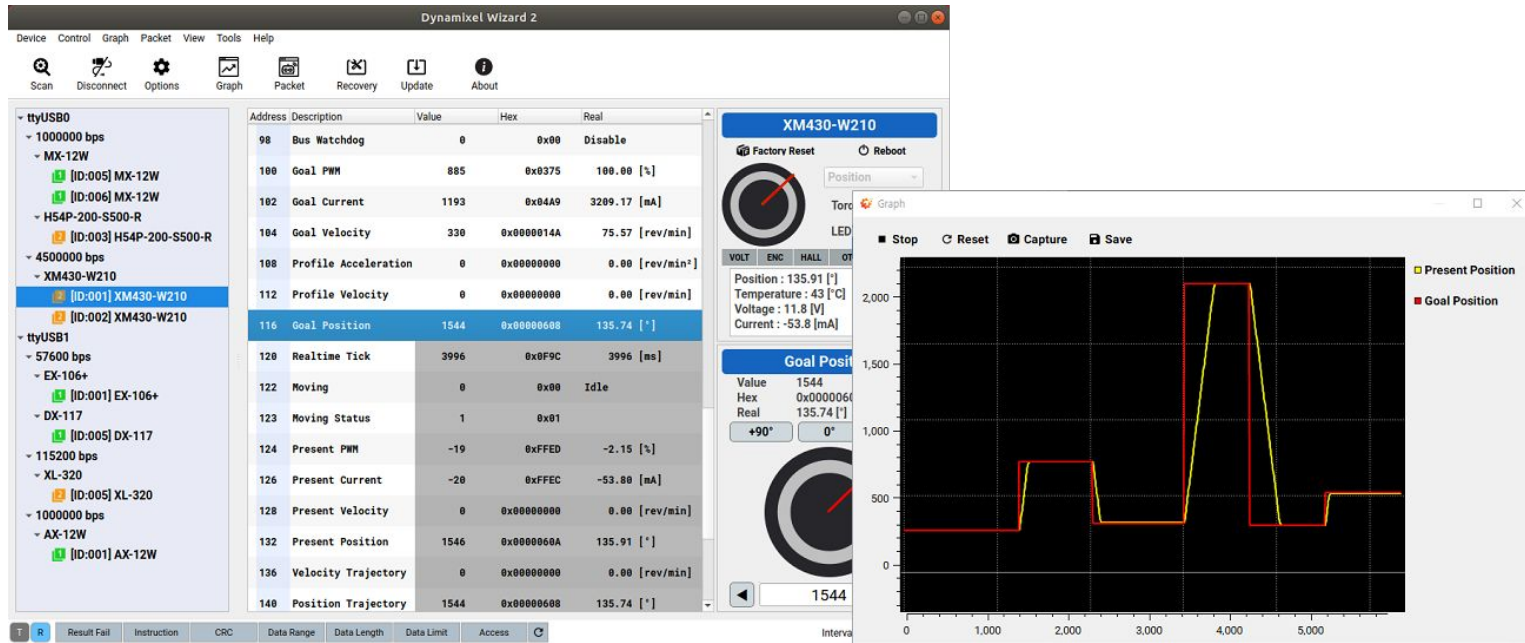
# Dynamixel Hardware Interface





# Dynamixel Software - Dynamixel Wizard, R+ Manager

- <http://www.robotis.com/service/downloadcenter.php>
- [http://www.robotis.com/service/downloadpage.php?ca\\_id=10](http://www.robotis.com/service/downloadpage.php?ca_id=10)
- [http://emanual.robotis.com/docs/en/software/dynamixel/dynamixel\\_wizard2/](http://emanual.robotis.com/docs/en/software/dynamixel/dynamixel_wizard2/)

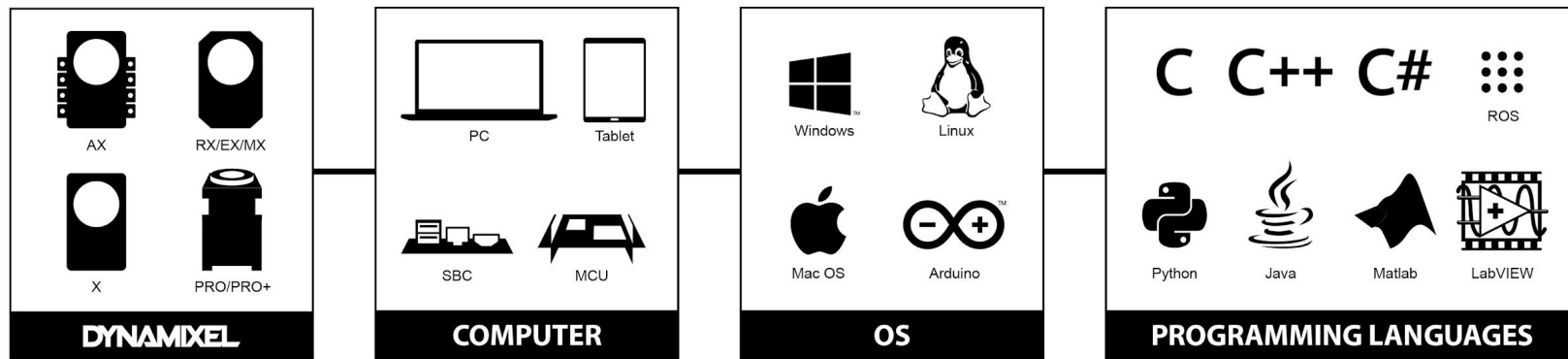


# Dynamixel SDK, Dynamixel Workbench(ROS support)

[http://emanual.robotis.com/docs/en/software/dynamixel/dynamixel\\_sdk/overview/](http://emanual.robotis.com/docs/en/software/dynamixel/dynamixel_sdk/overview/)

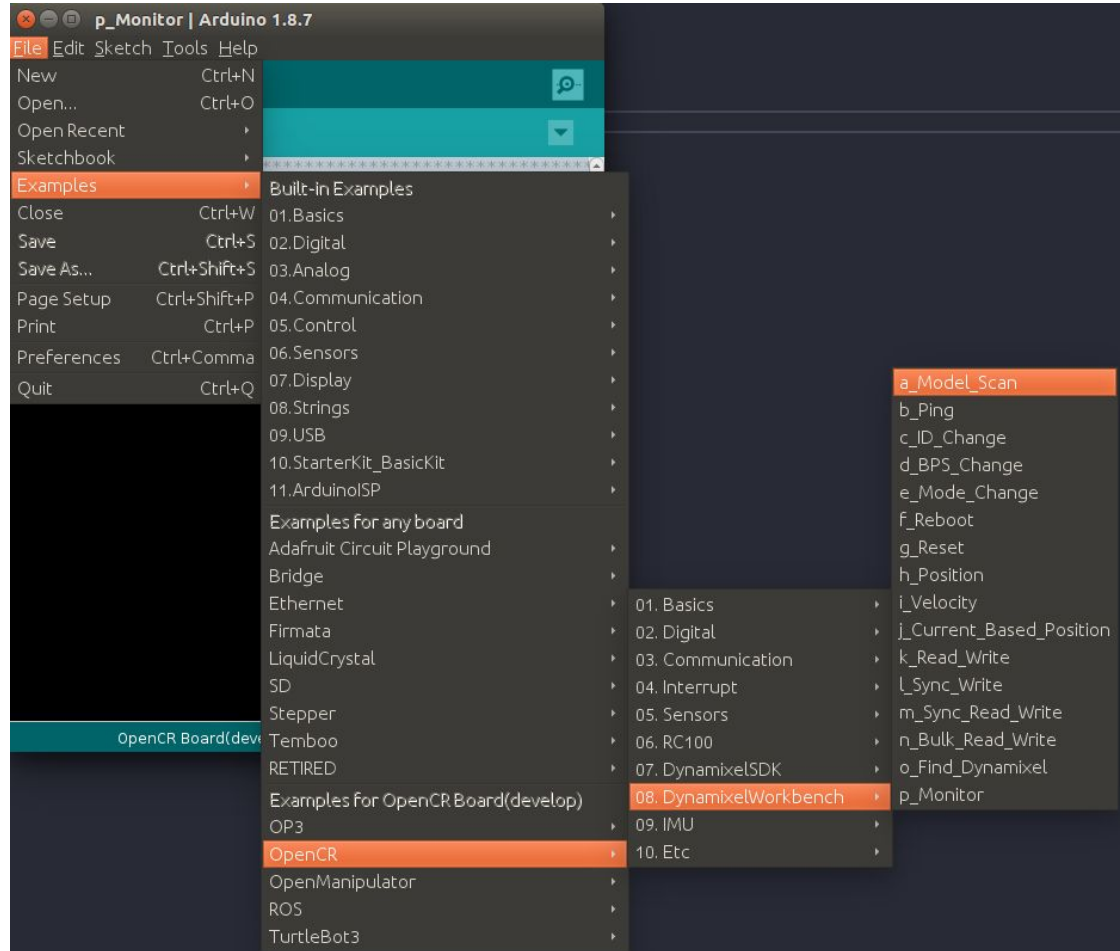
[http://emanual.robotis.com/docs/en/software/dynamixel/dynamixel\\_workbench/](http://emanual.robotis.com/docs/en/software/dynamixel/dynamixel_workbench/)

## DYNAMIXEL SDK



# Control using Arduino

- Half Duplex Serial !
- Arduino libraries
- <https://github.com/akira215/DynamixelArduino>



# Control using ROS

- ROS Packages for Dynamixel SDK <http://wiki.ros.org/dynamixel>
- For more information on ROS Packages for Dynamixel SDK, please refer to the ROS wiki pages below.
- [http://wiki.ros.org/dynamixel\\_sdk](http://wiki.ros.org/dynamixel_sdk)
- [http://wiki.ros.org/dynamixel\\_workbench](http://wiki.ros.org/dynamixel_workbench)
- [http://wiki.ros.org/dynamixel\\_workbench\\_msgs](http://wiki.ros.org/dynamixel_workbench_msgs)

- ROS에서 로봇티즈 다이내믹셀 움직여보기 Dynamixel Workbench
- <https://pinkwink.kr/1054>
- [http://wiki.ros.org/dynamixel\\_workbench\\_single\\_manager/Tutorials/GUI](http://wiki.ros.org/dynamixel_workbench_single_manager/Tutorials/GUI)
- <https://davincioh.tistory.com/22>

[http://emanual.robotis.com/docs/en/software/dynamixel/dynamixel\\_workbench/#ros-tutorials](http://emanual.robotis.com/docs/en/software/dynamixel/dynamixel_workbench/#ros-tutorials)

**THANK YOU!**