

Arduino institution	Function	Parameters	Returns																										
Dynamixel.begin(Baud_rate , Control_Pin)	Setup Arduino to communicate with Dynamixel servo, this instruction must be run at lest once	<p>Baud_rate: this is the speed at which the Arduino will be set and must be the same as the Dynamixel</p> <p>Control_Pin: the output pin on the Arduino used to control the full to half duplex buffer chip.</p>	Error code (See table below) 0 = non																										
Dynamixel.end																													
Dynamixel.reset(Servo_ID)	Reset the Dynamixel servo back to factory default	Servo_ID: Servo ID of which the institution will be addressed too	Error code (See table below) 0 = non																										
Dynamixel.ping(Servo_ID)	Ping the Dynamixel servo and receive status packet from Dynamixel servo	Servo_ID: Servo ID of which the institution will be addressed too	Returns = Servo ID of Pinged servo Error code (See table below)																										
Dynamixel.setStatusPaketReturnDelay(Servo_ID , Return_Delay)	The delay between Dynamixel servo receiving an instruction packet from the Arduino and the Dynamixel servo returning(sending) status packet.	<p>Servo_ID: Servo ID of which the institution will be addressed too</p> <p>Return_Delay: Return delay value (in uSec) (Dynamixel Default Value = 500 uSec)</p>	Returns = Servo ID if setStatusPacket is set to ALL Error code (See table below)																										
Dynamixel.setBaudRate(Servo_ID , Baud_Rate)	Set a new baud rate speed on the Dynamixel servo	<p>Servo_ID: Servo ID of which the institution will be addressed too</p> <p>Baud_Rate: New Baud rate to which Dynamixel will be set</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="text-align: center;">Target BPS</th> <th style="text-align: center;">Error Between Dynamixel and Arduino</th> </tr> </thead> <tbody> <tr><td style="text-align: center;">3000000</td><td style="text-align: center;">0.000 %</td></tr> <tr><td style="text-align: center;">2500000</td><td style="text-align: center;">0.000 %</td></tr> <tr><td style="text-align: center;">2250000</td><td style="text-align: center;">0.000 %</td></tr> <tr><td style="text-align: center;">1000000</td><td style="text-align: center;">0.000 %</td></tr> <tr><td style="text-align: center;">500000</td><td style="text-align: center;">0.000 %</td></tr> <tr><td style="text-align: center;">400000</td><td style="text-align: center;">0.000 %</td></tr> <tr><td style="text-align: center;">250000</td><td style="text-align: center;">0.000 %</td></tr> <tr><td style="text-align: center;">200000</td><td style="text-align: center;">0.000 %</td></tr> <tr><td style="text-align: center;">115200</td><td style="text-align: center;">-2.124 %</td></tr> <tr><td style="text-align: center;">57600 (Dynamixel Default)</td><td style="text-align: center;">0.794 %</td></tr> <tr><td style="text-align: center;">19200</td><td style="text-align: center;">-0.160 %</td></tr> <tr><td style="text-align: center;">9600</td><td style="text-align: center;">-0.160 %</td></tr> </tbody> </table>	Target BPS	Error Between Dynamixel and Arduino	3000000	0.000 %	2500000	0.000 %	2250000	0.000 %	1000000	0.000 %	500000	0.000 %	400000	0.000 %	250000	0.000 %	200000	0.000 %	115200	-2.124 %	57600 (Dynamixel Default)	0.794 %	19200	-0.160 %	9600	-0.160 %	Returns = Servo ID if setStatusPacket is set to ALL Error code (See table below)
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Dynamixel.setMaxTorque(Servo_ID , Torque)	Set max torque value which when reached the Dynamixel will alarm and shut down	<p>Servo_ID: Servo ID of which the institution will be addressed too</p> <p>Torque: value of max torque (value range 0x00 to 0x3FF) (Dynamixel Default Value = 0x3FF)</p>	Returns = Servo ID if setStatusPacket is set to ALL Error code (See table below)																										
Dynamixel.setHoldingTorque(Servo_ID , Bool)	Set holding torque	<p>Servo_ID: Servo ID of which the institution will be addressed too</p> <p>Bool: ON = Holding torque true,</p>	Returns = Servo ID if setStatusPacket is set to ALL Error code (See table below)																										

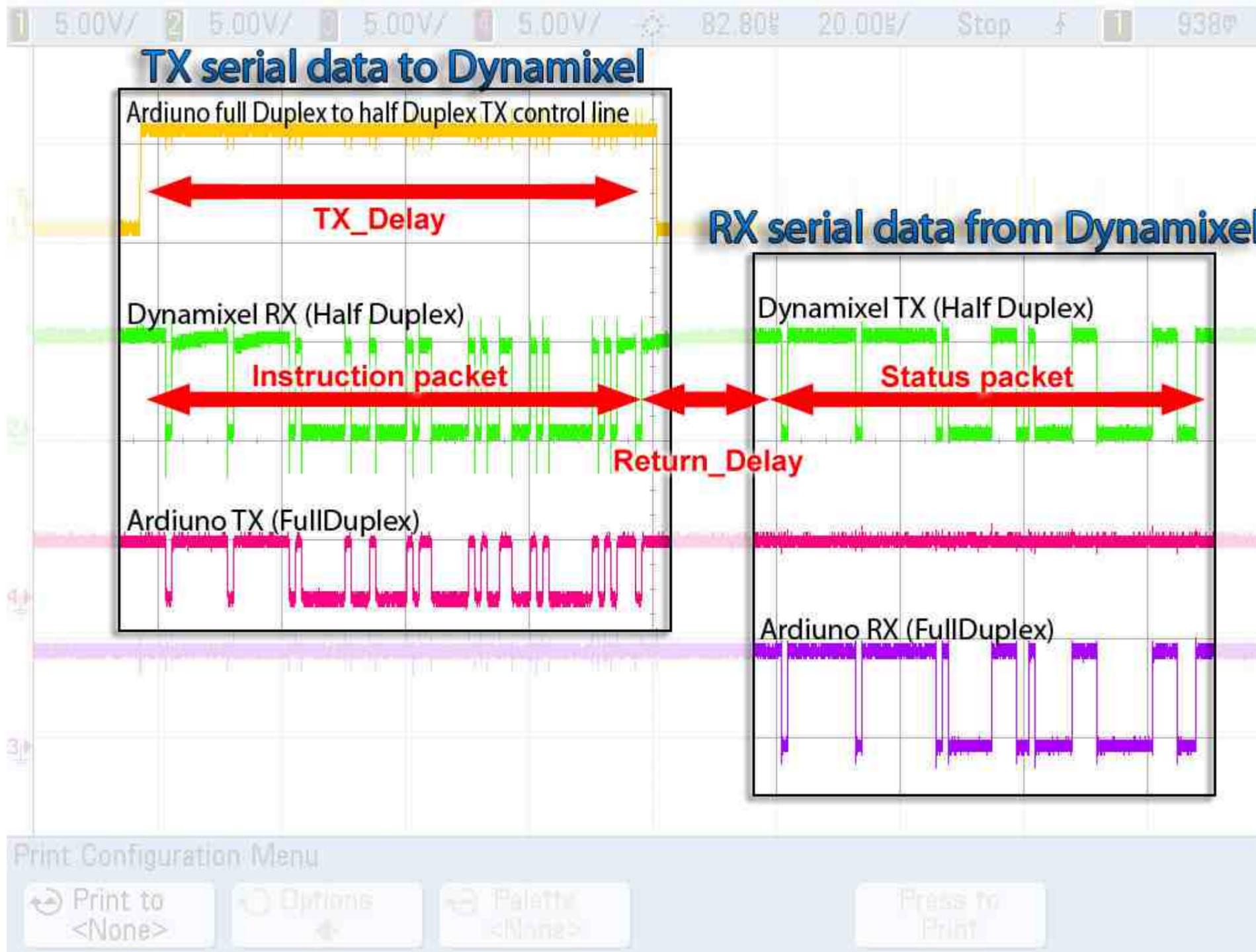
		OFF = Holding torque false	
Dynamixel.setAlarmShutdown(Servo_ID, Alarms)	Set which alarms for the Dynamixel to monitor	Servo_ID: Servo ID of which the institution will be addressed too Alarms: which alarm bits will be set (see Robotis manual for bit define)	Returns = Servo ID if setStatusPacket is set to ALL Error code (See table below)
Dynamixel.setStatusPaket(Servo_ID, Status)	Set when the Dynamixel will or will not return a status packet	Servo_ID: Servo ID of which the institution will be addressed too Status: NONE = no status packet are returned from Dynamixel. READ = only read instructions return a status packet. ALL = all instructions return a status packet	Returns = Servo ID if setStatusPacket is set to ALL Error code (See table below)
Dynamixel.setMode(Servo_ID,bool,CW_Limit,CCW_Limit)	Set servo to “wheel” mode or “servo” mode and set angel limits for servo mode	Servo_ID: Servo ID of which the institution will be addressed too Bool: WHEEL = wheel mode. SERVO = servo mode. CW_Limit: angel limit for clockwise movement (value range 0x01 to 0xFFFF) one unit is about 0.088 degrees e.g 0xFFFF x 0.088 is about 360 degrees CCW_Limit: angel limit for anticlockwise movement (value range 0x01 to 0xFFFF) one unit is about 0.088 degrees e.g 0xFFFF x 0.088 is about 360 degrees	Returns = Servo ID if setStatusPacket is set to ALL Error code (See table below)
Dynamixel.setPunch(Servo_ID, Punch)	Set Punch value	Servo_ID: Servo ID of which the institution will be addressed too Returns = Servo ID if setStatusPacket is set to ALL Error code (See table below) Punch: Punch value	Returns = Servo ID if setStatusPacket is set to ALL Error code (See table below)
Dynamixel.setPID(Servo_ID, P_Gain, I_Gain, D_Gain)	Set PID settings	Servo_ID: Servo ID of which the institution will be addressed too P_Gain: Proportional ban I_Gain: Integral action D_Gain: Derivative action	Returns = Servo ID if setStatusPacket is set to ALL Error code (See table below)
Dynamixel.set.Temp(Servo_ID,Temp)	Set highest temperature alarm limit	Servo_ID: Servo ID of which the institution will be addressed too Temp: Temperature value in Celsius	Returns = Servo ID if setStatusPacket is set to ALL Error code (See table below)
Dynamixel.setVoltage(Servo_ID, Lowest_Volt, Highest_Volt)	Set lowest and highest voltage alarm limits	Servo_ID: Servo ID of which the institution will be addressed too Lowest_Volt: Low voltage limit Highest_Volt: High voltage limit	Returns = Servo ID if setStatusPacket is set to ALL Error code (See table below)
Dynamixel.servo(Servo_ID, Angle, Speed)	Move in servo mode to a specific angle at speed “x”	Servo_ID: Servo ID of which the institution will be addressed too Angle: Angle to move servo too (value range 0x00 to 0xFFFF) one unit is about 0.088 degrees e.g 0xFFFF x 0.088 is about 360 degrees Speed: Speed to move at (value range 0x00 to 0x3FF) one unit is about 0.114rpm	Returns = Servo ID if setStatusPacket is set to ALL Error code (See table below)

		e.g 0x3FF x 0.114 is about 117.07rpm	
Dynamixel.servoPreload(Servo_ID, Angle, Speed)	Write to Dynamixel register the servo mode to a specific angle at speed “x” <i>NOTE: this conman only writes(stores) the instruction on the Dynamixel, you must then use “Dynamixel.action” to tell it to action the information in the Dynamixel register.</i>	Servo_ID: Servo ID of which the institution will be addressed too Angle: Angle to move servo too (value range 0x00 to 0xFF) one unit is about 0.088 degrees e.g 0xFF x 0.088 is about 360 degrees Speed: Speed to move at (value range 0x00 to 0x3FF) one unit is about 0.114rpm e.g 0x3FF x 0.114 is about 117.07rpm	Returns = Servo ID if setStatusPacket is set to ALL Error code (See table below)
Dynamixel.wheel(Servo_ID, Direction, Speed)	Move in wheel mode left/right at speed “x”	Servo_ID: Servo ID of which the institution will be addressed too Direction: _RIGHT = clockwise, LEFT = Anti-clockwise Speed: Speed to move at (value range 0x00 to 0x3FF) one unit is about 0.114rpm e.g 0x3FF x 0.114 is about 117.07rpm	Returns = Servo ID if setStatusPacket is set to ALL Error code (See table below)
Dynamixel.wheelPreload(Servo_ID, Direction, Speed)	Move in wheel mode left/right at speed “x”	Servo_ID: Servo ID of which the institution will be addressed too Direction: _RIGHT = clockwise, LEFT = Anti-clockwise Speed: Speed to move at (value range 0x00 to 0x3FF) one unit is about 0.114rpm e.g 0x3FF x 0.114 is about 117.07rpm	Returns = Servo ID if setStatusPacket is set to ALL Error code (See table below)
Dynamixel.action(Servo_ID)	Tell Dynamixel to action any instruction stored in its register	Servo_ID: Servo ID of which the institution will be addressed too	Returns = Servo ID if setStatusPacket is set to ALL Error code (See table below)
Dynamixel.readTemperature(Servo_ID)	Get Dynamixel Temperature in C	Servo_ID: Servo ID of which the institution will be addressed too	Error code (See table below) & Temperature in Celsius
Dynamixel.readVoltage(Servo_ID)	Get Dynamixel Voltage	Servo_ID: Servo ID of which the institution will be addressed too	The HEX value returned is ten time the real value. e.g return value of 109 is 10.9 Volts Error code (See table below) & Voltage
Dynamixel.readPosition(Servo_ID)	Get Dynamixel Position (angle)	Servo_ID: Servo ID of which the institution will be addressed too	one unit is about 0.088 degrees e.g 0xFF x 0.088 is about 360 degrees Error code (See table below) & Position
Dynamixel.readLoad(Servo_ID)	Get Dynamixel load and direction of load force on the Dynamixel	Servo_ID: Servo ID of which the institution will be addressed too	Error code (See table below) & Load
Dynamixel.readSpeed(Servo_ID)	Get speed at which the servo is turning	Servo_ID: Servo ID of which the institution will be addressed too	one unit is about 0.114rpm e.g 0x3FF x 0.114 is about 117.07rpm Error code (See table below) & Speed

Dynamixel.checkRegister(Servo_ID)	Check if there are any commands in register e.g Dynamixel.servoPreLoad()	Servo_ID: Servo ID of which the institution will be addressed too	Error code (See table below) & 0 = Non 1 = Yes
Dynamixel.checkMovement(Servo_ID)	Check to see if servo is still moving to goal angle	Servo_ID: Servo ID of which the institution will be addressed too	Error code (See table below) & 0 = Goal angle complete 1 = Goal angle still in progress
Dynamixel.checkLock(Servo_ID)	Check to see if the Dynamixel has EEPROM locked	Servo_ID: Servo ID of which the institution will be addressed too	Error code (See table below) & 0 = EEPROM can be modified 1 = EEPROM can not be modified
Dynamixel.ledState(Servo_ID, State)	Turn LED on Dynamixel off/on	Servo_ID: Servo ID of which the institution will be addressed too State: ON = turn LED on OFF = Turn LED off	Error code (See table below) 0 = non

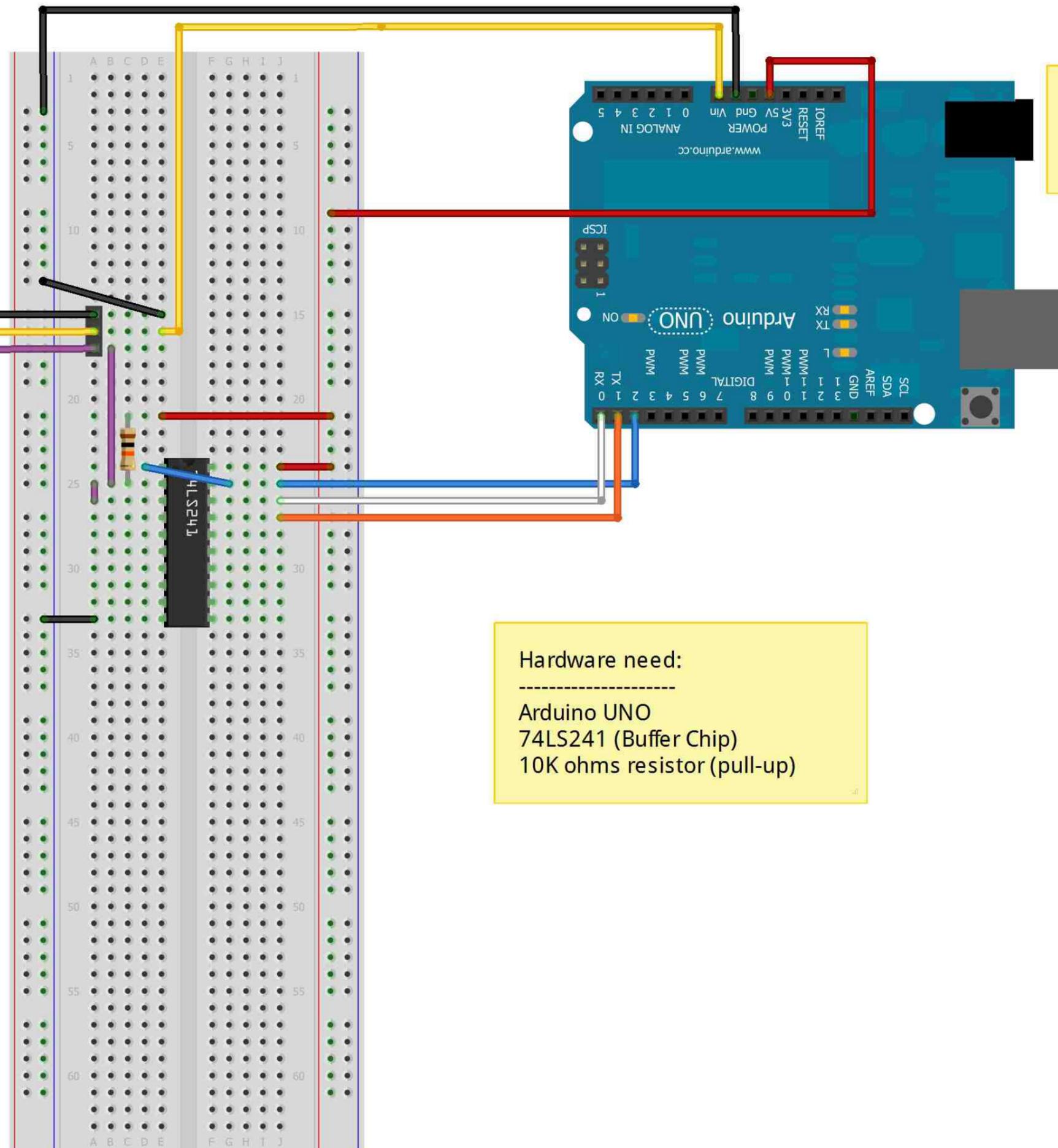
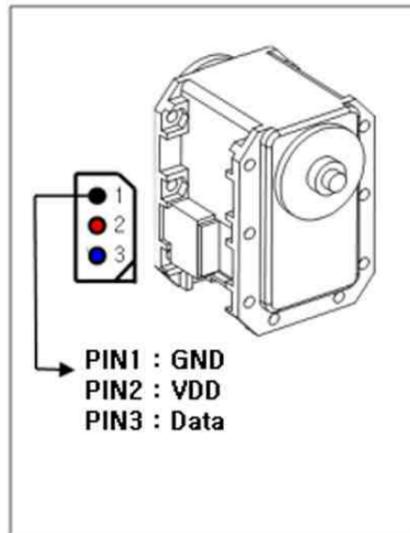
ERROR CODES

Bits															
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Bit(s) are 1 when there is and error,								Bit(s) are 0 when there is no error							
Bit 0	Dynamixel input voltage error (Voltage out side of set range)														
Bit 1	Dynamixel angle limit error (Goal position is outside angle limits)														
Bit 2	Dynamixel over heating error (Temperature is above set limit)														
Bit 3	Dynamixel command is beyond range of use														
Bit 4	Dynamixel Checksum error (packet received has invalid checksum)														
Bit 5	Dynamixel Overload error (current load can not be controlled with the present maximum torque)														
Bit 6	Dynamixel Instruction error (A undefined instruction has been send or action command is invalid)														
Bit 7	Recived status packet error (there has not been any status packet received by Arduino)														
Bit 8	None														
Bit 9	None														
Bit 10	None														
Bit 11	None														
Bit 12	All 4 are set 1 when there is a error on any of the above, 0 if there is no error														
Bit 13															
Bit 14	As the Dynamixel does not use the bit 12 to 15 for any data, these four bits are set (0xF000) so if these bits are set there is an error and other bits can be check as per this table to find out error. If bit 12 to 15 are zero all other data returned is valid e.g. temp, volt e.t.c.														
Bit 15															



TO MX28

Pin 1 : GND
Pin 2 : VDD
Pin 3 : Data



Power supply connected to Arduino MUST be 12Vdc

Hardware need:

Arduino UNO
74LS241 (Buffer Chip)
10K ohms resistor (pull-up)

