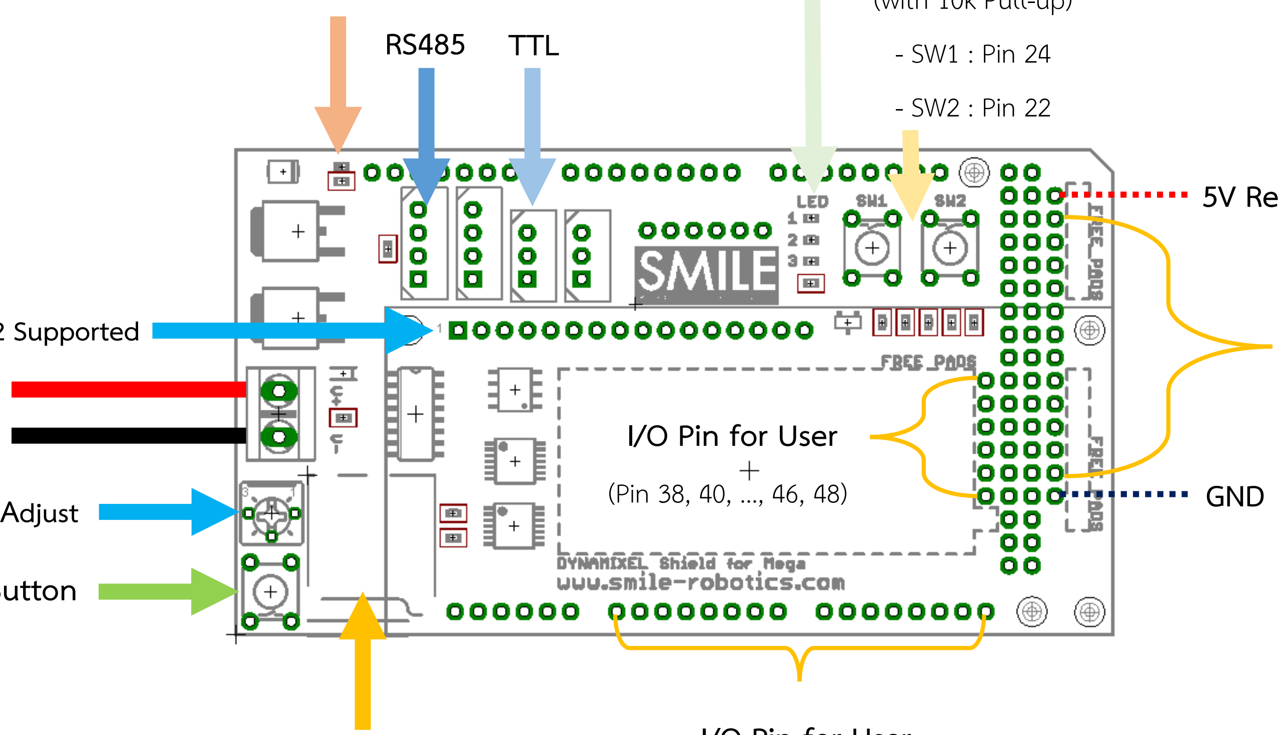
Dynamixel Shield for Arduino Mega2560

Maximum Baud Rate (Tested) : **1,000,000 bps**



LED for User

- LED 1 : Pin 30
- LED 2 : Pin 28
- LED 3 : Pin 26

Switch for User

(with 10k Pull-up)

- SW1 : Pin 24
- SW2 : Pin 22

PWR LED

RS485

TTL

5V Regulated

Character LCD 16x2 Supported

Power Supply Input

(9V-14V)

+

-

I/O Pin for User

(Pin 38, 40, ..., 46, 48)

I/O Pin for User

(Pin 25, 27, ..., 45, 47)

GND

LCD Contrast Adjust

Reset Button

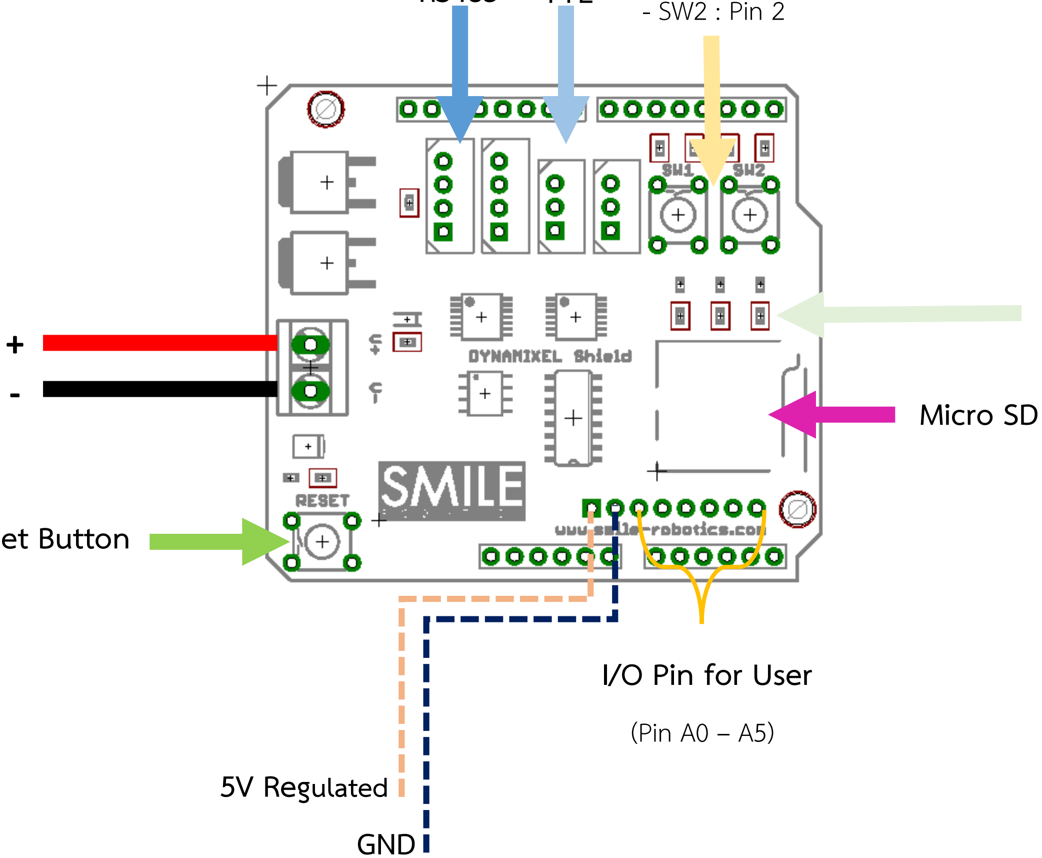
Micro SD Card

I/O Pin for User

(Pin A0 – A15)

Dynamixel Shield for Arduino UNO

Maximum Baud Rate (Tested) : **115,200 bps**



Switch for User

(with 10k Pull-up)

- SW1 : Pin 3
- SW2 : Pin 2

RS485

TTL

LED for User

- LED 1 : Pin 6
- LED 2 : Pin 5
- LED 3 : Pin 4

Power Supply Input

(9V-14V)

Micro SD Card

Reset Button

I/O Pin for User

(Pin A0 – A5)

5V Regulated

GND

Available Function for User

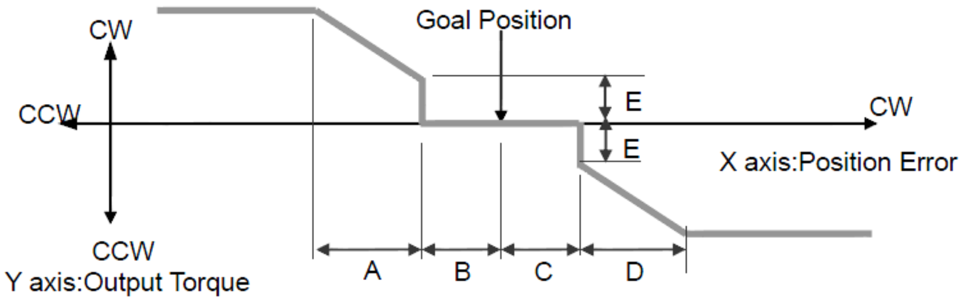
Write Function

Function	Description
begin(*BAUDRATE***);**	Start communication with a specific baud rate (in bps).
end();	End communication.
reset(*SERVO_ID***);**	Changes the control table values of the Dynamixel actuator to the Factory Default Value settings.
ping(*SERVO_ID***);**	Does not command any operations. Used for requesting a status packet or to check the existence of a Dynamixel actuator with a specific ID.
setID(*SERVO_ID, NEW_ SERVO_ID***);**	Changing the ID of a Dynamixel actuator with a specific new ID
setBD(*SERVO_ID, BAUDRATE***);**	Changing the Baud Rate of a Dynamixel actuator to a specific baud rate (in bps).
move(*SERVO_ID, POSITION***);**	set angular position for the Dynamixel actuator output to move to.
speed(*SERVO_ID, SPEED***);**	Set the angular velocity of the output moving to the Goal Position (The lowest velocity is when this value is set to 1. When set to 0, the velocity is the largest possible for the supplied voltage, e.g. no velocity control is applied.)
moveSpeed(*SERVO_ID, POSITION, SPEED***);**	Sets angular position and velocity in the same time.
setEndless(*SERVO_ID, STATUS***);**	Set STATUS to "ON" for Full Rotation mode.
turn(*SERVO_ID, SIDE, SPEED***);**	Set SIDE to "RIGHT" or "LEFT" to turn servo in Full Rotation mode.
moveRW(*SERVO_ID, POSITION***);**	Write position to register then stays in standby mode until the ACTION function is called.
moveSpeedRW(*SERVO_ID, POSITION, SPEED***);**	Write position and angular velocity to register then stays in standby mode until the action() function is called.
action();	Triggers the action registered by the moveRW or moveSpeedRW function
setTempLimit(*SERVO_ID, TEMPERATURE_SP***);**	Set the upper limit of the Dynamixel actuator's operating temperature. The values are in Degrees Celsius.

Function	Description
setAngleLimit(*SERVO_ID, CW_LIMIT, CCE_LIMIT***);**	Sets the Dynamixel actuator's operating angle range. The Goal Position needs to be within the range of: CW Angle Limit <= Goal Position <= CCW Angle Limit. An Angle Limit Error will occur if the Goal Position is set outside this range set by the operating angle limits.
setVoltageLimit(*SERVO_ID, LOWEST_VOLTAGE_SP, HIGHEST_VOLTAGE_SP***);**	Set the upper and lower limits of the Dynamixel actuator's operating voltage. The values are 10 times the actual voltage value. For example, if you want to set value to 8V, You have to set value to 80.
setMaxTorque(*SERVO_ID, MAX_TORQUE_SP***);**	Set the maximum torque output for the Dynamixel actuator. When this value is set to 0, the Dynamixel actuator enters the Free Run mode. In the EEPROM (Address 0X0E, 0x0F).
setTorqueLimit(*SERVO_ID, TORQUE_LIMIT_SP***);**	Set the maximum torque output for the Dynamixel actuator. When this value is set to 0, the Dynamixel actuator enters the Free Run mode. in the RAM (Address 0x22, 0x23).
setSRL(*SERVO_ID, SRL***);**	Determines whether the Dynamixel actuator will return a Status Packet after receiving an Instruction Packet. 'SRL = 0' - Do not respond to any instructions 'SRL = 1' - Respond only to READ_DATA instructions 'SRL = 2' - Respond to all instructions
setRDT(*SERVO_ID, RDT***);**	Set the time it takes for the Status Packet to return after the Instruction Packet is sent. The delay time is given by 2uSec * RDT value.
torqueStatus(*SERVO_ID, STATUS***);**	When the power is first turned on, the Dynamixel actuator enters the Torque Free Run condition (zero torque). Setting the value in Address 0x18 to 1 enables the torque.
ledStatus(*SERVO_ID, STATUS***);**	The LED turns on when set to 1 and turns off if set to 0.
lockRegister(*SERVO_ID***);**	After function called, Only Torque Status, LED, Compliance Margin, Compliance Slope, Goal Position, Moving Speed and Torque Limit can be written to and other areas cannot. Once locked, it can only be unlocked by turning the power off.

Function	Description
setLEDAlarm(*SERVO_ID, LED_ALARM_VALUE***);**	If the corresponding Bit is set to 1, the LED blinks when an Error occurs. Bit 7 : 0 Bit 6 : If set to 1, the LED blinks when an Instruction Error occurs Bit 5 : If set to 1, the LED blinks when an Overload Error occurs Bit 4 : If set to 1, the LED blinks when a Checksum Error occurs Bit 3 : If set to 1, the LED blinks when a Range Error occurs Bit 2 : If set to 1, the LED blinks when an Overheating Error occurs Bit 1 : If set to 1, the LED blinks when an Angle Limit Error occurs Bit 0 : If set to 1, the LED blinks when an Input Voltage Error occurs This function operates following the "OR" logical operation of all bits. For example, if the value is set to 0X05, the LED will blink when an Input Voltage Error occurs or when an Overheating Error occurs. Upon returning to a normal condition from an error state, the LED stops blinking after 2 seconds.

Function	Description
setShutdownAlarm(*SERVO_ID, SALARM***);**	If the corresponding Bit is set to a 1, the Dynamixel actuator’s torque will be turned off when an error occurs. Bit 7 : 0 Bit 6 : If set to 1, torque off when an Instruction Error occurs Bit 5 : If set to 1, torque off when an Overload Error occurs Bit 4 : If set to 1, torque off when a Checksum Error occurs Bit 3 : If set to 1, torque off when a Range Error occurs Bit 2 : If set to 1, torque off when an Overheating Error occurs Bit 1 : If set to 1, torque off when an Angle Limit Error occurs Bit 0 : If set to 1, torque off when an Input Voltage Error occurs This function operates following the “OR” logical operation of all bits. However, unlike the Alarm LED, after returning to a normal condition, it maintains the torque off status. To recover, the Torque Enable (Address0X18) needs to be reset to 1.



A : CCW Compliance Slope(Address0x1D)
B : CCW Compliance Margin(Address0x1B)
C : CW Compliance Margin(Address0x1A)
D : CW Compliance Slope (Address0x1C)
E : Punch(Address0x30,31)

The compliance of the Dynamixel actuator is defined by setting the compliance Margin and Slope. This feature can be utilized for absorbing shocks at the output shaft. The following graph shows how each compliance value (length of A, B, C & D) is defined by the Position Error and applied torque.

Function	Description
setCMargin(*SERVO_ID, CWCMargin, CCWCMargin***);**	Set length of C & B
setCSlope(*SERVO_ID, CWCSlope, CCWCSlope***);**	Set length of D & A
setPunch(*SERVO_ID, PUNCH***);**	Set length of E

Read Function (Return “Int” Value)

Function	Description
moving(*SERVO_ID***);**	Return ‘1’ when the Dynamixel actuator is moving by its own power.
RWStatus(*SERVO_ID***);**	Return ‘1’ when an instruction is assigned by the REG_WRITE command. Return ‘0’ after it completes the assigned instruction by the Action command.
readTemperature(*SERVO_ID***);**	Return the internal temperature of the Dynamixel actuator in Degrees Celsius.
readVoltage(*SERVO_ID***);**	Return the voltage currently applied to the Dynamixel actuator. The value is 10 times the actual voltage. For example, 10V is represented as 100 (0x64).
readPosition(*SERVO_ID***);**	Return current angular position of the Dynamixel actuator output.
readSpeed(*SERVO_ID***);**	Return current angular velocity of the Dynamixel actuator output.
readLoad(*SERVO_ID***);**	Return the magnitude of the load on the operating Dynamixel actuator. Bit 10 is the direction of the load.