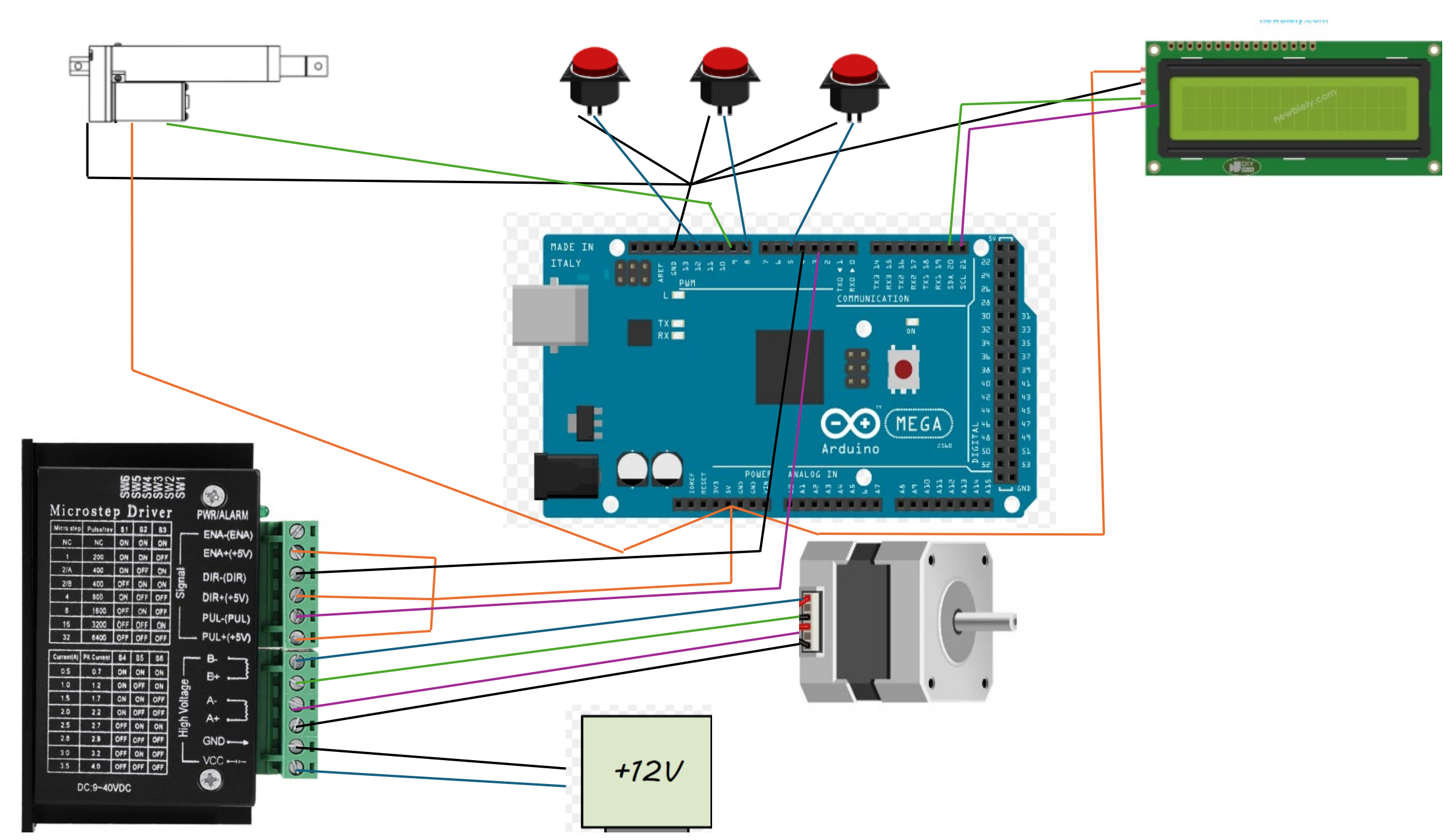
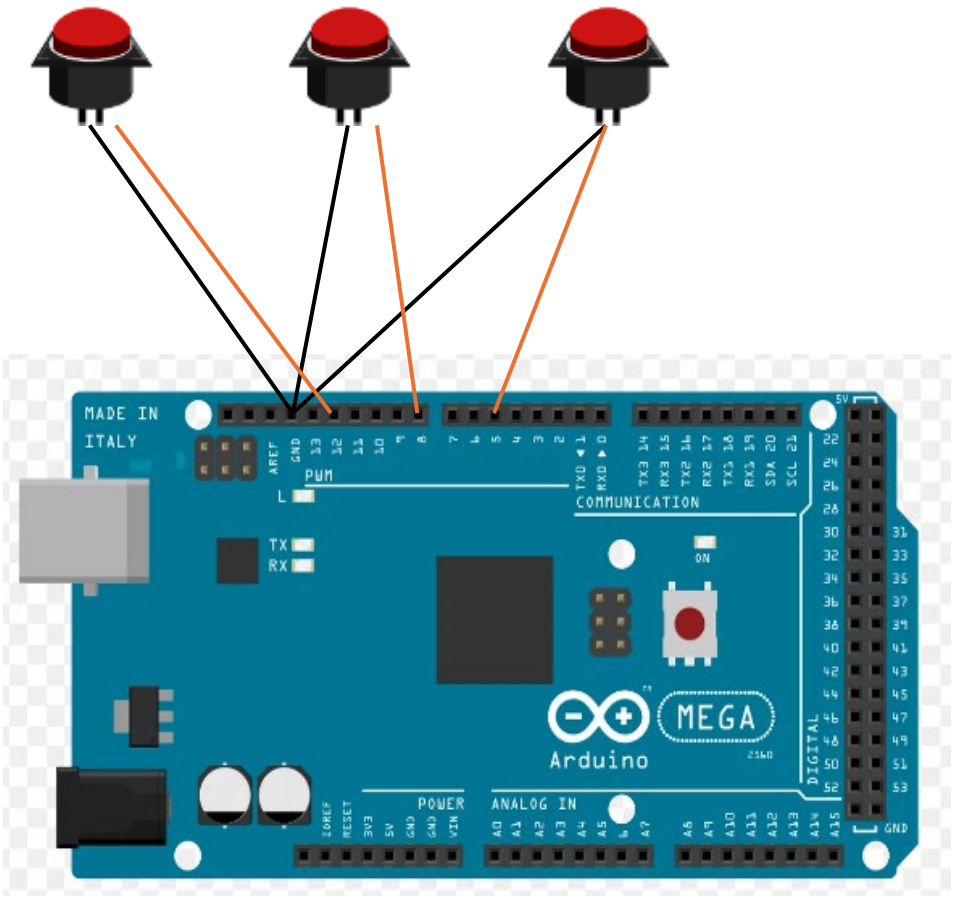
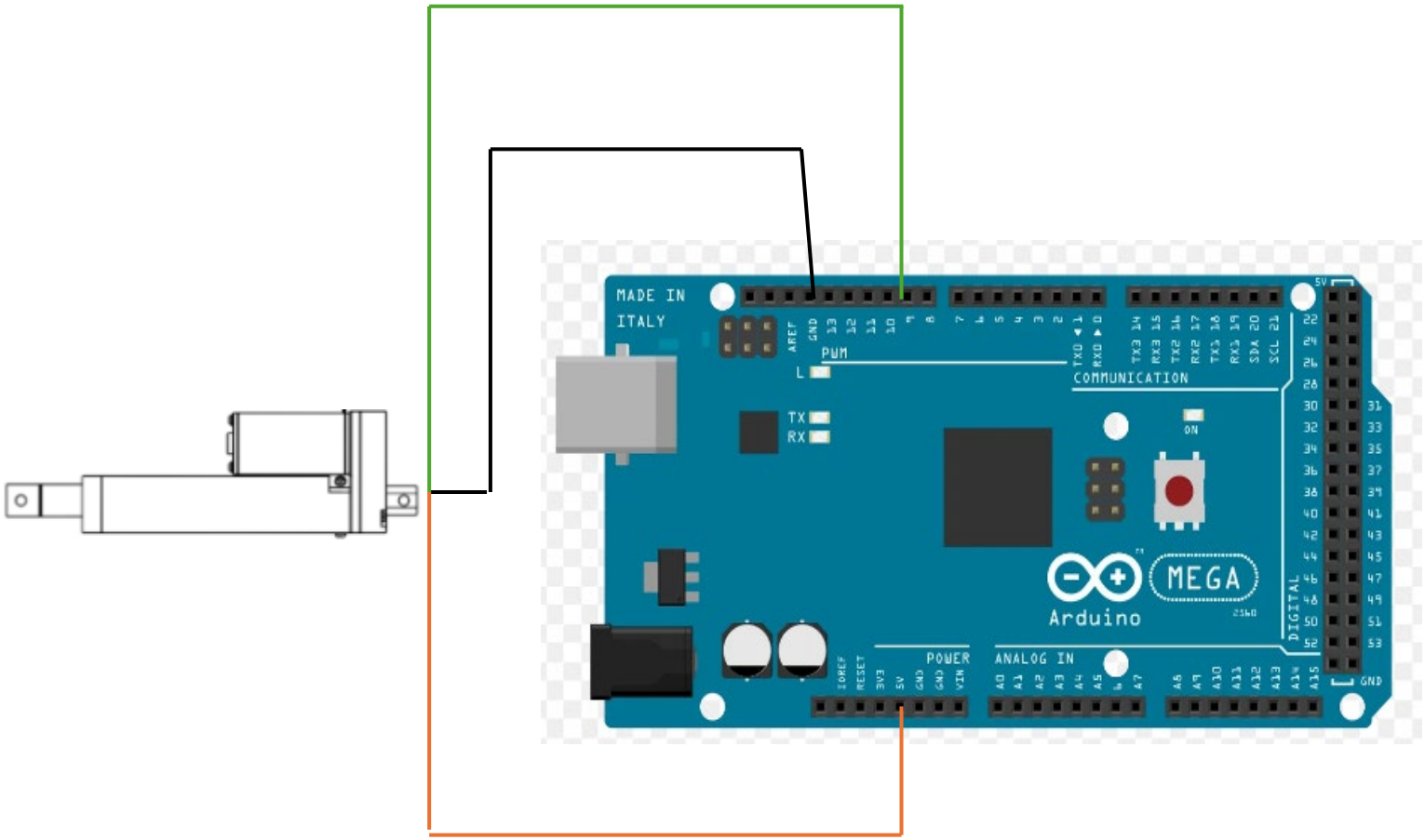

Microstep Driver
SW6 SW5 SW4 SW3 SW2 SW1
Micro step | Pulse/rev | S1 | S2 | S3
NC | NC | ON | ON | ON
1 | 200 | ON | ON | OFF
2/A | 400 | ON | OFF | ON
2/B | 400 | OFF | ON | ON
4 | 800 | ON | OFF | OFF
8 | 1600 | OFF | ON | OFF
16 | 3200 | OFF | OFF | ON
32 | 6400 | OFF | OFF | OFF
Current(A) | PK Current | S4 | S5 | S6
0.5 | 0.7 | ON | ON | ON
1.0 | 1.2 | ON | OFF | ON
1.5 | 1.7 | ON | ON | OFF
2.0 | 2.2 | ON | OFF | OFF
2.5 | 2.7 | OFF | ON | ON
2.8 | 2.9 | OFF | OFF | OFF
3.0 | 3.2 | OFF | ON | OFF
3.5 | 4.0 | OFF | OFF | OFF
DC:9~40VDC
PWR/ALARM
Signal
ENA-(ENA)
ENA+(+5V)
DIR-(DIR)
DIR+(+5V)
PUL-(PUL)
PUL+(+5V)
High Voltage
B-
B+
A-
A+
GND
VCC
MADE IN ITALY
PWM
COMMUNICATION
TX
RX
ON
MEGA
Arduino
POWER
ANALOG IN
DIGITAL
+12V



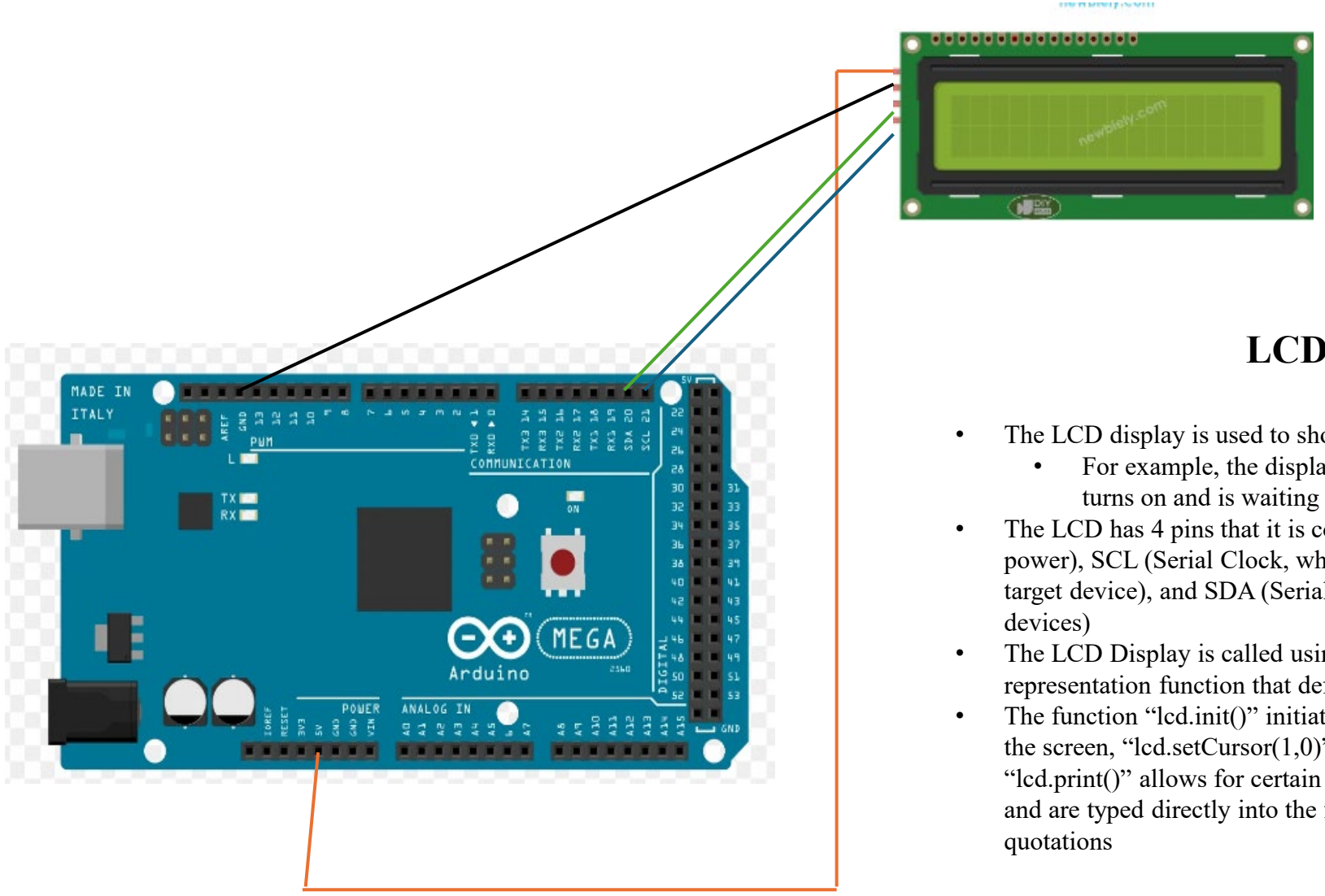

# Homing Buttons

- Each button has a wire that connects to ground, as well as a button that connects to an individual digital pin
- The X-homing pin is connected to the number “5” pin slot
  - It allows for the homing of the X-direction motor
- The Y-homing pin is connected to the number “8” pin slot
  - It allows for the homing of the Y-direction motor
- The “Turn” button is connected to the number “12” pin slot
  - It is the reset button for the algorithm, and allows for the player to interact with the machine to tell it that the player has completed their turn
  - Once pressed, the program will analyze the move, and react accordingly



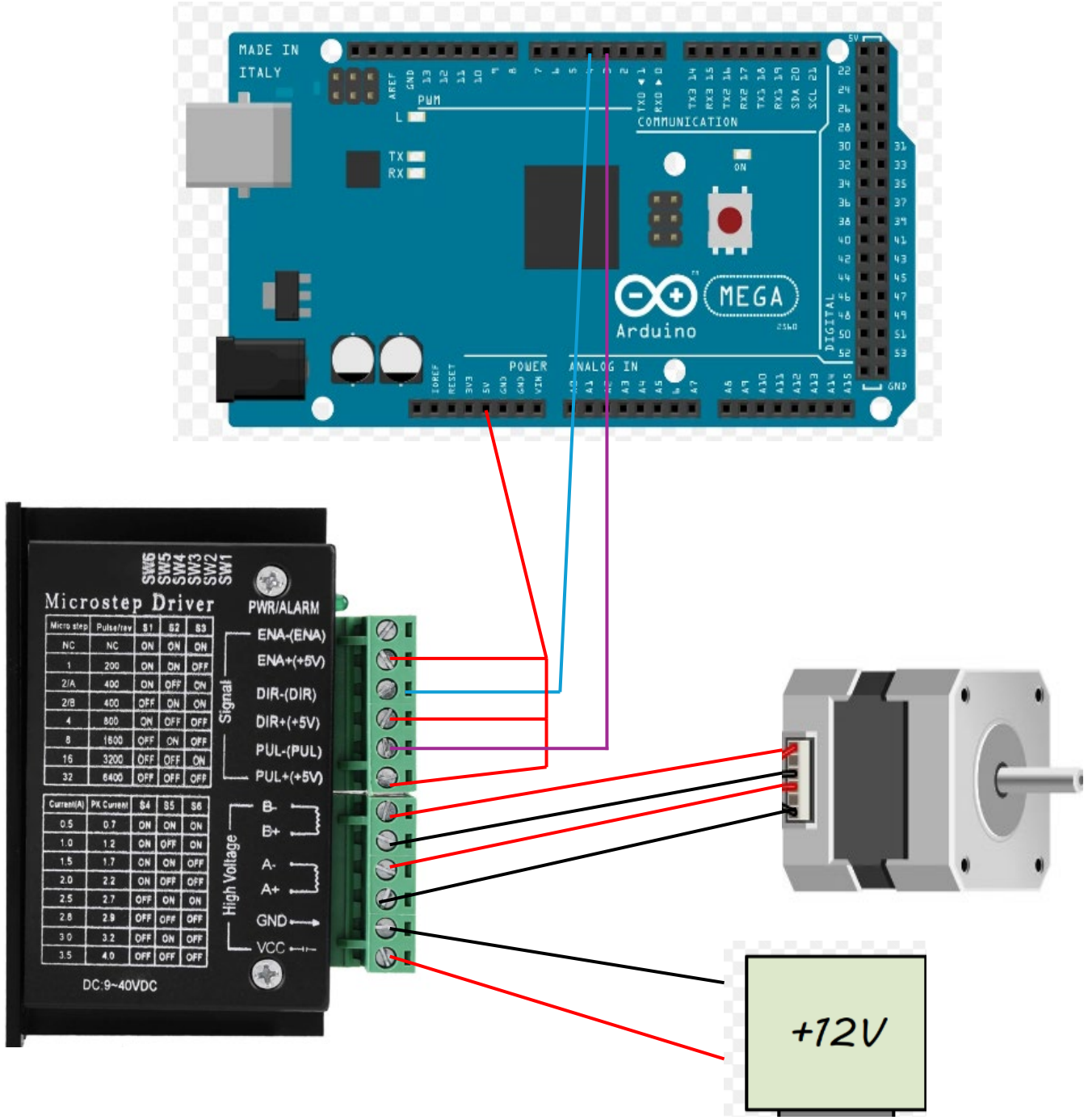

# The Linear Actuator

- The Linear Actuator has 3 different pin connections
  - It has a ground (GND) connection, a power (5V) connection, and digital pin connection
- The digital pin wire is connected to pin slot number “9”
  - This pin connection allows for the use of the servo function to be called and recognized by the code
  - Additionally, it allows for us to run different functions and transmit that back to the Arduino and actuator




# LCD Display

- The LCD display is used to show the action that the program is running
  - For example, the display reads, “On Standby” when the robot turns on and is waiting for a turn
- The LCD has 4 pins that it is connected to: GND (Ground), 5V (for power), SCL (Serial Clock, which synchronizes data in or out of the target device), and SDA (Serial Data, which transmits data between devices)
- The LCD Display is called using an “include” function, and a representation function that defines the screen size
- The function “lcd.init()” initiates the screen, “lcd.backlight()” turns on the screen, “lcd.setCursor(1,0)” sets the cursor position at the first box, “lcd.print()” allows for certain messages to be displayed by the screen and are typed directly into the function through the parentheses in quotations




# The Stepper Motor, Microstep Driver, and External Power Supply (2X):

- The stepper motor and 12V power supply are both routed to the driver which is then routed to the board through the 5V (Power), and two pin connections: one which controls the direction (in this diagram it is represented by the 4-pin), and the other which controls the step (represented by the 3-pin)
- The direction pin control the direction that the motor will travel, with two motors (the other is not displayed for simplicity), one driver/motor combo controls x-direction movement while the other control y-direction movement
- To set up a motor we define it using the “define” function and then we set both the direction and step to different pins
    - Next, we declare the pins by calling them as outputs using the “pinMode()” command
- To use the motors, we utilize the “movex()” or “movey()” commands depending on the direction we want to travel
- After the machine has finished its “turn” we can utilize the “homex()” and “homey()” commands, in which case, the motors will spin until the home button is depressed, signifying that the machine has finished its turn