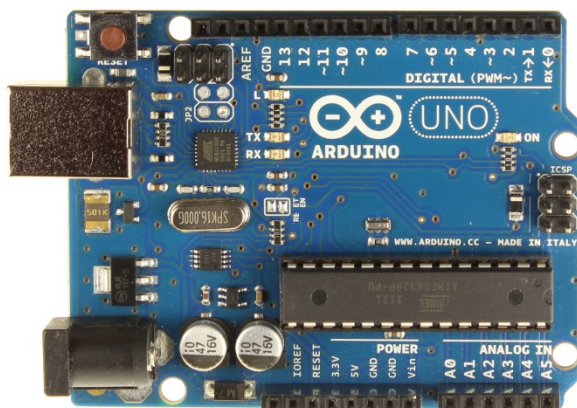


Lab. Script 10

Motors Command using ARDUINO

Part I: Elementary concepts regarding the ARDUINO platform programming

– **The Hardware:**



Microcontroller	ATmega328	SRAM	2 KB
Working Voltage	5V	EEPROM	1 KB
Supply Voltage	7-12V	Clock frequency	16 MHz
Digital I/O	14 (6 with PWM output)	Serial port	1
Analogue Inputs	6	SPI	1
Current per I/O	40 mA	I2C	1
Flash memory	32 KB	Interrupt line	2

– **The Software**

- Open the ARDUINO IDE.
- Basic “sketch” structure: the functions `setup()` and `loop()`

The basic ARDUINO **sketch** has, at least, two functions: the `setup()` and `loop()` functions. The first executes in the program beginning and is used to initiate variables and ports. The second is iteratively executed and the code within is repeated indefinitely.

- Analyse the sketch **Basic/Blink.ino** from the Examples.
- Analyse the sketch **Analog/AnalogInput.ino** from the Examples.
- Analyse the sketch **Basic/DigitalReadSerial.ino** from the Examples.
- The **Shield** concept. Use of LCD shield.

Upload the program **LiquidCrystal/HelloWorld.ino**

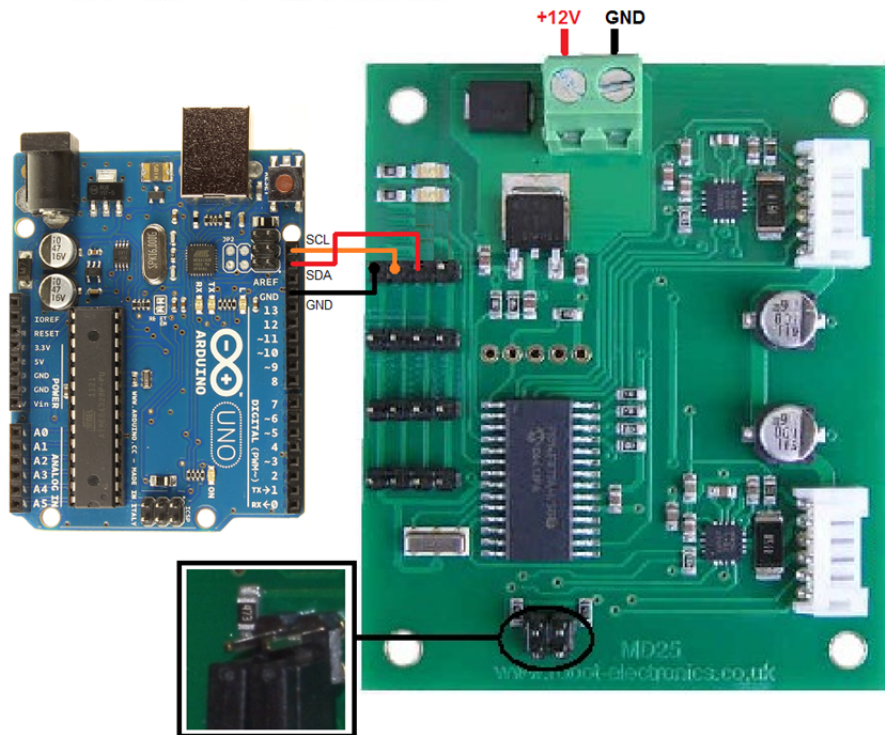
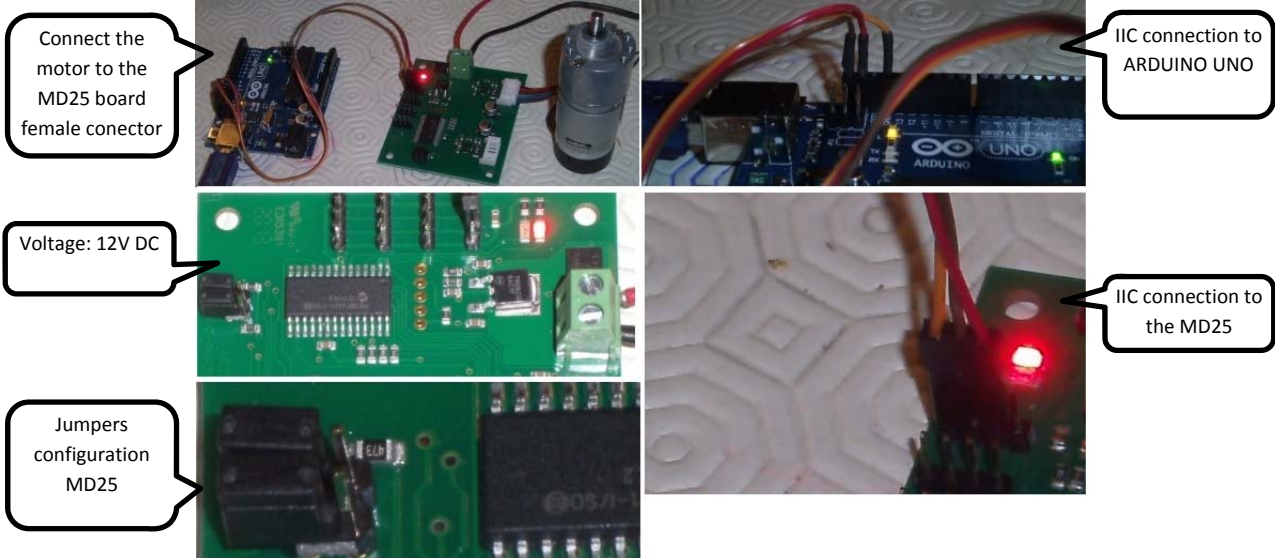
Note: Replace the line `LiquidCrystal lcd(12, 11, 5, 4, 3, 2);`
by `LiquidCrystal lcd(8, 9, 4, 5, 6, 7);`

Exercise: Use the ARDUINO board with the LCD shield to design a digital voltmeter with the following specifications:

- Measure voltages between 0 and 5 V from the analogue channel 1 (A1).
- Sampling time equal to 0.1 s.
- Average filter with a window size of 10 samples.
- Results presented in the LCD.

PART II: Command the EMG30 with the MD25 board (IIC MODE)

- Do the following connections:



- Download the MD25 library from:
www.ipb.pt/~jpcoelho/downloads.htm
- Design an ARDUINO sketch that can measure the motor angular velocity from the returned encoder data. The velocity must be presented in the computer serial monitor.
- Use the knowledge acquired in the previous sketch to design a new program that enable us to control the motor speed using a potentiometer connected to the analogue port 1 and the motor speed must be presented in the LCD display.