Guide from beginner to beginner.

This guide is my tribute to great work and support provide me from Dave.

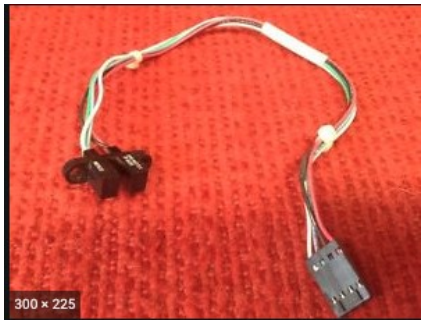
I suggest you to buy same parts ,because a small change could have big differences.
All pieces cost more or less 30/40€ and some hours for your time.

Requirements:

- Arduino uno based on ATMega 328

- LCD Nokia 5110

- Sensor OPB 830 or similar.

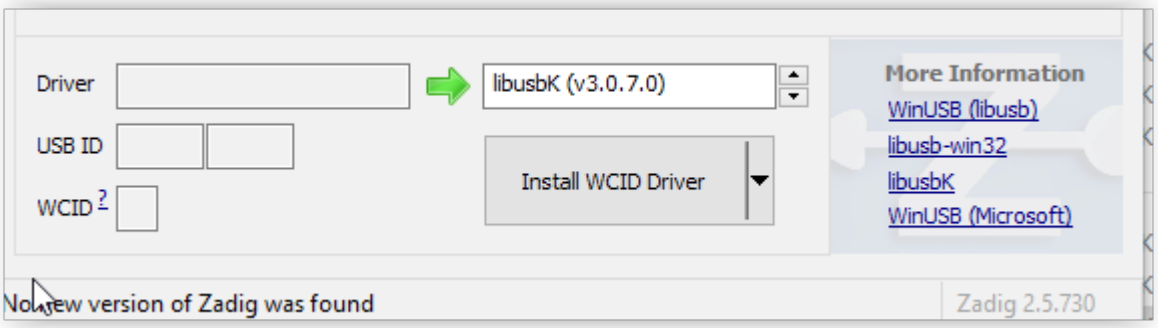


- 1 kΩ , 270Ω , 4.7 kΩ resistor
- 3 button

- USBASP ISP

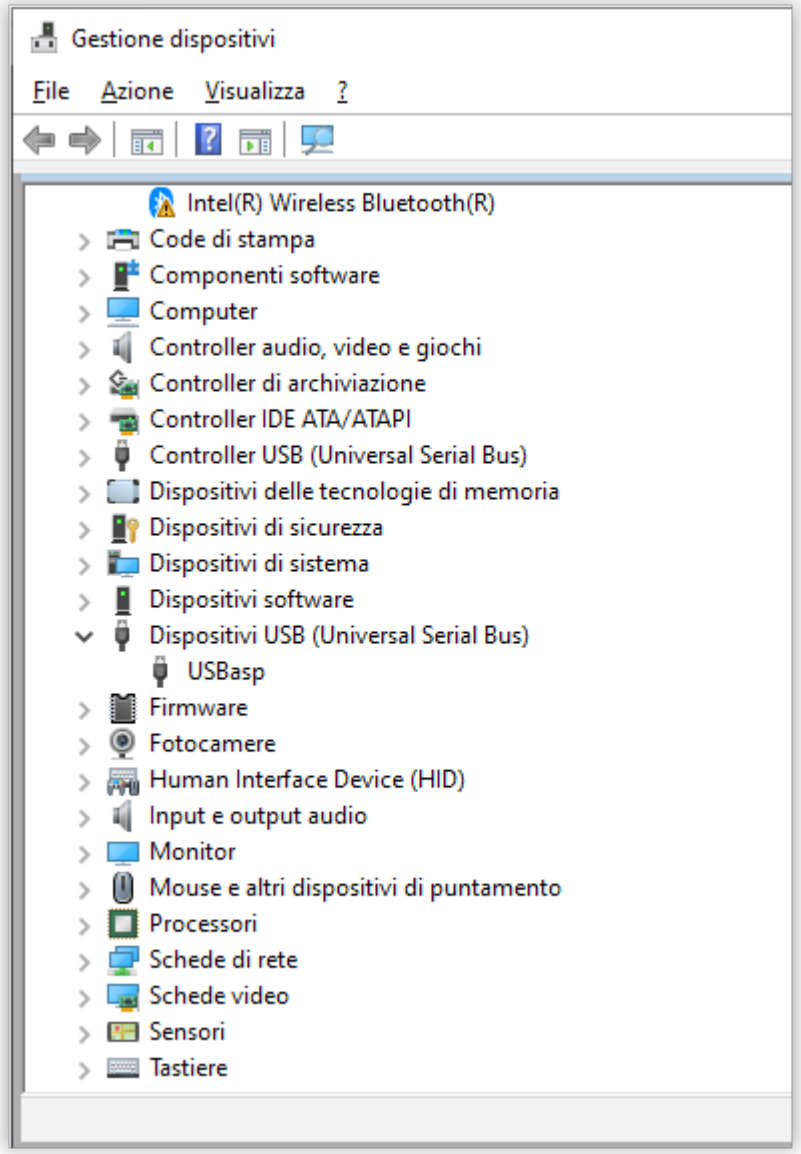
Software requirements

For windows: zadig. https://zadig.akeo.ie/ is a tools to help you to install usbasp programmator
IMPORTANT use this choice:



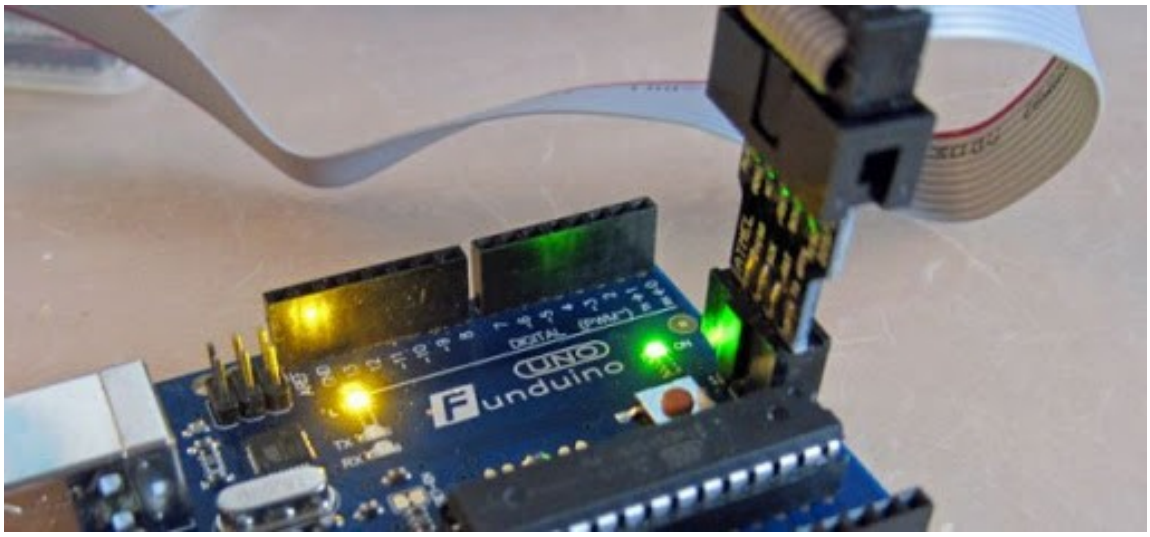
AVRDUDE http://download.savannah.gnu.org/releases/avrdude/
I used “avrdude-6.2-mingw32.zip”
extract in c:\
and renominate it in avrdude.

Check correct driver installation



For Linux and Mac driver shouldn’t be require, you can check with lsbusb. Avrdude is the same and you can find it at same link archive tar.gz or dmg

Connect usbasp to computer usb and to Arduino with adapter 10 to 6 pin



Now open windows command prompt and go to c:\avrdude

```
C:\WINDOWS\System32>cd c:\avrdude

c:\avrdude>dir
 Il volume nell'unità C è OS
 Numero di serie del volume: 68EB-93E0

 Directory di c:\avrdude

09/03/2021  16:12    <DIR>          .
09/03/2021  16:12    <DIR>          ..
25/09/2012  20:44           510.464 avr-size.exe
04/03/2021  08:09           222.919 avrdude-6.2-mingw32.zip
02/06/2020  10:44           501.112 avrdude.conf
17/02/2016  10:26           465.422 avrdude.exe
04/03/2021  08:17           611.037 AVRDUDESS-2.13-portable.zip
23/07/2020  12:20           142.848 avrdudess.exe
21/01/2014  17:12            17.764 bits.xml
22/07/2020  23:38             6.168 Changelog.txt
06/03/2021  07:50             1.469 config.xml
22/06/2020  13:28             2.006 Credits.txt
08/03/2021  13:43                 6 ext_fuse_val.hex
08/03/2021  13:43                 6 high_fuse_val.hex
23/07/2020  12:23    <DIR>          Languages
17/02/2018  15:39            67.680 libusb0.dll
17/02/2013  01:59            35.147 License.txt
08/03/2021  13:41                 6 lock_val.hex
08/03/2021  13:43                 6 low_fuse_val.hex
28/02/2021  19:47             4.399 main.hex
07/03/2021  19:34            69.023 nil-dark-skinny.hex
10/03/2021  02:14            71.171 nil-dark.hex
```

Download software for Dave repository
https://github.com/dvernooy/ErgWare

copy from v 0.4 mail.hex and paste to c:\avrdude

copy from v 0.4 nil.hex and paste to c:\avrdude

now check if all work
write this command:

```
avrdude -c usbas-clone p -p m328p -P usb -B 750.0
```

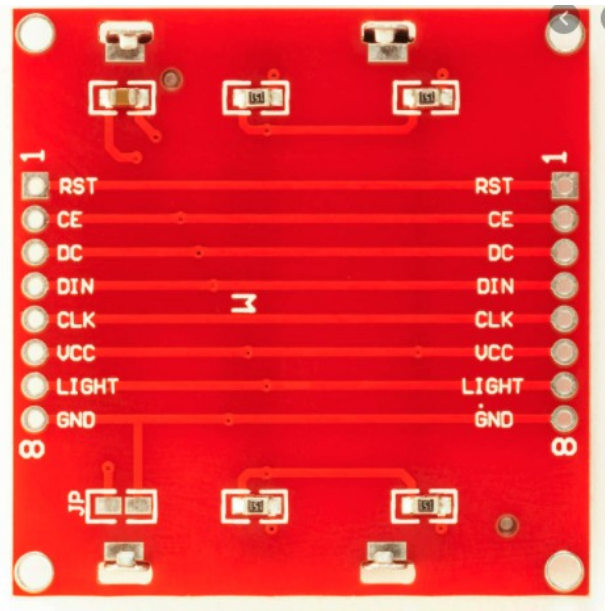
the result should be something like this:
avrdude: safemode: Fuses OK (E:FD, H:D6, L:FF)

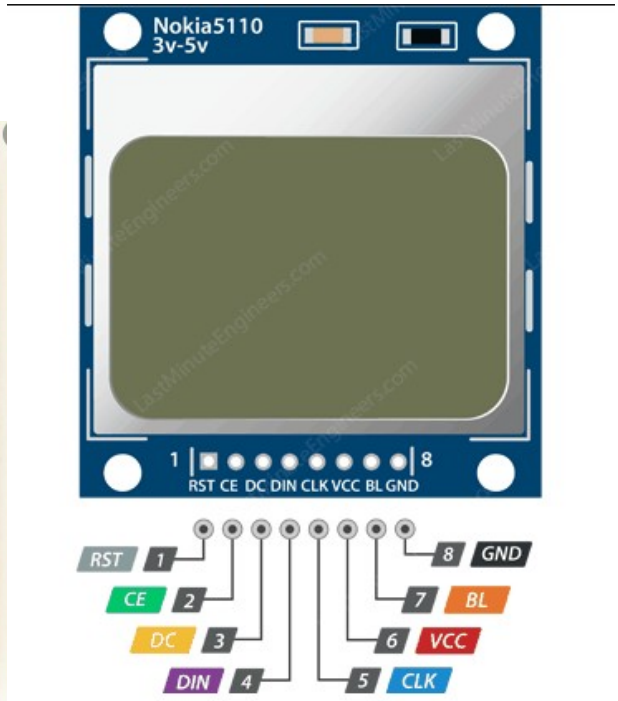
now

```
avrdude -c usbasp-clone -P usb -p m328p -U lock:r:lock_val.hex:h
```

output should be something like this
avrdude: safemode: Fuses OK (E:FD, H:D6, L:FF)

Now wire the circuit
Connect LCD pin to arduino.





I buy two LCD one red and one blue, pinout is the same.

LCD_Vcc → Arduino 3.3V (very important, DO NOT use the Arduino 5V)
LCD_GND → Arduino GND
LCD_SCE (or LCD_CE) → Arduino PC1 or Arduino A1
LCD_RST → Arduino PC0 or Arduino A0
LCD_D/C → Arduino PC2 or Arduino A2
LCD_MOSI (or LCD_Data) → Arduino PC3 or Arduino A3
LCD_SCLK (or LCD_CLK) → Arduino PC4 or Arduin A4
LCD_Backlight → 1kohm in series with Arduino 3.3V. Don't wire the backlight directly to 3.3V. Put a 1kohm resistor in series with the 3.3V line.

Switch 1 high → Arduino PD7 or Arduino 7
Switch 1 low → Arduino GND
Switch 2 high → Arduino PD6 or Arduino ~6
Switch 2 low → Arduino GND
Switch 3 high →Arduino PD5 or Arduino ~5
Switch 3 low → Arduino GND

if all goes fine it's time to write code on Arduino.

First step erase Arduino chip, after that Arduino isn't the same,we have erase the Arduino code.

```
avrdude -c usbasp-clone -p m328p -P usb -e
```

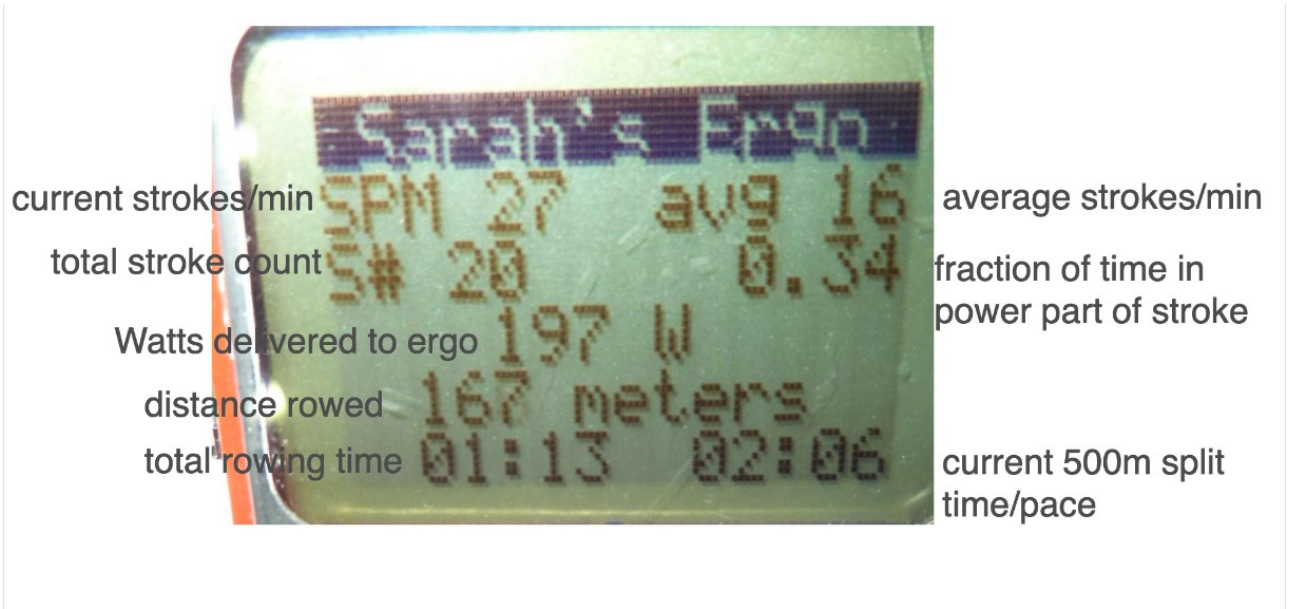
now write ergware software:

```
avrdude -c usbasp-clone -p m328p -P usb -U flash:w:main.hex
```

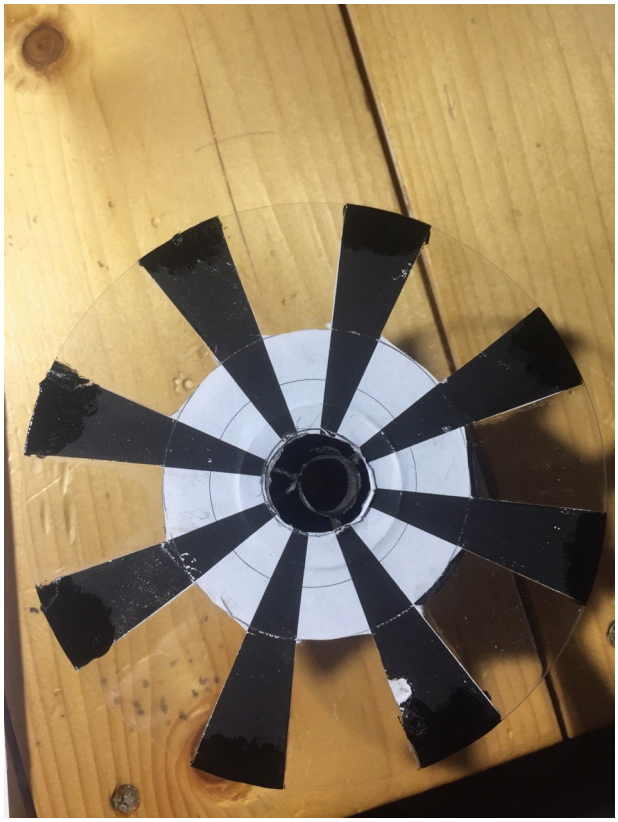
Press the button on Arduino board and waith 10 seconds
after

```
avrdude -c usbasp-clone -p m328p -P usb -U flash:w:nil.hex
```

At this point you should see something to LCD

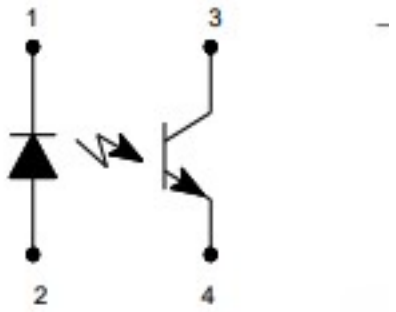


You can follow Dave’s guide at Step 15.
My experiences is like this. Chopper wheel. I made an adapter to fix CD to hub.

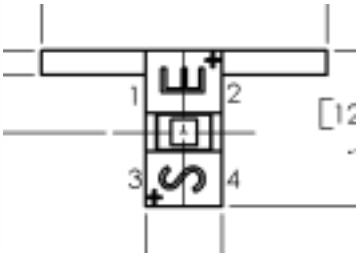



MAVIC

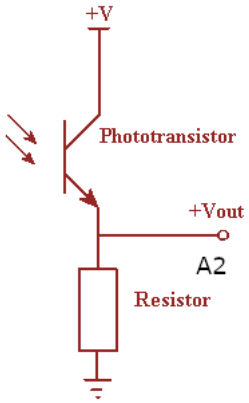
Now connect the sensor OPB, it has this pinout



Pin # / Color	Description
1 / Black	Cathode
2 / Red	Anode
3 / White	Collector
4 / Green	Emitter

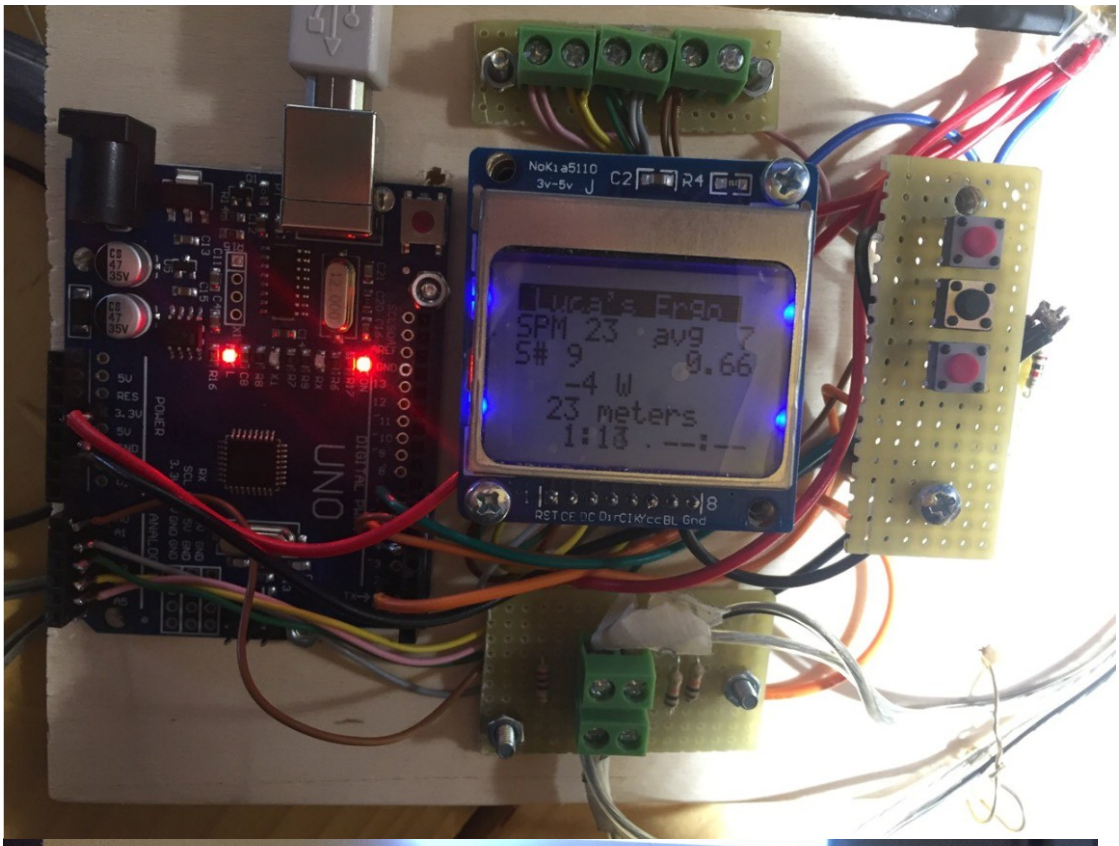


1 -> GND
2 -> R 270Ω -> 3.3v
3 ->3.3v
4-> R 4.7kΩ -> GND , pin4 to PIN A2 di arduino. (image below)



You should find between A2 and GND 2.9v sensor open(white) , and 0.7v sensor close(black).

At this time you have a splend ergware. Thanks Dave!!


Nokia5110
3v-5v
C2
R4
Lucas Aran
SPM 23 avg 7
S# 9 9.66
-4 W
23 meters
1:13 .--:--
RST CE DC DinCLK Vcc BL Gnd
UNO
POWER
ANALOG IN

I attach the links where I buy, only for comparison, choose the best shop for you.

Arduino
LCD
USBASP
OPB 830