MAIN TOPICS

- Smart X.
- What AVR?
- AVR Types.
- Why AVR?
- AVR Structure.
- How To program AVR Chip?

SMART X


REMOTE HOME CONTROL
ONLINE HOME AUTOMATION
22°C
ECO MODE
NORMAL


NOKIA


9:41 AM
100%
Messages
Calendar
Photos
Camera
Weather
Clock
Maps
Videos
Notes
Reminders
Stocks
Game Center
Newsstand
iTunes Store
App Store
iBooks
Health
Passbook
Settings
iPhone
Phone
Mail
Safari
Music


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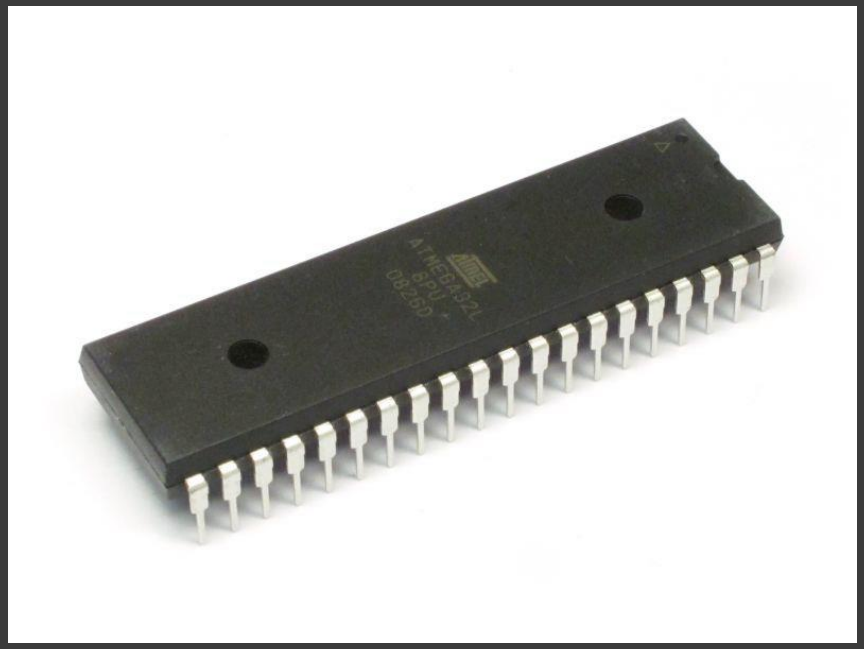
What AVR?

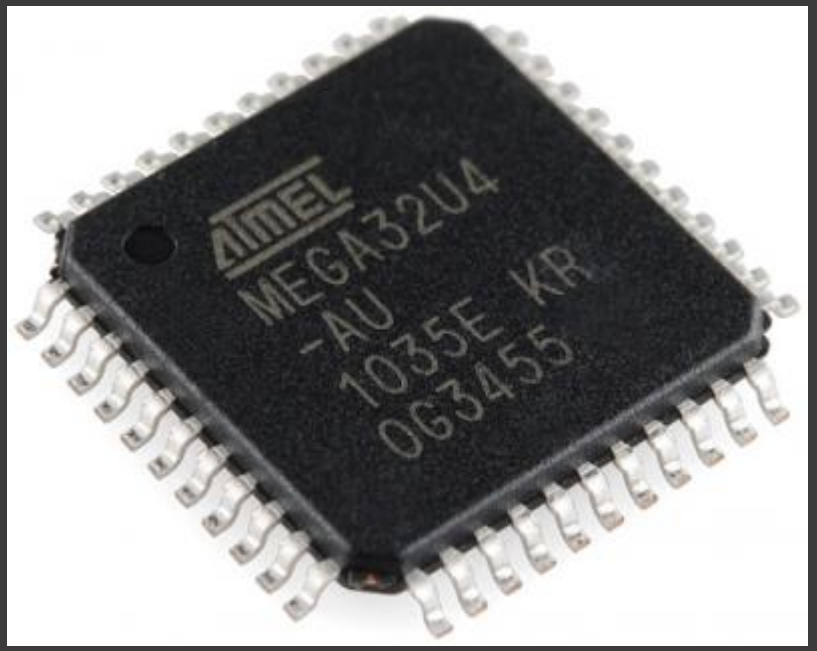
➔**AVR** is a **Microcontroller, From Atmel.**

➔ **There are 2 types of AVR :** DIP (Dual in-line Package) & SMD (Surface Mount Device)

AVR Types



Dual in-line Package

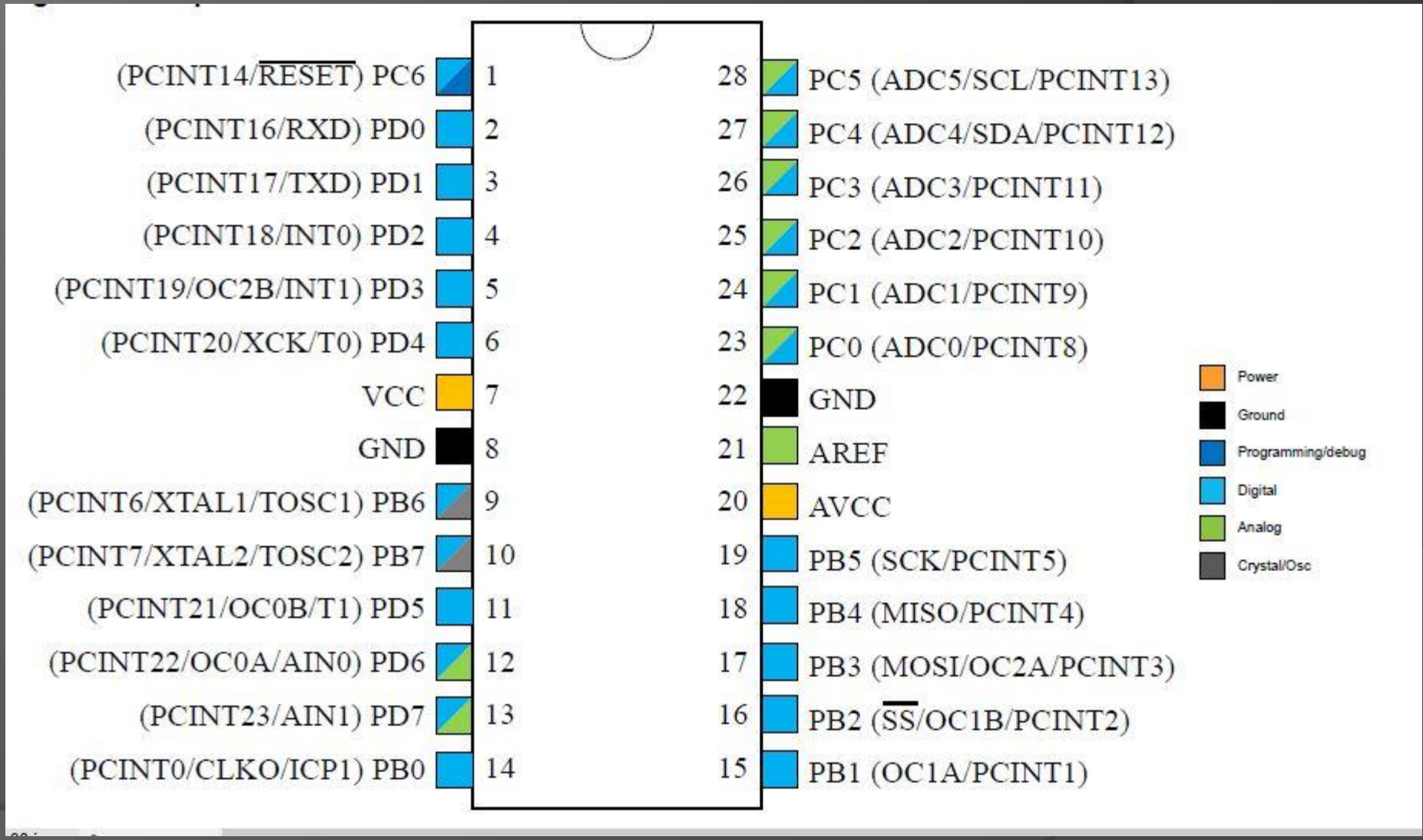


Surface Mount Device

Why AVR?

- Cheap .
- Small in area and available in many vergins , you can a suitable one.
- Easy to program comparing with other microcontrollers.

AVR Structure

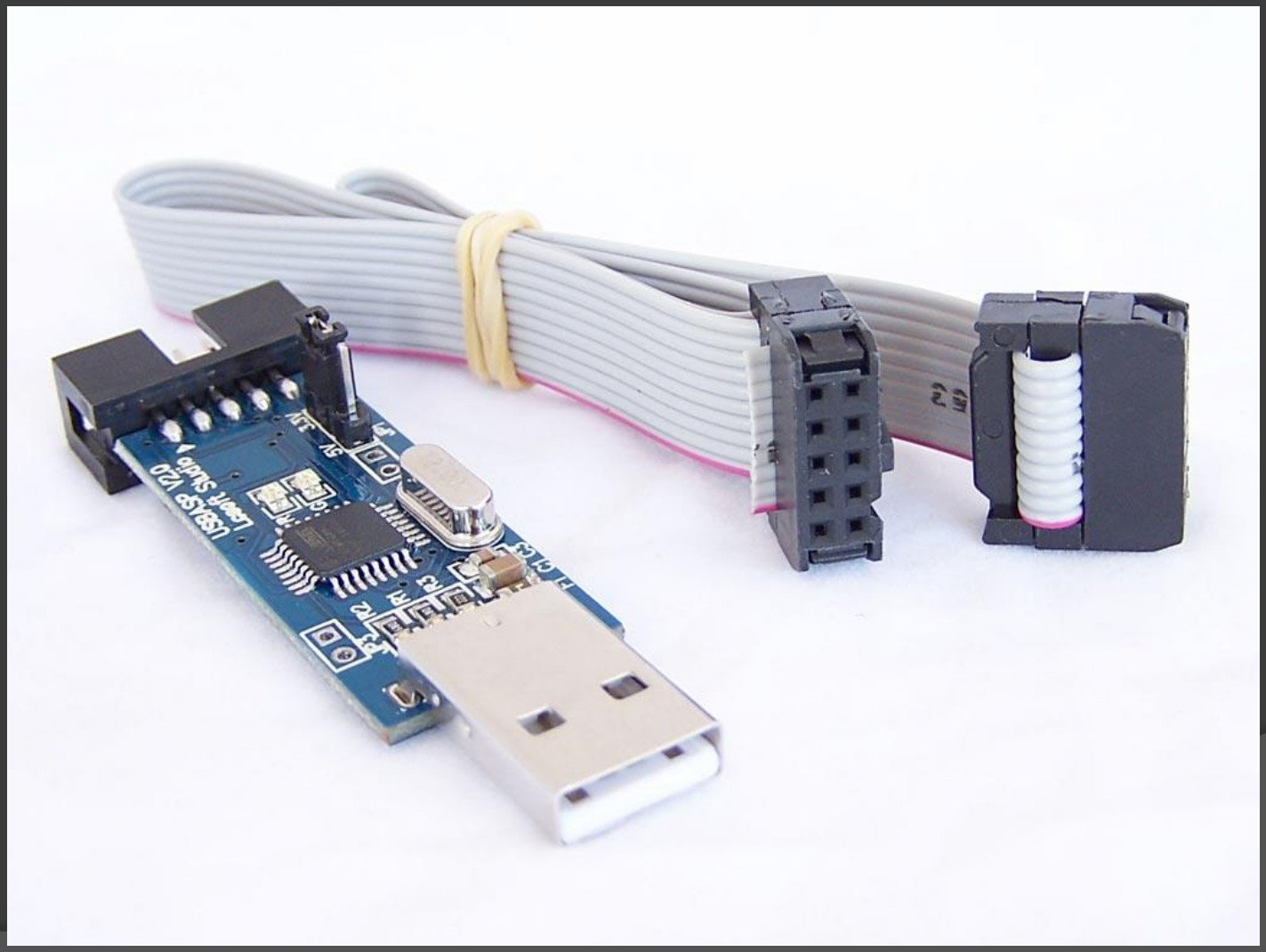


How To program AVR Chip?

➔First Write your code on any IDE support C programming Language.

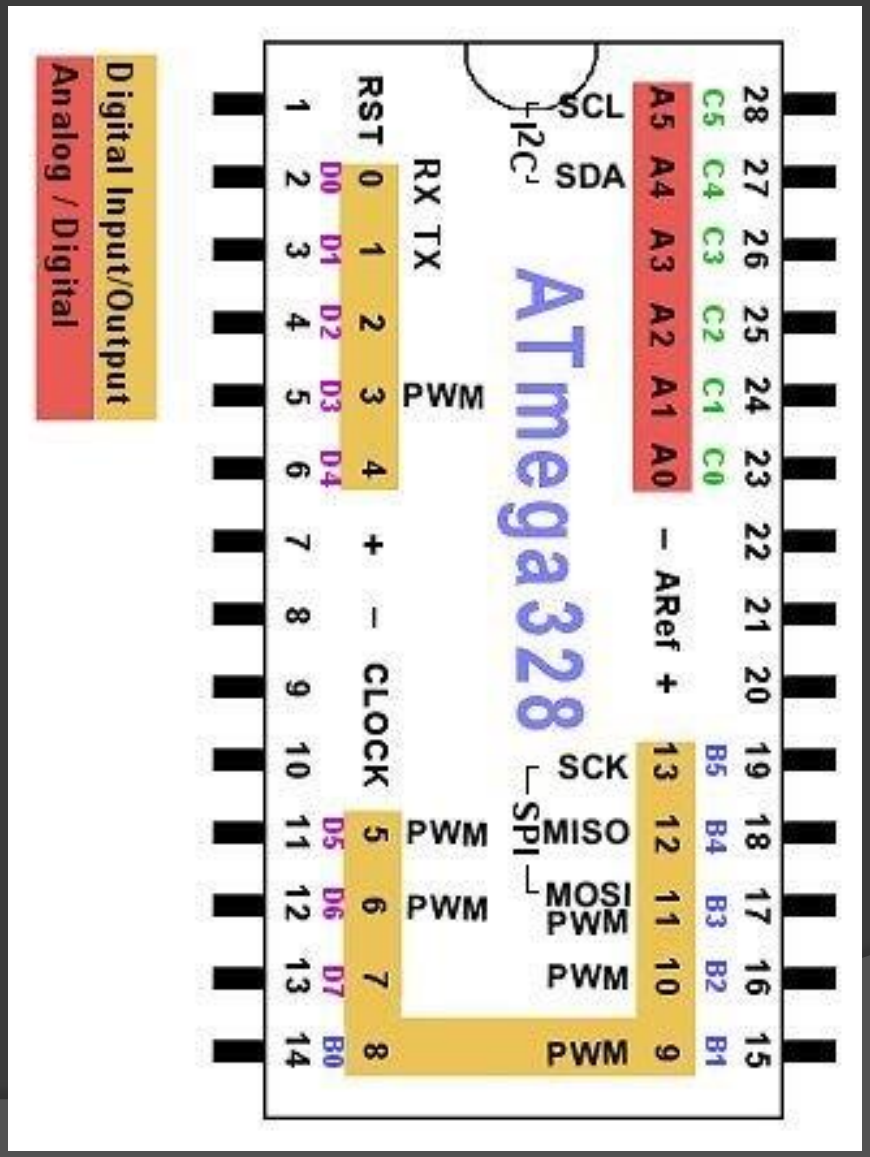
- ➔ Then compile it & convert it to HEX. File.
- ➔ Finally burn the HEX. File on AVR chip by USBISP programmer.

USBISP programmer



The Magic of Arduino

Atmega 328 Pin out



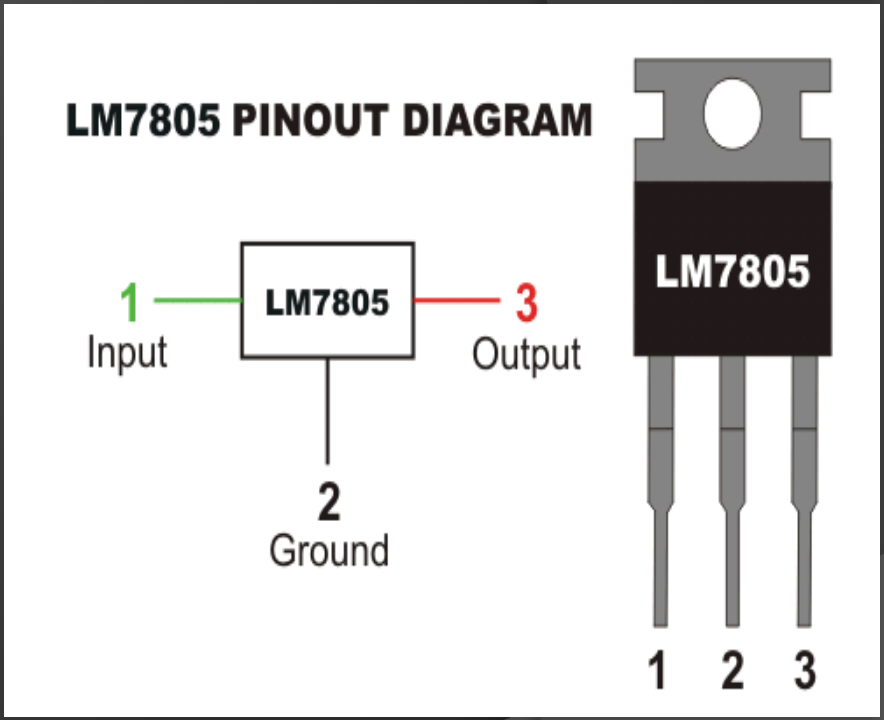
Atmega 328 Pin out

- → Digital Pins from 0 → 13.
- → Analog pins from 0 → 5.
- → Pin 8 & 22 connected to Ground.
- → Pin 7 , 20 & 21 Connected to Vcc.
- → Pin 9 & 10 for External CLK.

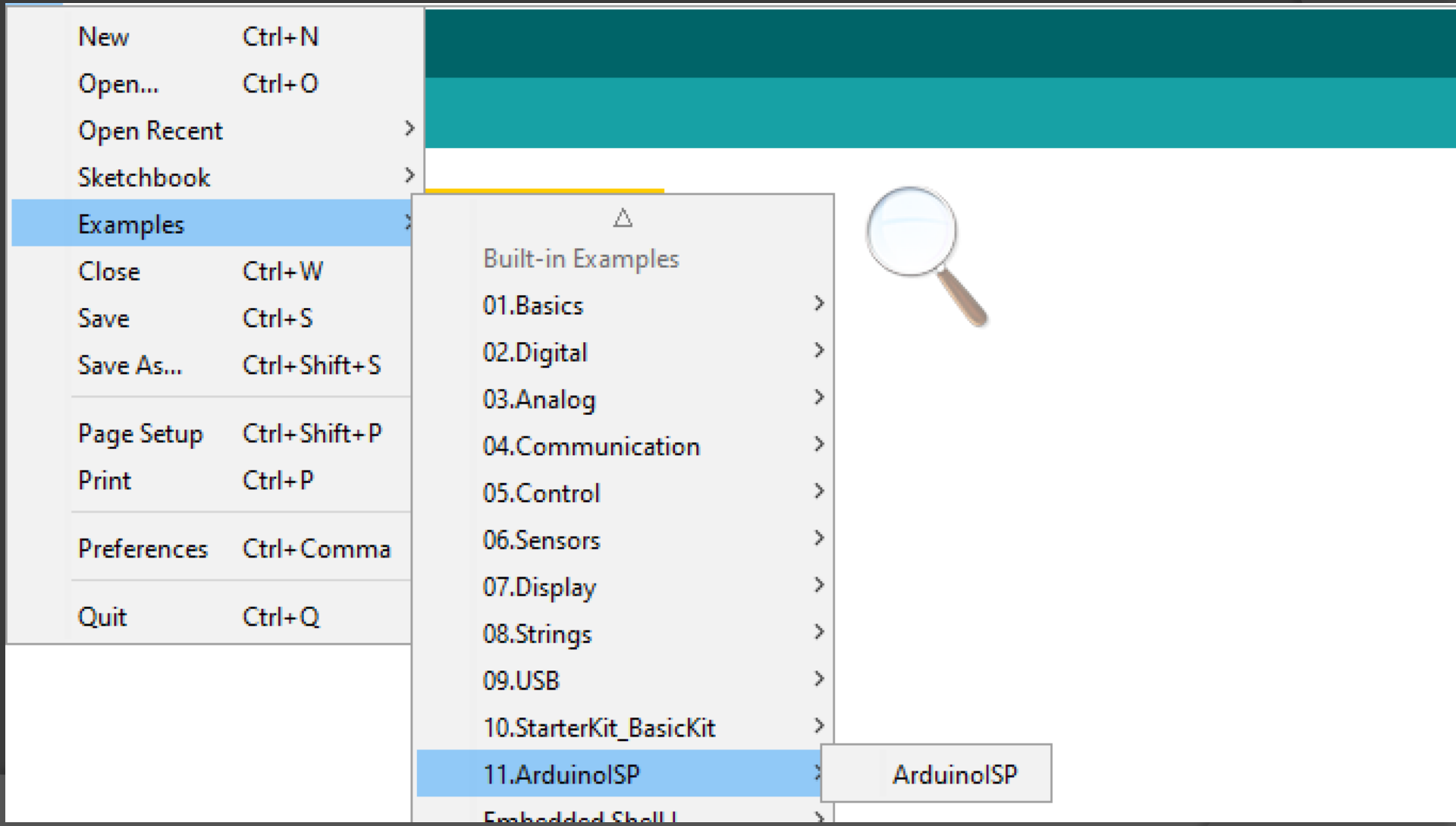
→ **NOTE** : CLK tells us How many commands will be executed per second.

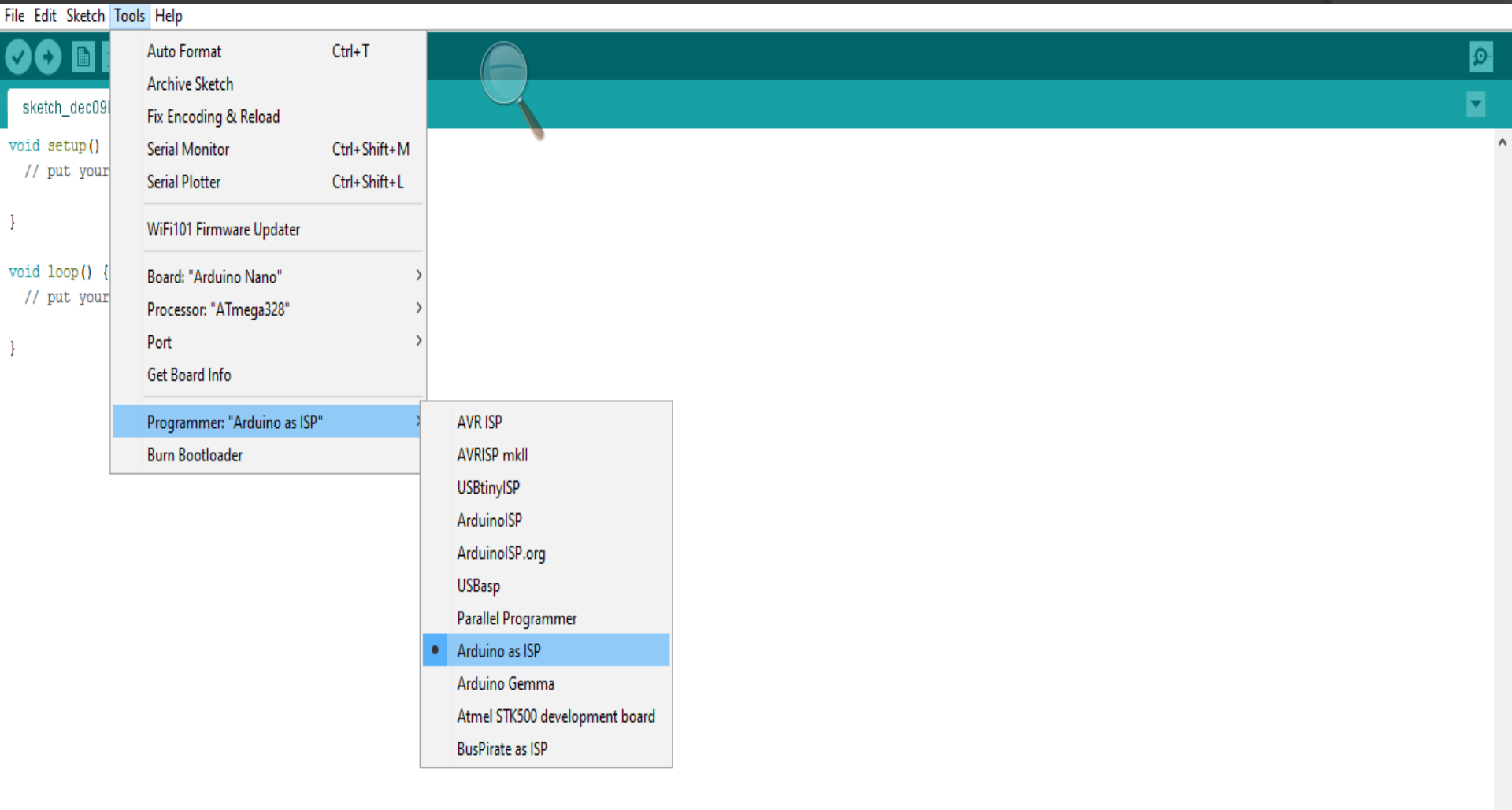
Operating Voltage

➔ AVR works only with 5 v , if a higher voltage is applied **may damage it** ! But we deal with 9 v battery to solve this use **Voltage Regulator 7805**.



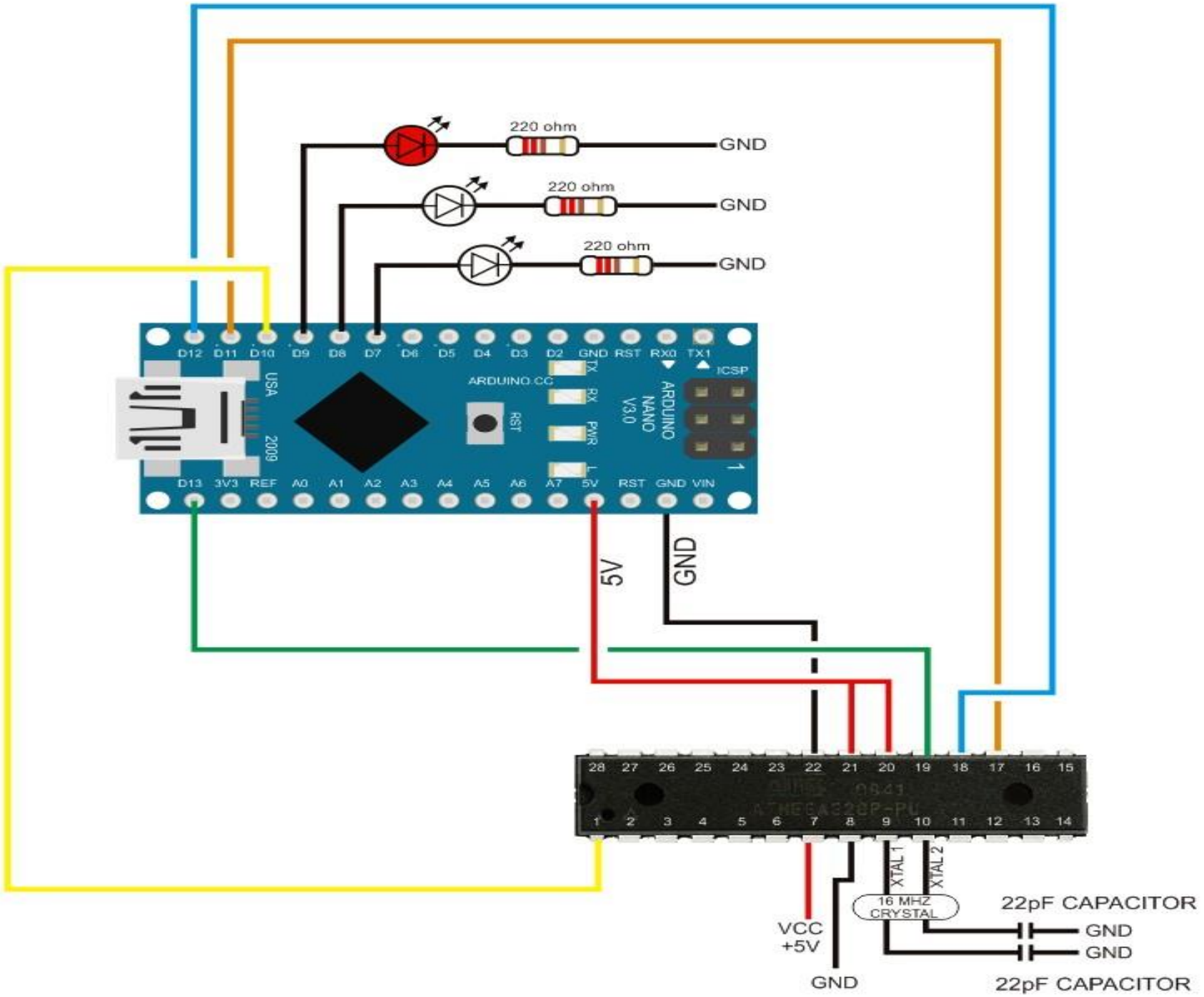
Preparing the Arduino to act as USBISP.



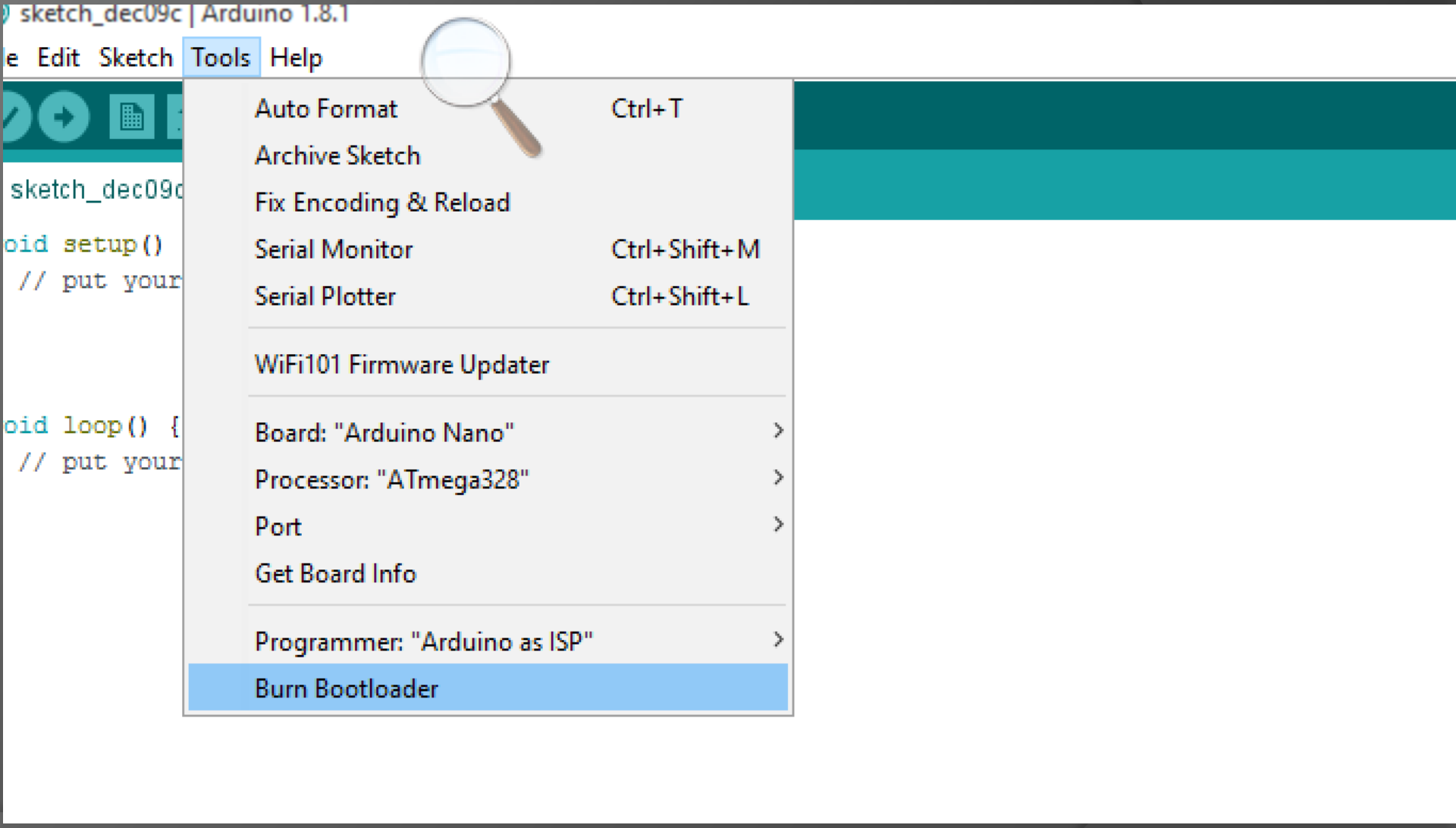

File Edit Sketch Tools Help
Auto Format Ctrl+T
Archive Sketch
Fix Encoding & Reload
Serial Monitor Ctrl+Shift+M
Serial Plotter Ctrl+Shift+L
WiFi101 Firmware Updater
Board: "Arduino Nano"
Processor: "ATmega328"
Port
Get Board Info
Programmer: "Arduino as ISP"
Burn Bootloader
AVR ISP
AVRISP mkII
USBtinyISP
ArduinoISP
ArduinoISP.org
USBasp
Parallel Programmer
Arduino as ISP
Arduino Gemma
Atmel STK500 development board
BusPirate as ISP
void setup()
// put your
}
void loop() {
// put your
}

Connect the Arduino to the Atmega with the following connections:

- Arduino D13 to ATmega pin 19 (SCK).
- Arduino D12 to ATmega pin 18 (MISO).
- Arduino D11 to ATmega pin 17 (MOSI) .
- Arduino D10 to Atmega pin 1 (RESET).
- Don’t Forget to connect the Vcc & Ground.
- Note that we connect a 22 pF cap . With CLK pins To the Ground.


220 ohm
GND
220 ohm
GND
220 ohm
GND
D12 D11 D10 D9 D8 D7 D6 D5 D4 D3 D2 GND RST RX0 TX1
ICSP
ARDUINO.CC
TX
RX
PWR
L
RST
ARDUINO NANO V3.0
USA
2009
D13 3V3 REF A0 A1 A2 A3 A4 A5 A6 A7 5V RST GND VIN
5V
GND
28 27 26 25 24 23 22 21 20 19 18 17 16 15
1 2 3 4 5 6 7 8 9 10 11 12 13 14
XTAL1
XTAL2
16 MHZ CRYSTAL
22pF CAPACITOR
GND
GND
22pF CAPACITOR
VCC +5V
GND

Burning Bootloader



Example :

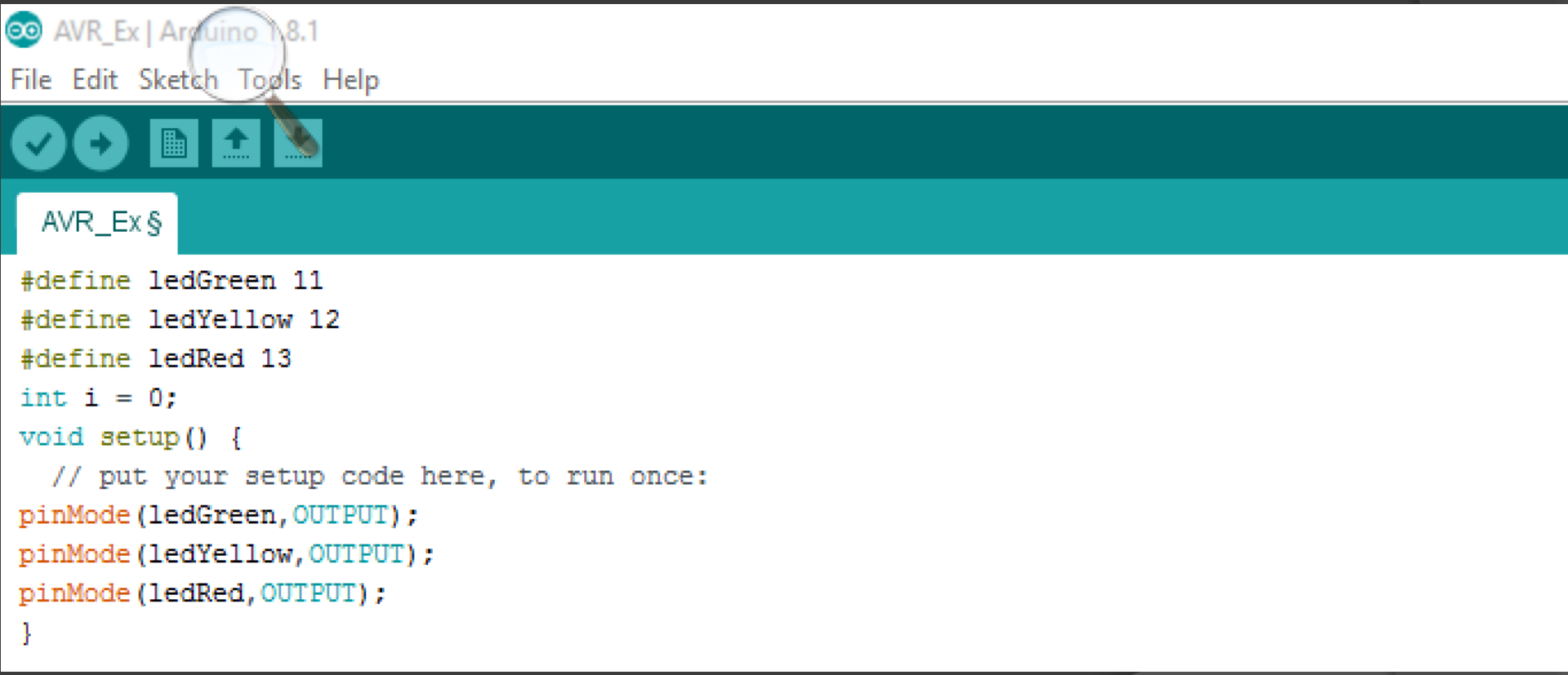
You are asked to design a traffic light system with this requirements :

1) the Green light will be on for 18 Seconds.

2) then the green will be off and the Yellow will be flashing for 5 times.

3) After the 5^{th} flashing the red will be on for 18 Second.

Code


AVR_Ex | Arduino 1.8.1
File Edit Sketch Tools Help
AVR_Ex §
#define ledGreen 11
#define ledYellow 12
#define ledRed 13
int i = 0;
void setup() {
// put your setup code here, to run once:
pinMode(ledGreen,OUTPUT);
pinMode(ledYellow,OUTPUT);
pinMode(ledRed,OUTPUT);
}

```
void loop() {
  // put your main code here, to run repeatedly:
digitalWrite(ledGreen,HIGH);
delay(18000);
digitalWrite(ledGreen,LOW);

for ( i = 0; i < 5 ;i++) {
  digitalWrite(ledYellow,OUTPUT);
  delay(500);
  digitalWrite(ledYellow,LOW);
  delay(500);
                          }

digitalWrite(ledRed,OUTPUT);
delay(18000);
digitalWrite(ledRed,LOW);
}
```

Done compiling.

Another Example

AVR_EX2 §

```
#define led1 5
#define led2 7
#define btn1 9
#define btn2 10
void setup() {
pinMode(led1,OUTPUT);
pinMode(led2,OUTPUT);
pinMode(btn1,INPUT);
pinMode(btn2,INPUT);
}
void loop() {
if(digitalRead(btn1)==HIGH)
{digitalWrite(led1,HIGH);
digitalWrite(led2,LOW);
  }
  else if (digitalRead(btn2)==HIGH)
  {digitalWrite(led2,HIGH);
digitalWrite(led1,LOW);
   }
                }
```

Summery

- Arduino as USBISP.
- Arduino IDE support C language and can create the HEX. File.
- Arduino IDE is a strong tool to program AVR .

Questions?


Bye!