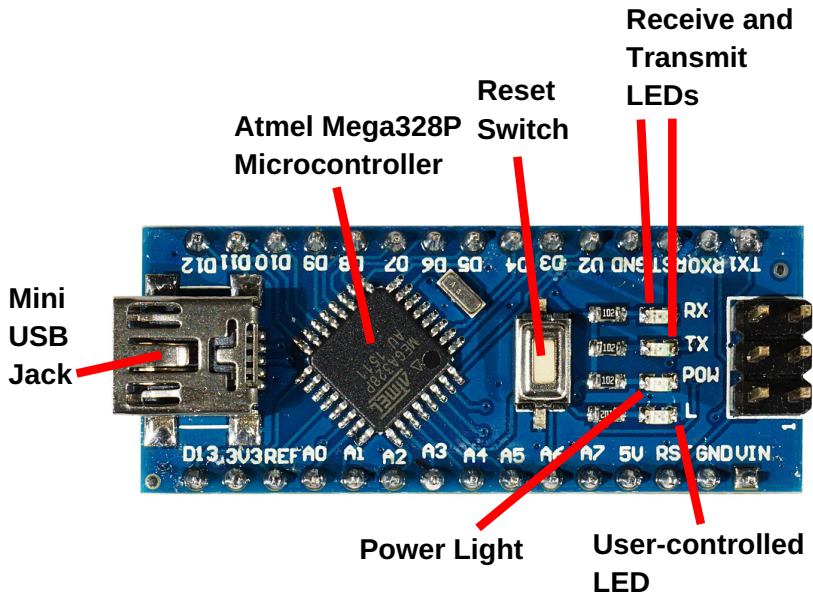


EEE:
Programming Tiny, Colorful Computers

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March 30, 2019

The Arduino Nano



Getting Started

Start the Arduino IDE



Select Tools → Board → Arduino Nano

The screenshot shows the Arduino IDE interface with the **Tools** menu open. The menu items are as follows:

- 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" (highlighted in orange)
- Processor: "ATmega328P"
- Port
- Get Board Info
- Programmer: "AVRISP mkII"
- Burn Bootloader

The **Board: "Arduino Nano"** item is expanded, showing a list of boards:

- Boards Manager...
- Arduino AVR Boards
- Arduino Yún
- Arduino/Genuino Uno
- Arduino Duemilanove or Diecimila
- Arduino Nano (highlighted in orange, with a mouse cursor over it)
- Arduino/Genuino Mega or Mega 2560
- Arduino Mega ADK
- Arduino Leonardo

The background shows a code editor with the following code:

```
sketch_mar10a
void setup()
  // put your code here
}

void loop() {
  // put your code here
}
```

Connect Your Arduino

Plug the USB cable into your board

Plug your board into your computer

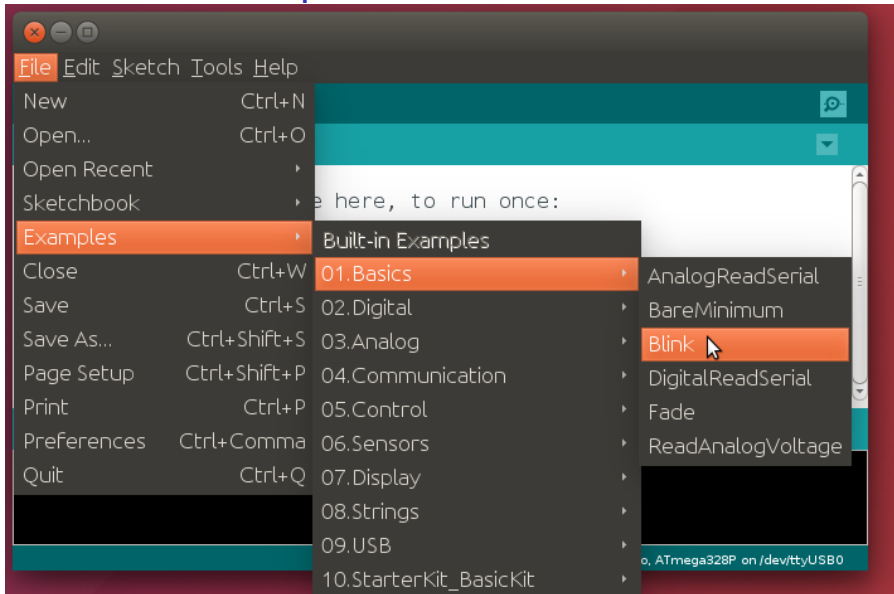
The board's power light should be on

Select Tools→Port→COM7

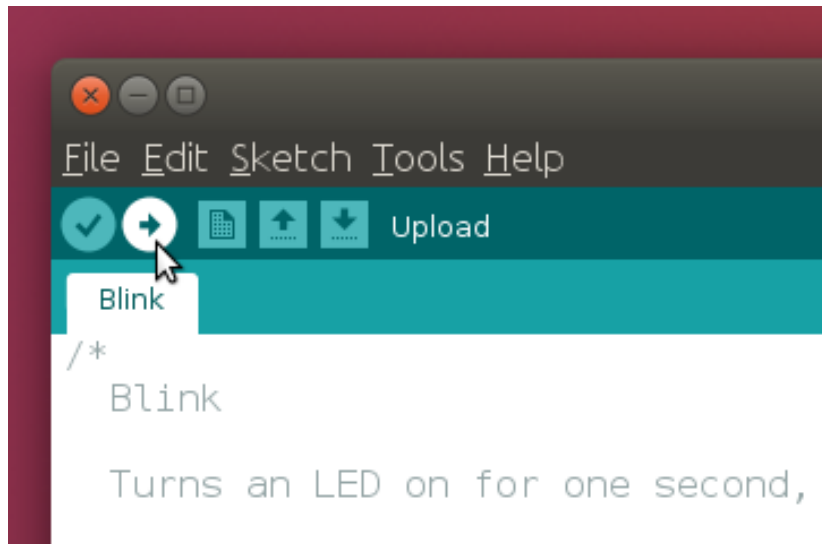
Which COM port may vary; choose the one that is there

Under "Tools→Processor," select
"ATmega328P (Old Bootloader)"

Select File → Examples → 01.Basics → Blink



Upload the Sketch to the Board

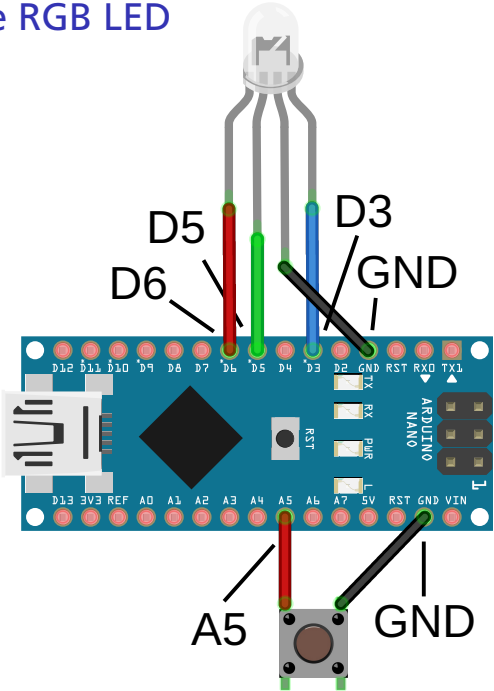


Should say "Done uploading." The user LED should blink

The Blink Example

```
void setup() {  
  pinMode(LED_BUILTIN, OUTPUT);  
}  
  
void loop() {  
  digitalWrite(LED_BUILTIN, HIGH);  
  delay(1000);  
  digitalWrite(LED_BUILTIN, LOW);  
  delay(1000);  
}
```


Connect the RGB LED and switch



Controlling the RGB LED (cycleRGB.ino)

```
const int rpin = 3, gpin = 5, bpin = 6;
```

```
void setup() {  
  pinMode(rpin, OUTPUT);  
  pinMode(gpin, OUTPUT);  
  pinMode(bpin, OUTPUT);  
}
```

```
void rgb(int r, int g, int b) {  
  analogWrite(rpin, r);  
  analogWrite(gpin, g);  
  analogWrite(bpin, b);  
}
```

```
void loop() {  
  rgb(10, 0, 0);  
  delay(500);  
  rgb(0, 10, 0);  
  delay(500);  
  rgb(0, 0, 10);  
  delay(500);  
  rgb(10, 10, 10);  
  delay(500);  
}
```

Reacting to the switch (switchRGB.ino)

```
const int rpin = 3, gpin = 5, bpin = 6;
```

```
const int spin = 19;
```

```
void setup() {  
  pinMode(rpin, OUTPUT);  
  pinMode(gpin, OUTPUT);  
  pinMode(bpin, OUTPUT);  
  pinMode(spin, INPUT_PULLUP);  
}
```

```
void rgb(int r, int g, int b) {  
  analogWrite(rpin, r);  
  analogWrite(gpin, g);  
  analogWrite(bpin, b);  
}
```

```
void wait() {  
  while (digitalRead(spin) == LOW) ;  
  while (digitalRead(spin) == HIGH) ;  
}
```

```
void loop() {  
  rgb(10, 0, 0);  
  wait();  
  rgb(0, 10, 0);  
  wait();  
  rgb(0, 0, 10);  
  wait();  
  rgb(10, 10, 10);  
  wait();  
}
```

Controlling Each Color (fadeRGB.ino)

```
const int rpin = 3, gpin = 5, bpin = 6;
```

```
const int spin = 19;
```

```
int red = 10, green = 0, blue = 0;
```

```
void setup() {
```

```
  pinMode(rpin, OUTPUT);
```

```
  pinMode(gpin, OUTPUT);
```

```
  pinMode(bpin, OUTPUT);
```

```
  pinMode(spin, INPUT_PULLUP);
```

```
}
```

```
void update(int &color ) {
```

```
  while (digitalRead( spin ) == HIGH ) ;
```

```
  while (digitalRead( spin ) == LOW ) {
```

```
    color = (color + 1) % 12;
```

```
    analogWrite(rpin, red);
```

```
    analogWrite(gpin, green);
```

```
    analogWrite(bpin, blue);
```

```
    delay(200);
```

```
  }
```

```
}
```

```
void loop() {
```

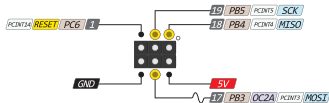
```
  update(red);
```

```
  update(green);
```

```
  update(blue);
```

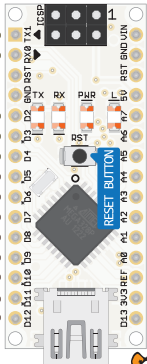
```
}
```

NANO PINOUT



1
0

PCINT17 TXD PD1 31
PCINT16 RXD PD0 30
PCINT14 RESET PC6 29



2
3
4
5
6
7
8
9
10
11
12

PCINT18 INT0 PD2 32
OC2B PCINT19 INT1 PD3 1
XCK PCINT20 T0 PD4 2
OC0B PCINT21 T1 PD5 9
OC0A PCINT22 AIN0 PD6 10
PCINT23 AIN1 PD7 11
ICP1 PCINT0 CLKO PB0 12
PCINT1 OC1A PB1 13
SS PCINT2 OC1B PB2 14
MISO PCINT4 PB4 16

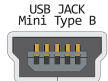
VIN
GND
29 PC6 RESET PCINT14
5V
22 ADC7
19 ADC6
28 PC5 PCINT13 ADC5 SCL
27 PC4 PCINT12 ADC4 SDA
26 PC3 PCINT11 ADC3
25 PC2 PCINT10 ADC2
24 PC1 PCINT9 ADC1
23 PC0 PCINT8 ADC0
3V3
17 PB5 PCINT5 SCK

The input voltage to the board when it is running from external power. Not USB bus power.

A7
A6
A5
A4
A3
A2
A1
A0
13

- Power
- GND
- Serial Pin
- Analog Pin
- Control
- INT INT
- Physical Pin
- Port Pin
- Pin function
- INTERRUPT Interrupt Pin
- ~ PWM Pin
- Port Power

Absolute MAX per pin 40mA recommended 20mA
 Absolute MAX 200mA for entire package



Analog exclusively Pins

The power sum for each pin's group should not exceed 100mA

pinMode

Each pin has a number (the pink boxes on “Nano pinout”)

Most pins can be either inputs or outputs

```
pinMode(4, OUTPUT); // Control the voltage on pin 4  
pinMode(6, INPUT); // Observe the voltage on pin 6  
pinMode(19, INPUT_PULLUP); // Observe 19; “suggest” it be high  
pinMode(LED_BUILTIN, OUTPUT); // Control pin 13, LED ‘L’
```

Digital Input and Output

Digital: on or off, high or low voltage; nothing in between

```
digitalWrite(13, LOW); // Turn off the user LED  
digitalWrite(13, HIGH); // Turn on the user LED
```

A digital read from a pin reports either HIGH or LOW

```
if ( digitalRead(19) == LOW ) {  
    // Low voltage on pin 19, a "0"  
}  
if ( digitalRead(19) == HIGH ) {  
    // High voltage on pin 19, a "1"  
}
```