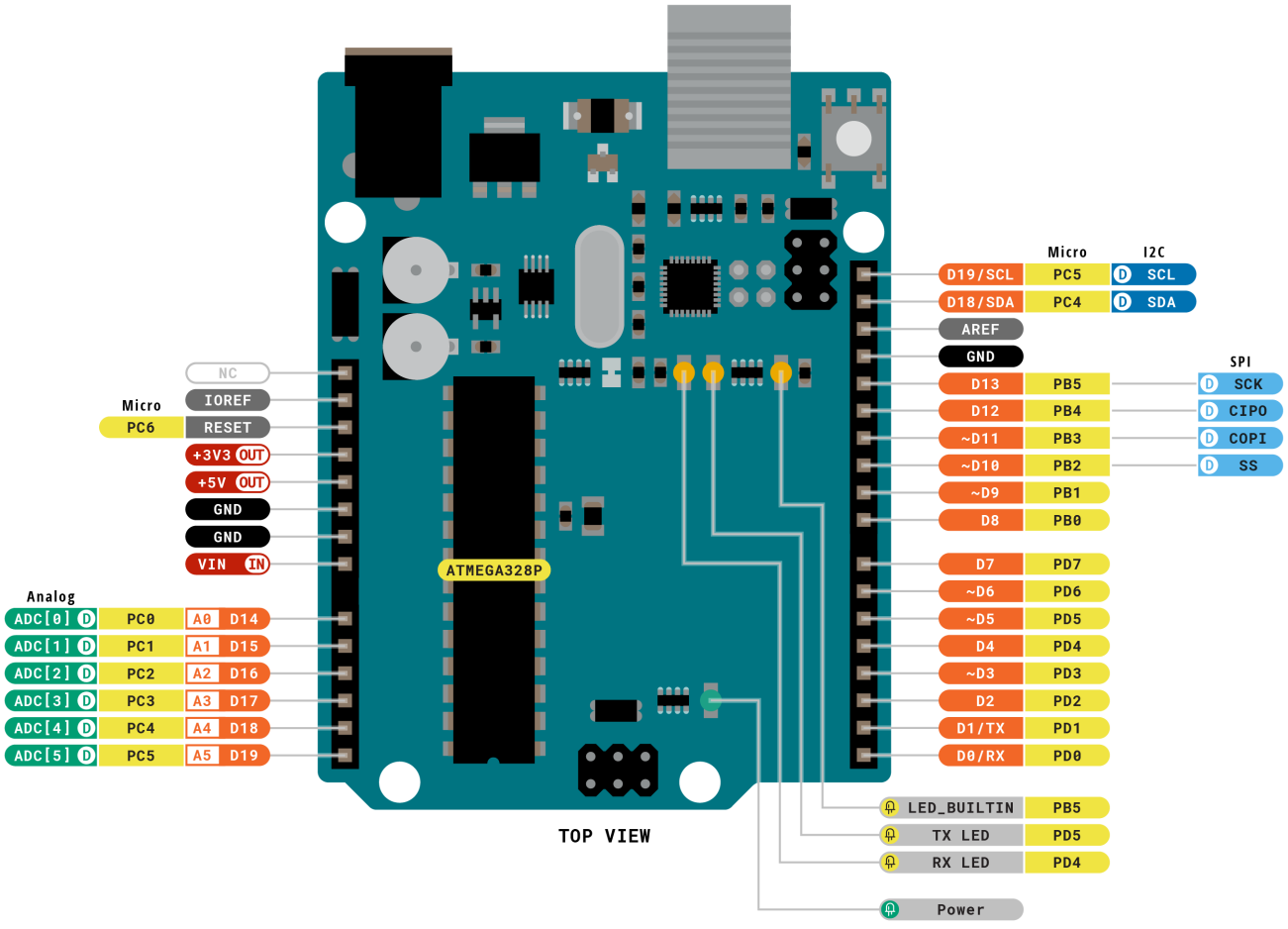
Blinking LEDs: For the Brave and the Curious

Amal Chandran M V

I build, I break, I repeat

22 February 2025, Kochi FOSS

Anatomy of Arduino



Legend:	Digital	I2C
Power	Analog	SPI
Ground	Main Part	Analog

ARDUINO

ARDUINO UNO REV3
SKU code: A000066
Pinout
Last update: 6 Oct, 2022

Blinking LEDs: The Standard Edition

```
void setup() {
  pinMode(LED_BUILTIN, OUTPUT);  // Set pin 13 as output
}

void loop() {
  digitalWrite(LED_BUILTIN, HIGH);  // Turn on LED
  delay(1000);  // Wait for 1 second

  digitalWrite(LED_BUILTIN, LOW);  // Turn off LED
  delay(1000);  // Wait for 1 second
}
```

Goodbye digitalWrite, Hello PORTB!

13.4.2 PORTB – The Port B Data Register

Bit	7	6	5	4	3	2	1	0	
0x05 (0x25)	PORTB7	PORTB6	PORTB5	PORTB4	PORTB3	PORTB2	PORTB1	PORTB0	PORTB
Read/Write	R/W	R/W	R/W	R/W	R/W	R/W	R/W	R/W	
Initial Value	0	0	0	0	0	0	0	0	

```
void setup() {
  pinMode(LED_BUILTIN, OUTPUT);
}

void loop() {
  // Turn on the LED by setting PB5 high
  PORTB = 32;
  delay(1000);  // Wait for 1 second

  // Turn off the LED by setting PB5 low
  PORTB = 0;
  delay(1000);  // Wait for 1 second
}
```

PinMode Who? Meet Direct Port Manipulation!

13.4.3 DDRB – The Port B Data Direction Register

Bit	7	6	5	4	3	2	1	0	
0x04 (0x24)	DDB7	DDB6	DDB5	DDB4	DDB3	DDB2	DDB1	DDB0	DDRB
Read/Write	R/W	R/W	R/W	R/W	R/W	R/W	R/W	R/W	
Initial Value	0	0	0	0	0	0	0	0	

```
void setup() {
  DDRB = 32; // sets PB5 as output
}

void loop() {
  // Turn on the LED by setting PB5 high
  PORTB = 32;
  delay(1000);  // Wait for 1 second

  // Turn off the LED by setting PB5 low
  PORTB = 0;
  delay(1000);  // Wait for 1 second
}
```

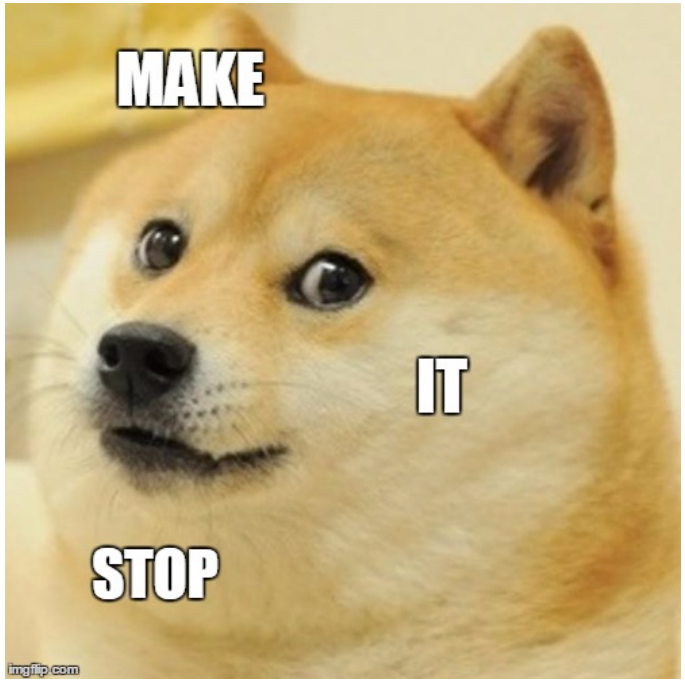
Delay? Nah, Let's Count Some Iterations!

```
void setup() {
  DDRB = 32; // sets PB5 as output
}

void loop() {
  // Turn on the LED by setting PB5 high
  PORTB = 32;
  for (long i = 0; i < 1000000; i++) { PORTB = 32; }  // Wait

  // Turn off the LED by setting PB5 low
  PORTB = 0;
  for (long i = 0; i < 1000000; i++) { PORTB = 0; }  // Wait
}
```

The Two Wolves Inside You



Finale - Blink in C

```c
#include <avr/io.h>
#include <util/delay.h>

int main(void) {
    // Set PB5 (pin 13) as output
    DDRB = DDRB | (1 << DDB5);

    while (1) {
        // Turn on LED
        PORTB = PORTB | (1 << PORTB5);
        _delay_ms(1000);  // Wait for 1 second

        // Turn off LED
        PORTB = PORTB & ~(1 << PORTB5);
        _delay_ms(1000);  // Wait for 1 second
    }
}
```

Thank You! (Or Was It?)

You've survived the madness! Now, do you have any questions? Or maybe a riddle for me? Or perhaps you just want to say... "Who let this person present?!"

References I

- Arduino, "The Official Arduino Website," https://www.arduino.cc/.
- ATmega328P, "ATmega328P Datasheet," https://ww1.microchip.com/downloads/en/DeviceDoc/Atmel-7810-Automotive-Microcontrollers-ATmega328P_Datasheet.pdf/.
- Github, "AVRDUDE Repo," https://github.com/avrdudes/avrdude.git.
- Github, "Blinking LEDs: For the Brave and the Curious," https://github.com/AmalChandru/Blinking-LEDs.git.
- Reddit, "Meme Templates," https://www.reddit.com/r/MemeTemplatesOfficial.