Atmel AVR C - The 3 Most Common Registers Explained

In Atmel AVR C, for each port there are 3 registers that are used especially commonly:

DDRB, DDRC, and DDRD (commonly referred to as "DDRx")

PORTB, PORTC, and PORTD (commonly referred to as "PORTx")

PINB, PINC, and PIND (commonly referred to as "PINx")

Note that the ATmega 328P has Ports B, C, and D, so these registers exist for these ports only on the 328P, but other Atmel chips could have other port letters, ex, DDRA, DDRE, DDRF, etc. Since we are using the 328P as the chip for our examples we will stick to ports that are present on the 328P.

What do these registers do?

DDRx - short for "Data Direction Register", each bit of a DDR controls if the corresponding pin is to be input or output

PORTx - if the corresponding DDRx pin is set for input, set the corresponding PORTx bit to 1 to use an internal pull-up resistor,
or 0 to not use the internal pull-up resistor
-if the corresponding DDRx pin is set for output, clear the corresponding PORTx bit to set output low,
or set the corresponding PORTx bit to set output high

PINx - use to check the state of the corresponding pin

Let's take a look at our example program today to make this more clear. Suppose we would like to put a switch on pin #4 and use that for input, and we would like to put a resistor/LED on pin #28 and use that for output. A quick check of the 328P pinout shows us that pin #4 is PD2 (short for Port D bit 2) and pin #28 is PC5 (short for Port C bit 5). Here are the steps to configure our pin #4 input and pin #28 output:

set Port D bit 2 (i.e. PD2, which is pin #4) to input:

1) Clear DDRD bit 2 to set PD2 (pin 4) to input
2) Set PORTD, bit 2 to set PD2 (pin 4) internal pull-up resistor
3) Check state of PIND, bit 2 (remember we are using an internal
pull-up resistor, so this will be logic low, i.e. 1 is not pressed,
0 is pressed)

set Port C, pin 5 (i.e. PC5, which is pin #28) to output:

1) Set DDRC, bit 5 to set PC5 (pin 28) for output
2) Clear PORTC, bit to set PC5 (pin 28) low,
set PORTC, bit 5 to set PC5 (pin 28) high

Note that the wording of these steps matches the comments in **DigitalInputs.c**