

Using an ATmega328P Directly From a Raspberry Pi

Although I really like the Gertboard as a safer way to play with an ATmega328P, it is good to know how to use an ATmega328P directly from the Raspberry Pi. In the circuit below, I have copied the simple supporting circuit used in the Gertboard. The total cost of the parts shown (excluding the Pi) was under \$4.

Whenever connecting directly to the Pi's GPIO pins, it is very easy to make a connection error that might damage the Pi, ATmega328P or burn out a the diode or LED. Be sure the long lead of the LED is toward the processor pin.

The diode is wired so that if the voltage on the RESET pin of the ATmega328P is accidentally higher than about 3.8 V, the diode will drain current to the 3.3 V supply and perhaps protect the ATmega328P. Be sure the black bar on the diode is connected to +3.3 V. The 10 kΩ resistor between the RESET pin and 3.3 V is to make RESET default to “1” when not being actively pulled down.

The capacitors are there to minimize high-frequency noise that might go between pins via the power circuit.

The LED is wired as directed by the comments in the sample assembly code `BlinkingLEDUsingTimer0.asm`, and the voltage divider is wired to give about 1.65 V for the program `Voltmeter.asm` as readout by `VoltmeterTest.py`. The other programs, of course, require slightly different connections. Never connect more than 3.3V to any pins.

ATmega328P Pin Functions
(Note: image is pointed opposite to the wiring diagram below)

(PCINT14/RESET) PC6	1	28	PC5 (ADC5/SCL/PCINT13)
(PCINT16/RXD) PD0	2	27	PC4 (ADC4/SDA/PCINT12)
(PCINT17/TXD) PD1	3	26	PC3 (ADC3/PCINT11)
(PCINT18/INT0) PD2	4	25	PC2 (ADC2/PCINT10)
(PCINT19/OC2B/INT1) PD3	5	24	PC1 (ADC1/PCINT9)
(PCINT20/XCK/T0) PD4	6	23	PC0 (ADC0/PCINT8)
VCC	7	22	GND
GND	8	21	AREF
(PCINT6/XTAL1/TOSC1) PB6	9	20	AVCC
(PCINT7/XTAL2/TOSC2) PB7	10	19	PB5 (SCK/PCINT5)
(PCINT21/OC0B/T1) PD5	11	18	PB4 (MISO/PCINT4)
(PCINT22/OC0A/AIN0) PD6	12	17	PB3 (MOSI/OC2A/PCINT3)
(PCINT23/AIN1) PD7	13	16	PB2 (SS/OC1B/PCINT2)
(PCINT0/CLKO/ICP1) PB0	14	15	PB1 (OC1A/PCINT1)

