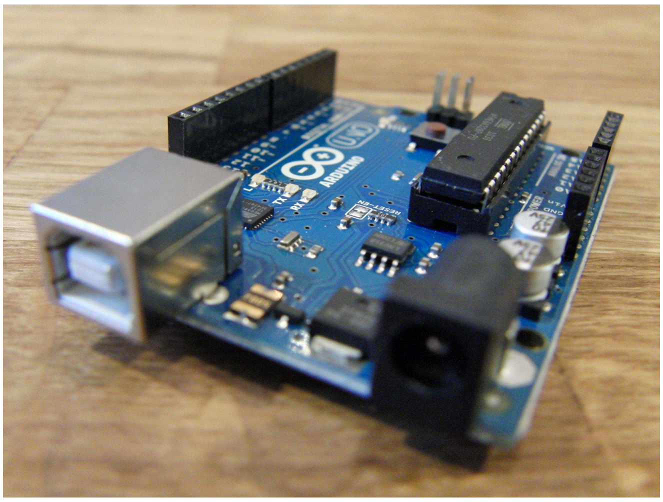
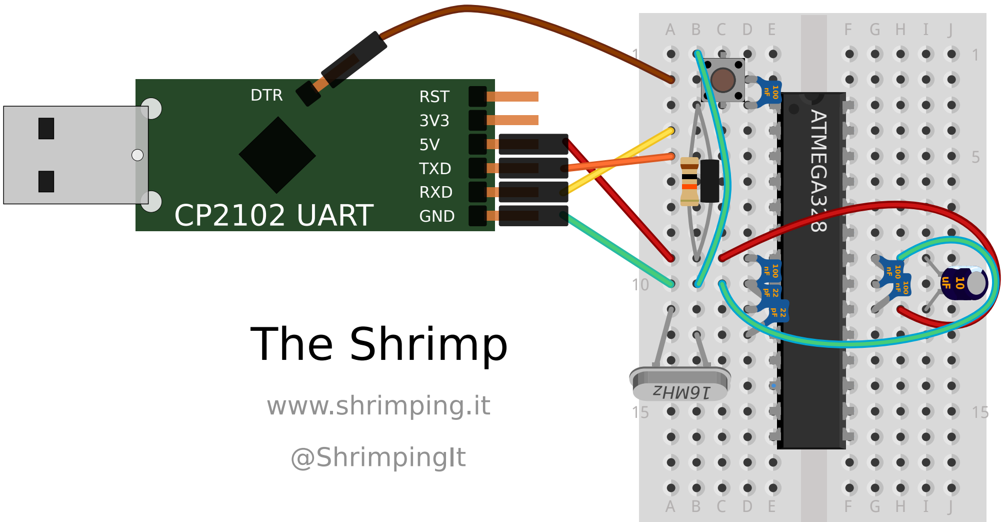
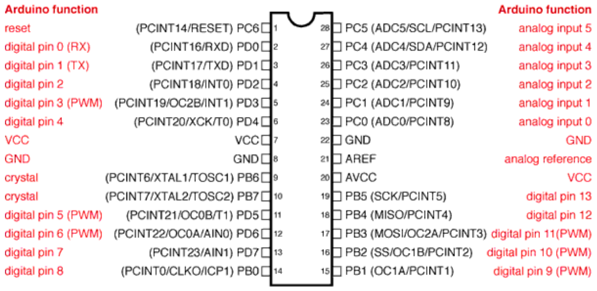


Arduino Microcontroller



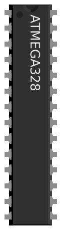
@ShrimpingIt Layout



Arduino function					Arduino function
reset	(PCINT14/RESET) PC6	1	28	PC5 (ADC5/SCL/PCINT13)	analog input 5
digital pin 0 (RX)	(PCINT16/RXD) PD0	2	27	PC4 (ADC4/SDA/PCINT12)	analog input 4
digital pin 1 (TX)	(PCINT17/TXD) PD1	3	26	PC3 (ADC3/PCINT11)	analog input 3
digital pin 2	(PCINT18/INT0) PD2	4	25	PC2 (ADC2/PCINT10)	analog input 2
digital pin 3 (PWM)	(PCINT19/OC2B/INT1) PD3	5	24	PC1 (ADC1/PCINT9)	analog input 1
digital pin 4	(PCINT20/XCK/T0) PD4	6	23	PC0 (ADC0/PCINT8)	analog input 0
VCC	VCC	7	22	GND	GND
GND	GND	8	21	AREF	analog reference
crystal	(PCINT6/XTAL1/TOSC1) PB6	9	20	AVCC	VCC
crystal	(PCINT7/XTAL2/TOSC2) PB7	10	19	PB5 (SCK/PCINT5)	digital pin 13
digital pin 5 (PWM)	(PCINT21/OC0B/T1) PD5	11	18	PB4 (MISO/PCINT4)	digital pin 12
digital pin 6 (PWM)	(PCINT22/OC0A/AIN0) PD6	12	17	PB3 (MOSI/OC2A/PCINT3)	digital pin 11(PWM)
digital pin 7	(PCINT23/AIN1) PD7	13	16	PB2 (SS/OC1B/PCINT2)	digital pin 10 (PWM)
digital pin 8	(PCINT0/CLKO/ICP1) PB0	14	15	PB1 (OC1A/PCINT1)	digital pin 9 (PWM)

Relationship between Arduino pins and @ShrimpingIt pins

Components used in the POV display circuit



A **Microcontroller** combines a computer with inputs and outputs

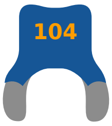
The Arduino Uno and @ShrimpingIt boards both use the ATMEGA328 family of microcontrollers. They can be programmed again and again by sending new digital behaviours over the serial pins (yellow and orange) using the USB device below.. Programs can easily sense or act on the physical world by controlling or measuring the voltage.of different pins.

Light Emitting Diode (LED for short)

LEDs are diodes, so they only allow current to pass in one direction. The longer leg should be positive, the shorter one negative. Round LEDs are also flat near the negative leg. They generate lots of different frequencies or colors of light. Only some of them are visible. Many components contain three LEDs; Red, Green and Blue (RGB for short) blending them to create the impression of any colour since the human eye can only sense these three colors.

Resistors limit the movement of charge

Resistors connect different parts of circuits like a wire. They allow charge to move as part of a circuit's behaviour. However, they have different *resistances* to the movement of charge, measured in Ohms (using the symbol Ω). Circuit designer can therefore control how fast charge moves. If you imagine charge is like water, a resistor is like a narrow pipe. Pressure (voltage) can still build up, but not much water can get through.



Capacitors store a little bit of charge

Capacitors have the ability to store a small amount of charge. Storage is measured in Farads (using the symbol F). In many circuits they help to smooth out unwanted variations in energised charge by releasing it when there's a dip, and absorbing it when there's a peak.
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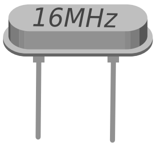


A **Crystal** sends a time signal to our microcontroller

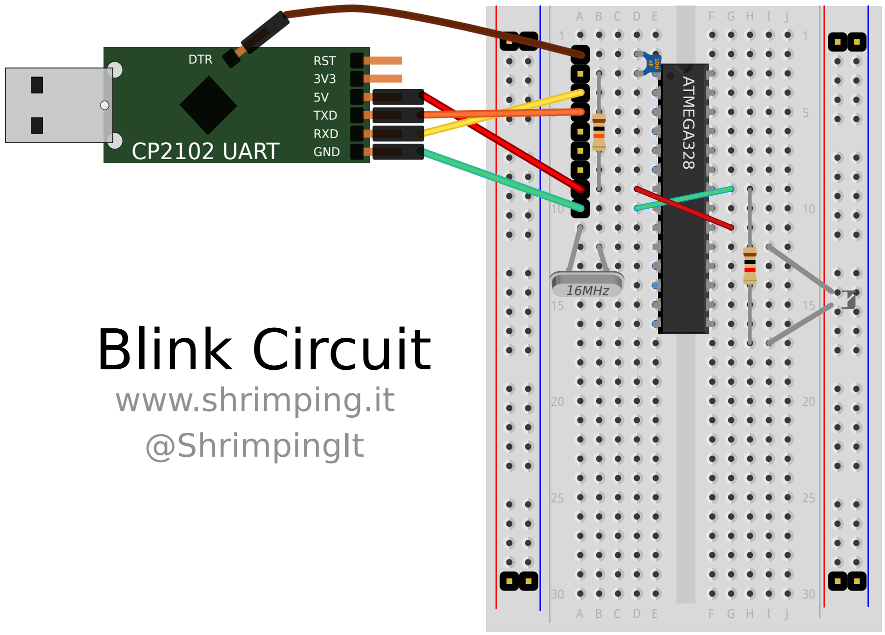
For electronic mechanisms to 'tick' along, we need something like a pendulum to pause the mechanism while each operation completes, and before the next operation is started. In digital watches, a voltage is applied across a Quartz crystal, which moves backwards and forwards very fast, and the ticks are counted to control the time display. Our microcontroller needs a crystal with a really, really fast tick, as it carries out 16 million operations a second.

USB Serial Receiver and Transmitter

Our example circuit uses a CP2102 USB to UART adaptor, which a laptop or desktop can use send and receive information to the Microcontroller. When programming, the digital behaviour, or program, is sent using this device. For some applications, you may also use this to communicate with to a desktop or laptop whilst the project circuit is running.

http://shrimping.it @ShrimpingIt

Thanks to Fritzing.org for electronics vector art



Blink Circuit

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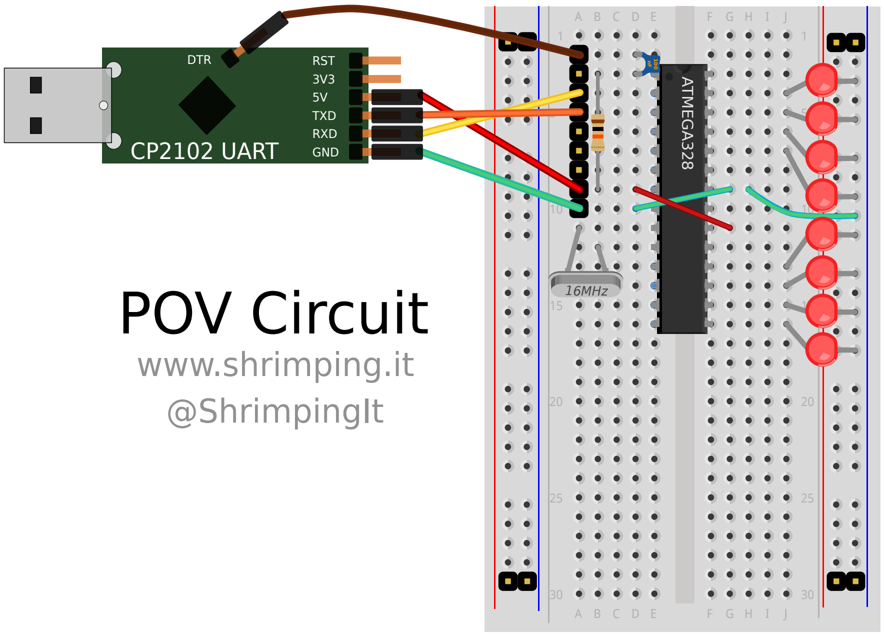

POV Circuit

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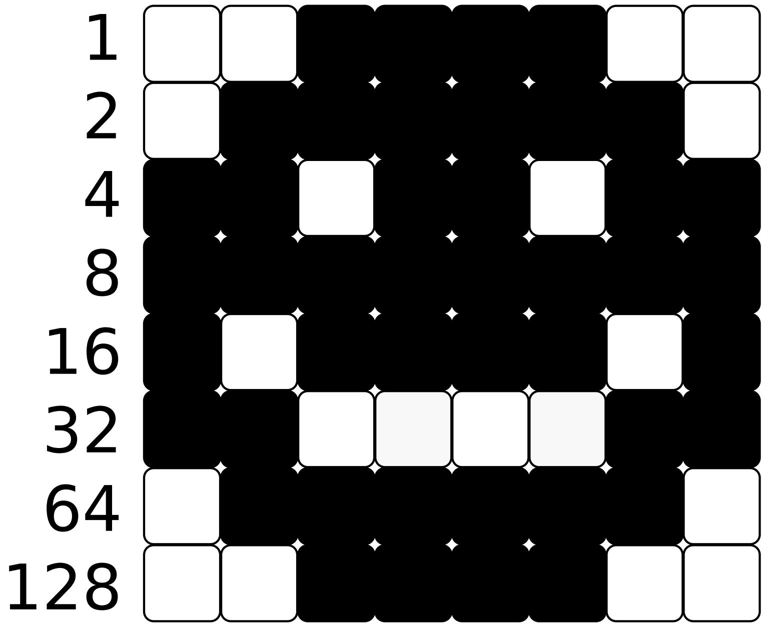


You can build your own graphics for your POV display.

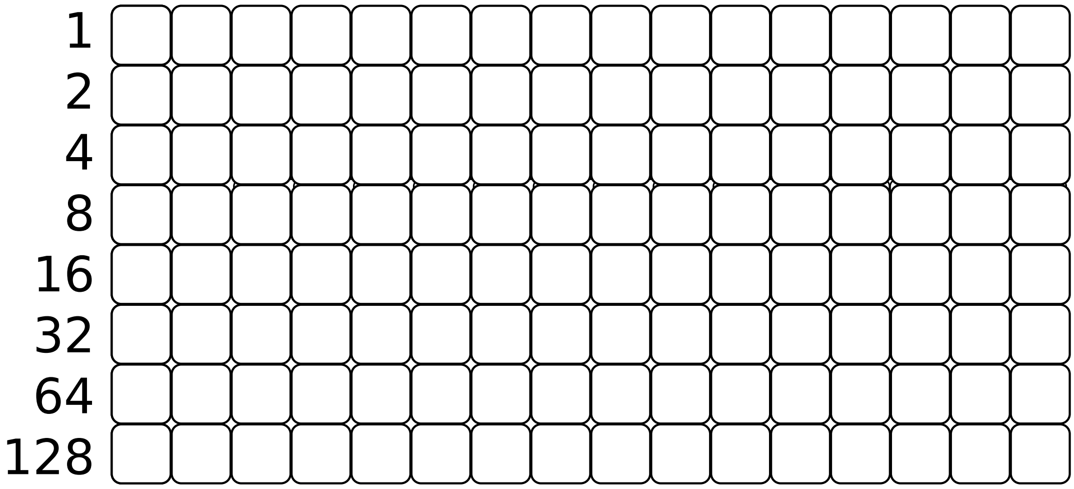
The letters in the POV are described as a 'bitmap' a binary representationin which pixels are either ON or OFF.

You can make an image on squared paper and then calculate the right numbers to make it appear on the POV display

			1+	1+			
		1+	2+	2+	1+		
		2+	4+	4+	2+		
4+	4+	8+	8+	8+	8+	4+	4+
8+	8+	16+	16+	16+	16+	8+	8+
16+	32+	64+	64+	64+	64+	32+	16+
32=	64=	128=	128=	128=	128=	64=	32=
60	**108**	**219**	**223**	**223**	**219**	**108**	**60**

To total a column, if a pixel is filled, add the number from the left to the column total. See if you can follow the example of the Smily face.

Draw an icon, record how many columns it uses and total each colum



___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___

Column
Totals