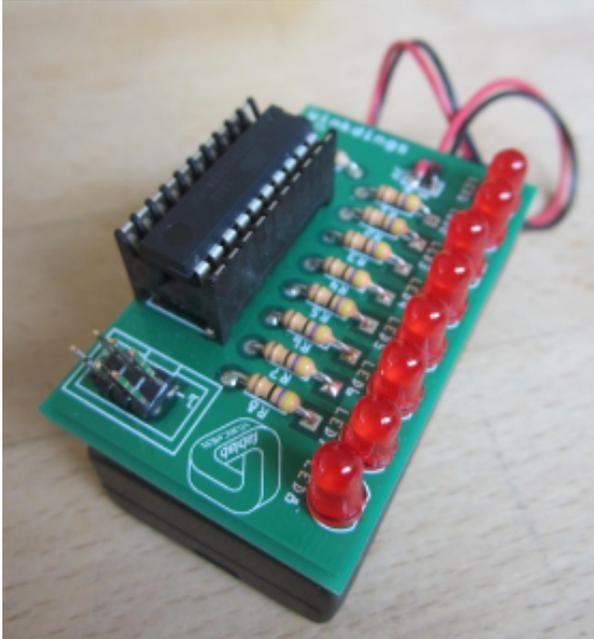


Winkdings (English)

[Here is the German version - Hier geht's zur deutschen Version](#)

Winkdings is a simple POV gadget you can use to "draw into the air". (POV = [Persistence of Vision](#))

The project was done for electronics workshops, mainly for introduction into soldering and the basics of electronics, but it also can be used to get started with microcontroller programming.



The device can be programmed to display many different things. For our workshops we usually pre-program it with a heart:



Goals

- easy to build
- cheap
- DIY friendly
- easy to program

Implementation

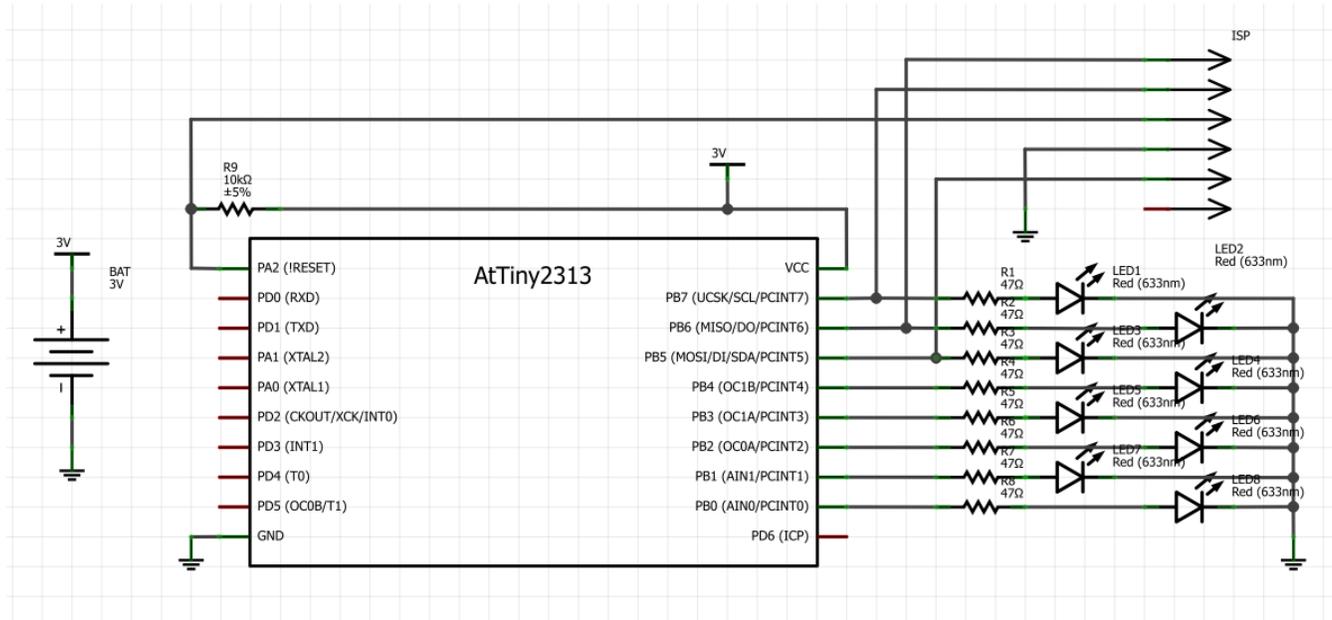
There is already quite a good implementation of this idea - the [MiniPOV3](#) - and it also was used for workshops at the FabLab München with success already.

But there is room for improvement:

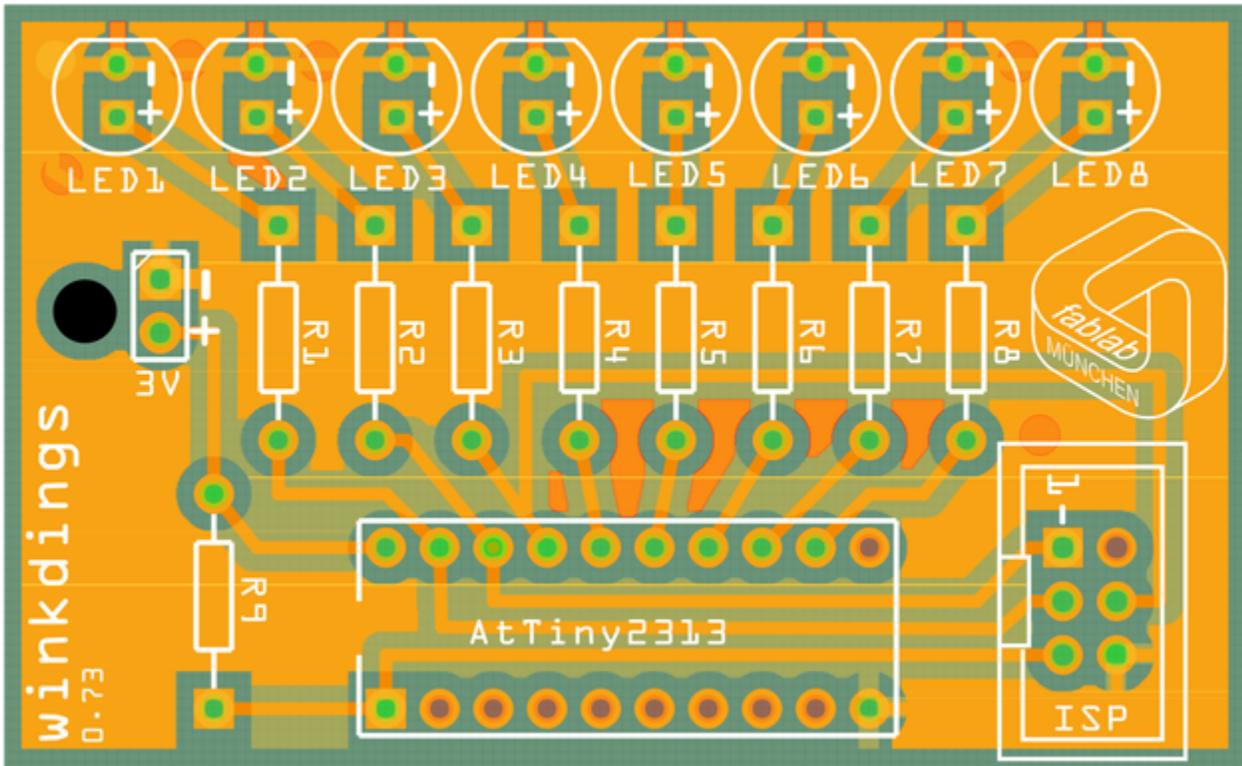
- Simplified layout (easier to see the connections and easier to solder)
- MiniPOV3 uses a COM interface for programming. That's a great idea, because people don't need a special programming device. But new PCs don't come with COM interfaces any longer, so the advantage came to naught. Instead we use a standard 6-pin ISP programming connector. You need a programmer now, but it also has advantages:
 - Less parts
 - cheaper therefore
 - no z-diodes (which people tend to solder the wrong way around)
- Programming using the Arduino IDE (instead of avr-gcc tool-chain)
- Single-sided PCB (easy to etch yourself)

We source the PCBs and the other parts ourselves, so the kit is cheaper too.

Circuit



PCB



Fritzing file: [winkdings0_74.fzz](#)

Parts

#	Part	mouser	reichelt
1	PCB winkdings		
1	ATTiny2313	556-ATTINY2313A-PU	ATTINY 2313A-PU
1	IC Socket 20 pins		GS 20
8	LED 5mm red	859-LTL-307E	LED 5MM ST RT
8	resistor 47 Ohm		METALL 47,0
1	resistor 10 kOhm		METALL 10,0K
1	connector 2x3 pins		MPE 087-2-006
1	battery box for 2 AA batteries (with switch)	12BH325/CS-GR	

Additionally

- velcro strip (PCB on battery box), e.g. [this one](#)
- 2 AA batteries

Building

Handout: [winkdings0_73_handout.pdf](#) (German)

Soldering instructions for kids: [winkdings0_74_lötanleitung.pdf](#) (German)

Programming

Winkdings is software compatible to MiniPOV3. [MiniPOV3 firmwares](#) run on the Winkdings without changes. The [programming skeleton](#) to create your own images can be used as well.

For programming you need an AVR programmer, which you connect at the ISP connector on the Winkdings.

On a brand new Attiny2313 you also need to "burn the fuses" correctly (8MHz, internal oscillator, clock division off). The parameter for avrdude is `-U lfuse:w:0xe4:m`. With the MiniPOV3 package you use `make burn-fuse`.

A complete avrdude call could be e.g.:

```
avrdude -p attiny2313 -c avrisp2 -P COM6 -B 10 -U lfuse:w:0xe4:m -U flash:w:winkdings_herz.hex
```

On MacOSX the call looks like this:

```
avrdude -p attiny2313 -c avrisp2 -P usb -B 100 -U lfuse:w:0xe4:m -U flash:w:winkdings_herz.hex
```

Standard Heart Firmware

- HEX file: [winkdings_herz.zip](#)
- GALEP32 project: [winkdings_herz.gpf](#), [Settings for Galep](#)

Note: The Vcc pin of the ISP connector is not connected. This was done to prevent LEDs to get a too high voltage when the Winkdings is programmed with a programmer using 5V. Therefore the Winkdings needs to be switched on, so it gets power. Unfortunately this causes problems with some programmers, e.g. the AVRISP mkII, which probes the Vcc pin and rejects programming if there is no voltage. As a workaround you can temporarily connect 3V+ with the Vcc pin.

Revisions

0.75

- small changes in silk print
- next batch of PCBs

0.74

- fixed resistor values in schematics

0.73

- first batch of 50 boards
- slightly changed board size and layout

0.72

- first working prototype