# global open time

- use kicad 8, 9 still has some problems
- have 2 leds: power & debugging
  debugging: run a blink program and make sure your mcu is still alive.
  how to use the pin with the led? just solder pin header before or after the led.
- 2 layers
  put pin through the board -> bam, 2 layers
  you can connect then the two pins on the backside with a cable. there is no shame in that btw.
- suggestion: use labels. makes your design a bit easier.
- use disconnected mark in kicad if pins are not connected
- use power flags if you get errors regarding power
  - you need to tell kicad where power is coming into the board
  - hit p on keyboard
- pull-up & pull-down: check adrians doc
  - if you do not connect the open switch directly to pin, there will be noise due to --- internal processes in the chip
  - add pulldown resistor with low resastance so that noise rather goes to ground.
  - how big pulldown resistors to be? (ricardo marques)
  - for buttons you can use lke 5k,
  - LEDs between 500 and 1k
  - i2c depends on a few variables but between 900 and 5k.
  - for 3.3v logic don't go over 2.5k
- getting started with electronics pgase 6 to 41. for this weeks assignment
- make beautiful pcb, not a square. it is the design week
  - check ccc talk
- make power lines of fatter thickness on a pcb
  - you see it better
  - signal lines you want to be thin
  - thick power lines can handle more current
- some more about pullup/pulldown by ricardo marques
  - if you dont use pulldown pullup, there a tristate. its not defined what voltage is on the pin. internals of mC.
  - this is explained further by neil in input devices
- only use bat gnd and bat vin if usb is not used. otherwise they will conflict.
  (source: rico)

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