Introduction to
KiCAD & Open Hardware

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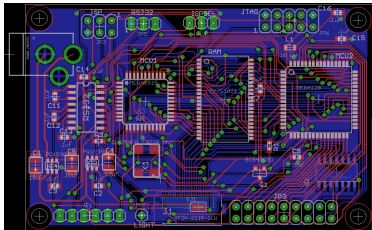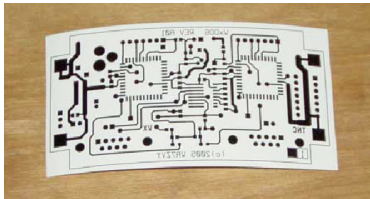
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Contents

Introduction

- Components, Boards and Firmware
- Board (PCB) design is "drawing"
- Open Hardware guideline
  - Schematics, Boards, Symbols, Footprints (as CAD files!)
  - Bill of material
  - Firmware (if any)
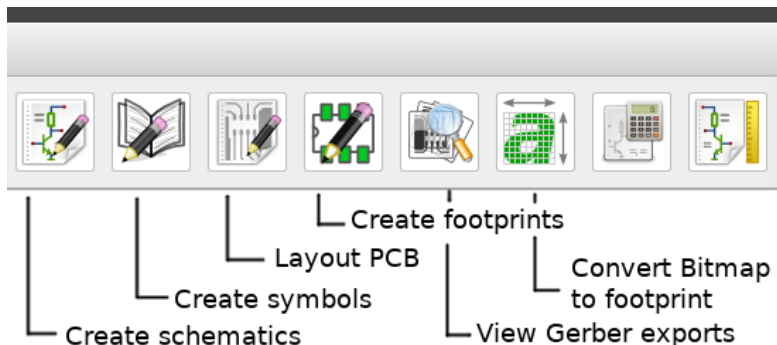 - Mechanical CAD files (if any)
  - Documentation
  - Non-commertial license

KiCAD

- Developed by CERN
- Current version 4.0.*
- Next version (5.0) just around the corner
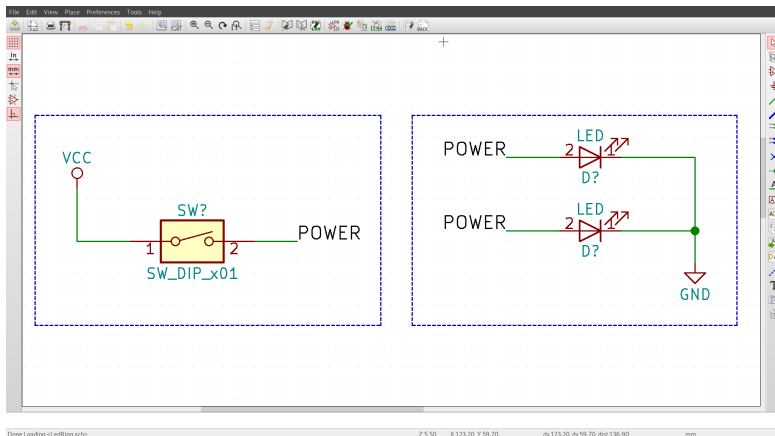- Open ecosystem around components & footprints

Workflow

- Schematics (represent Circuits)
- Associate Footprints
- Layout boards & route traces
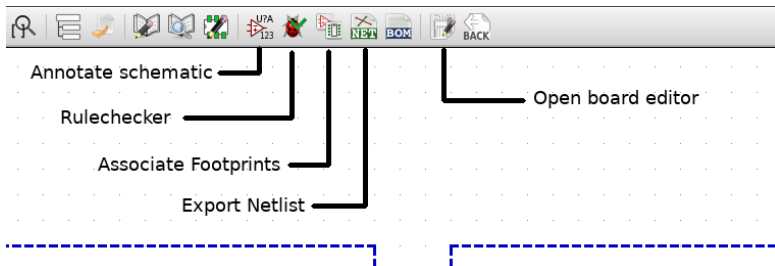- Repeat for iterations

Schematics

- ▶ Symbols (Create missing symbols)
- ▶ Labels
- ▶ Connections

Schematics Workflow

- ► Create circuit schematic
- ► Annotate (Give components unique names)
- ► Associate footprints
- ► Export Netlist

Annotate schematic

Rulechecker

Associate Footprints

Export Netlist

Open board editor

Board Layout

- Import Netlist
    - Imports component footprints
    - Can replace/ update/ remove old footprints
    - Import new Netlist for each revision
- Layout components
- Route traces
- Export
    - Gerber files (traces)
    - Drill holes (holes, edge cuts)
    - (Optional) Bill of Materials

Best Practises

- ▶ Schematics
  - ▶ Group components into segments (in nice boxes)
  - ▶ Put large segments onto sub-sheets
  - ▶ Use labels to connect segments together
- ▶ Store required libraries in project
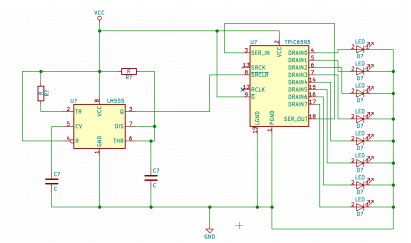- ▶ Include datasheets for components

Figure: Avoid doing this!

Understanding Datasheets

- Describes a component in detail
- Not everything always relevant
- Pick out important information
    - High-level description
    - Example usage
    - Pin-out
    - Footprint size

Best Practises: Library Management

- Three types of libraries
  - Schematic symbols (.lib)
  - Component footprints (.pretty)
  - (Optional) 3D models (.3dshapes)
- Different approaches to library management
  - Each have their pro's and con's
  - No "standard" way of doing it
  - One library per ...
    - Project
    - Component type
    - Manufacturer
    - Individual component