PCB Design and Manufacturing

Experiential Learning Center

Pathway

- Why and when to use PCBs
- Design Software
- Manufacturing Options

PCBs: Why and When

- Printed Circuit Boards
 - Why are PCBs useful?



- Printed Circuit Boards
 - Why are PCBs useful?
 - No one likes rat nests.

- Printed Circuit Boards
 - Why are PCBs useful?
 - No one likes rat nests.
 - PCBs have their place... not at the beginning, but well before the end

- 1. Drawings and simulations
- 2. Breadboarding
- 3. (Prototyping Circuit Boards)
- 4. Printed Circuit Boards



Design Software: Options and Tricks

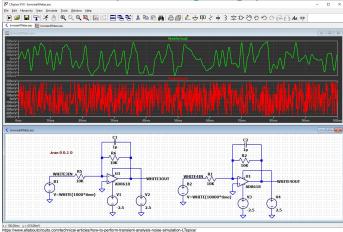
Simulation

- Simulation
 - SPICE
 - LTspice



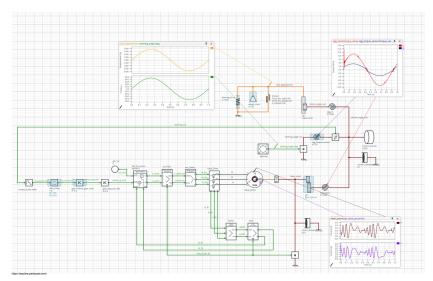


- https://www.analog.com/en/design-center/design-tools-and-calculators/ltspice-simulator.html
- Ngspice
 - https://www.autodesk.com/products/eagle/blog/spice-simulation-part-1/



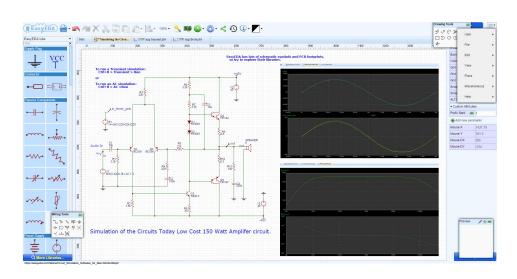
PART**QUEST**

- Simulation
 - SPICE
 - System Vision (Part Quest)
 - https://explore.partquest.com/



- Simulation
 - SPICE
 - System Vision
 - EasyEDA

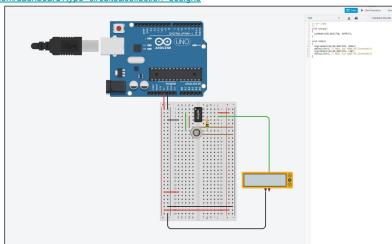




- Simulation
 - SPICE
 - System Vision
 - EasyEDA
 - Tinkercad

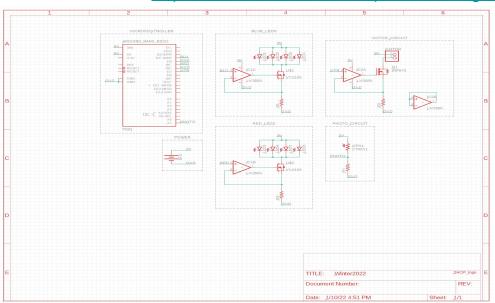


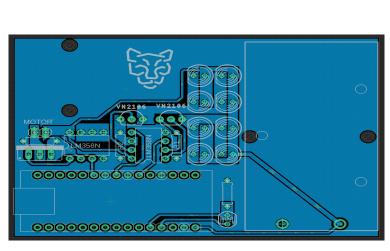
https://www.tinkercad.com/dashboard?type=circuits&collection=designs



Design

- Design
 - Eagle
 - https://www.autodesk.com/products/eagle/free-download

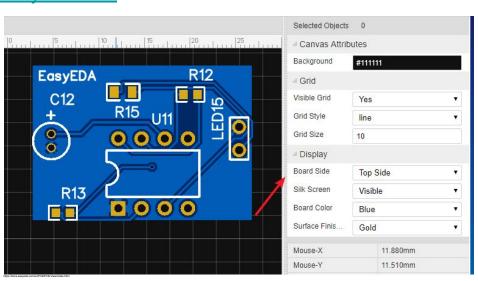






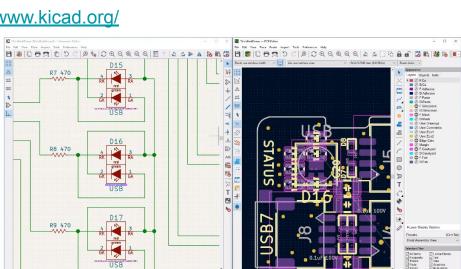
- Design
 - Eagle
 - Easy EDA
 - https://easyeda.com/





- Design
 - Eagle
 - Easy EDA
 - **KiCAD**
 - https://www.kicad.org/

7.440 × 7.825 ¥ 5.550 & 2.7825 dy 5.550 die 9.593 https://www.kicad.org/discover/pcb-design/



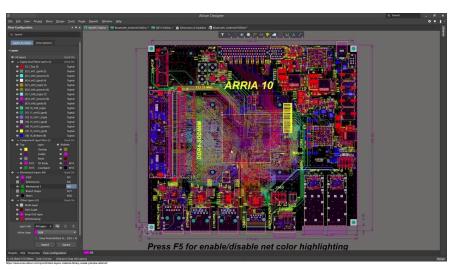
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- Design
 - Eagle
 - Easy EDA
 - KiCAD
 - Altium
 - https://www.altium.com/





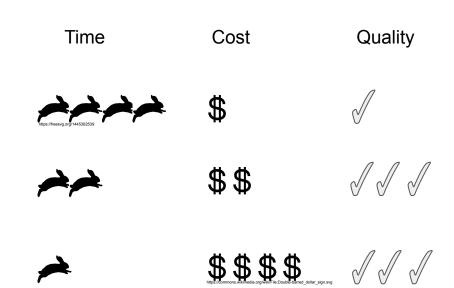
- Resources for designing
 - Videos
 - https://www.youtube.com/playlist?list=PLNIH7A-INg4Zh_IXH8toDxGoAZLpm9mz1
 - Tutorials and forums



Manufacturing

Manufacturing

- Onsite
 - o ELC
- Overseas
 - JLCPCB
 - o PCBWAY
- Local
 - Osh Park
 - o 4 pcb



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		J

o 4 pcb

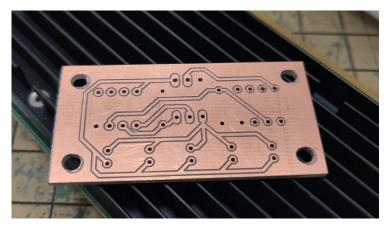
J	Time	Cost	Quality
OnsiteELC	<24 hours	\$2.00/ board	No Solder Mask No plated through holes
OverseasJLCPCBPCBWAY	~ 6 days	\$4.36/ board	Excellent
LocalOsh Park	~ 14 days	\$5.12/ board	Excellent

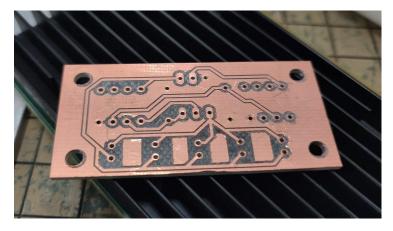
Manufacturing

- Prep for working with different manufactures
 - o DRC
 - https://ece.byu.edu/00000178-370a-d963-a7fc-377af4240000/elcdrc-dru
 - https://github.com/oxullo/jlcpcb-eagle/tree/master/design%20rules
- Other cool tips and tricks
 - Just because it's the minimum, doesn't mean you need to use it!

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Questions?