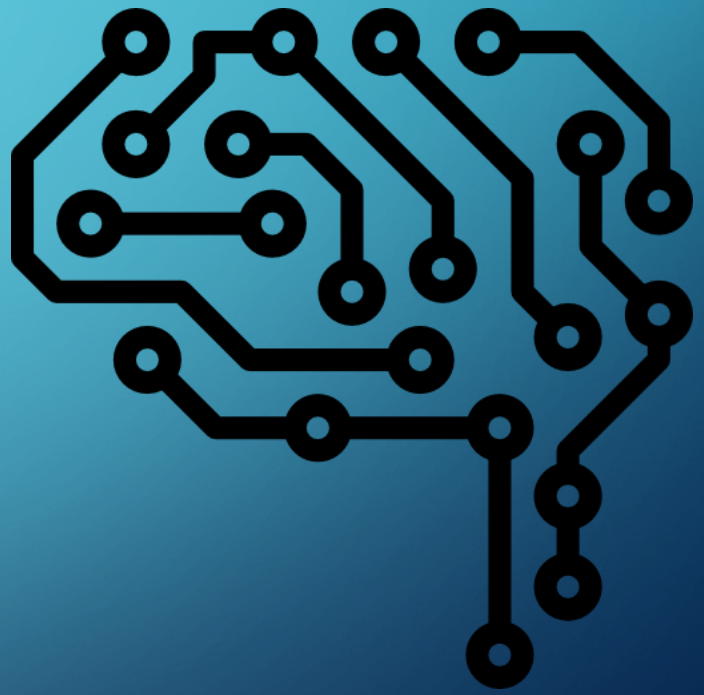
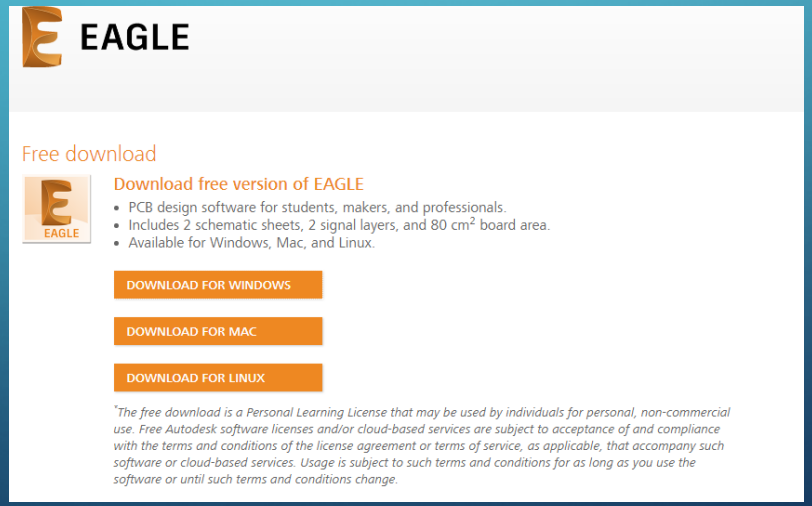
IEEE PCB DESIGN WORKSHOP



SINGAPORE UNIVERSITY OF TECHNOLOGY AND DESIGN

DOWNLOAD EAGLE

- https://www.autodesk.com/products/eagle/overview
- Click 'Download for free'
- Find the correct version (Windows/Mac/Linux)



PCB SOFTWARE

- EAGLE stands for Easily Applicable Graphic Layout Editor
- Altium Designer
- ZenitPCB
- TinyCAD
- CircuitMaker
- Gerber

PRE-WORK (ARDUINO WORKSHOP)

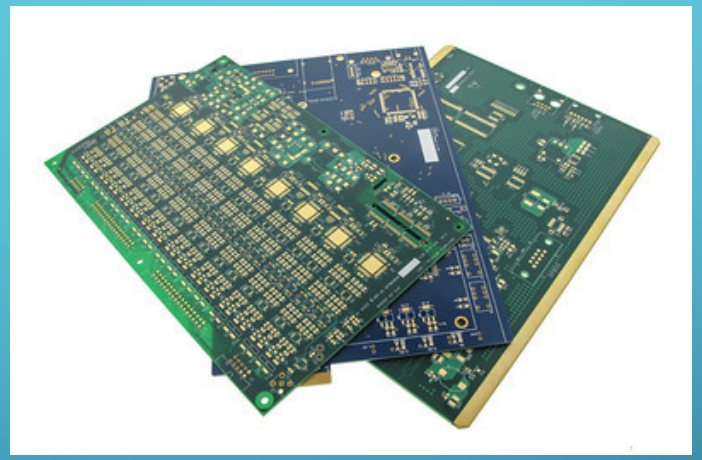
- Learnt circuit building and coding
- Experienced various components
- Prototyped using breadboards

PRINTED CIRCUIT BOARD

- Board that is electrically connected with electronic components
- Uses conductive track pads and other features etched from copper sheets
- PCB populated with electronic components is a printed circuit assembly (PCA)
- PCBs are rugged and highly reliable
- Professional as they fit industry standard specifications
- Replace the flimsy and messy breadboard connections

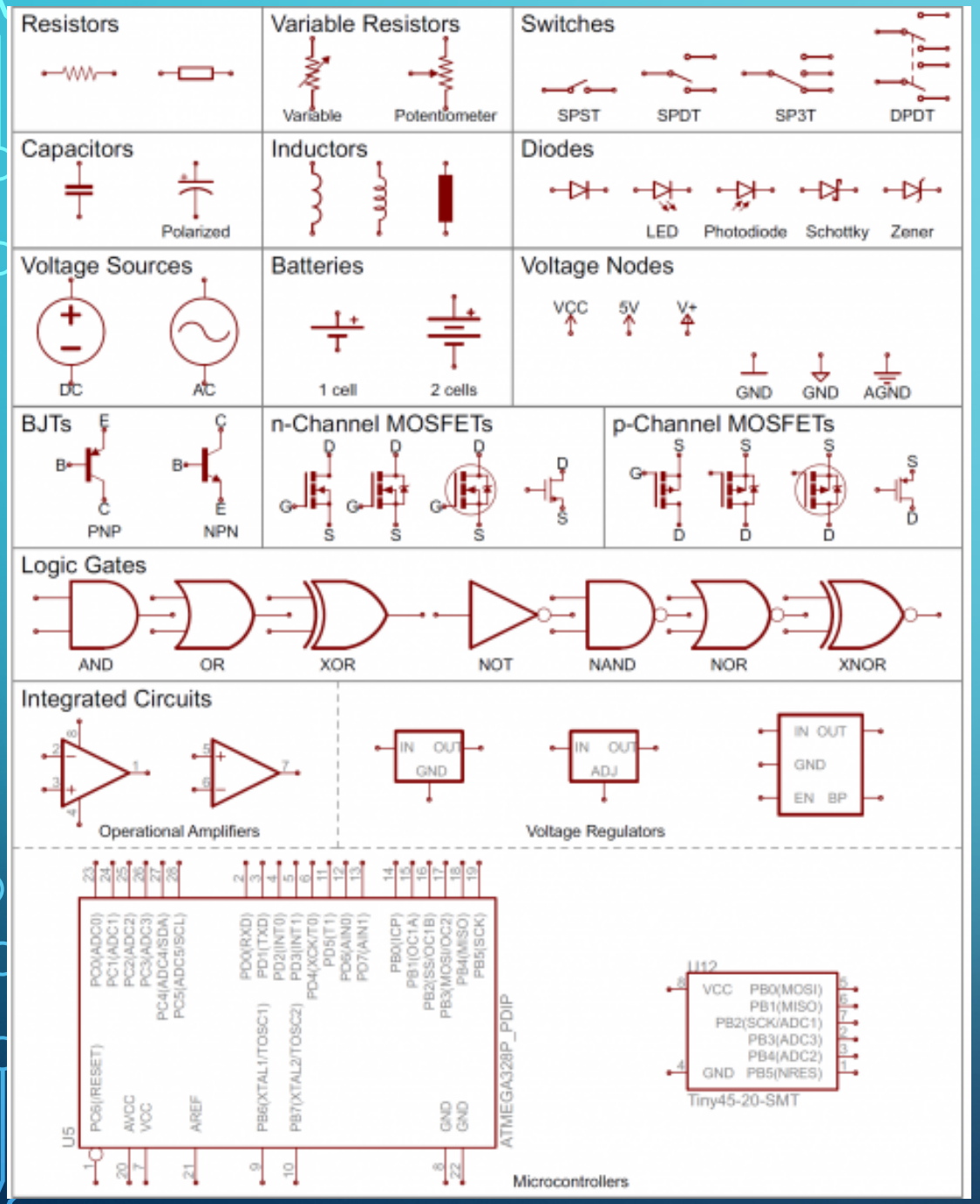
COMMON PRODUCTS

- Motherboards
- Microcontrollers
- Hardware
- Industry Machines
- Consumer Appliances



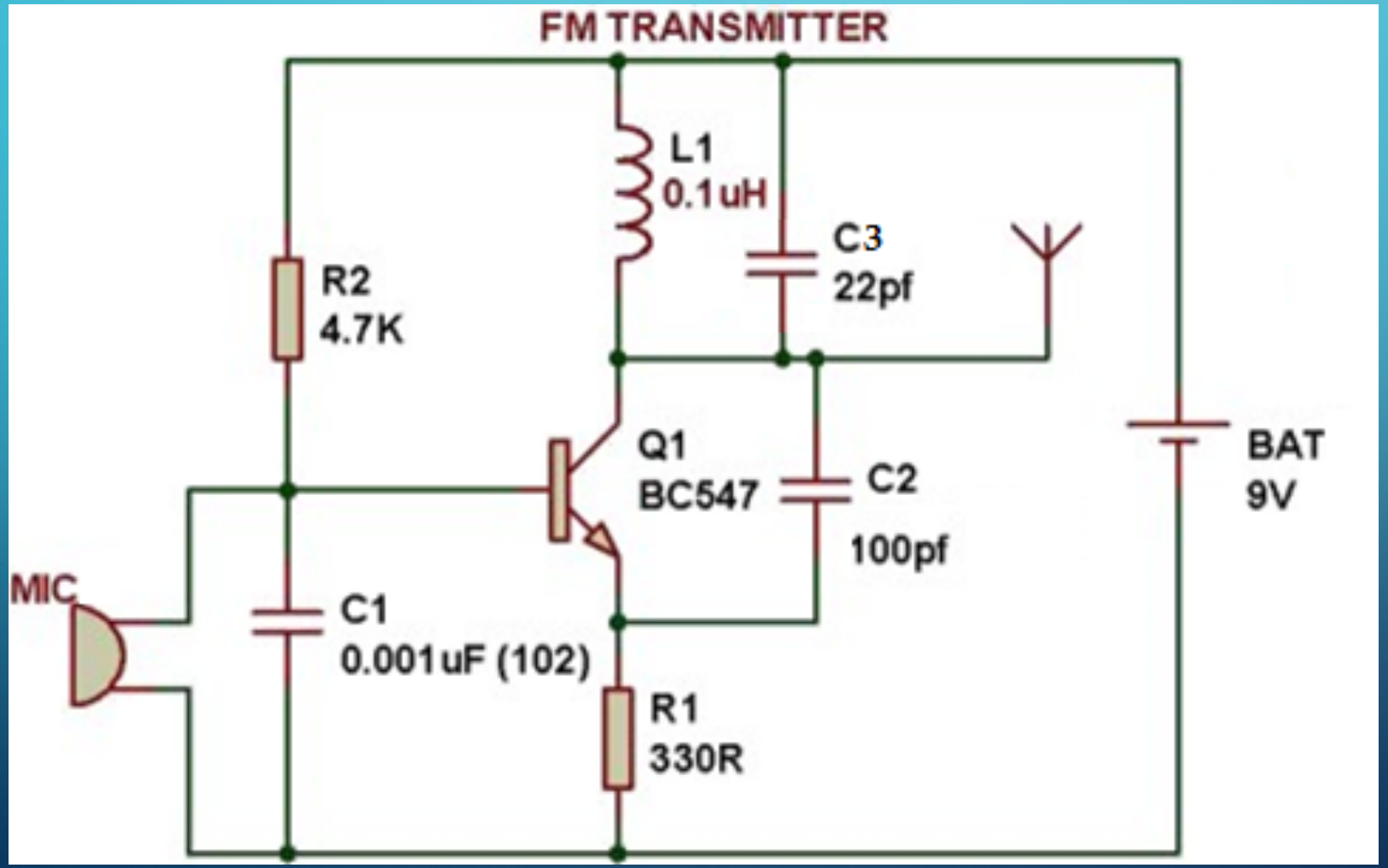
COMPONENTS

- Components used in circuits :
  - Capacitors (Store and discharge electricity)
  - Transistors (Amplify and switch electrical power and electrical signals)
  - Resistors (Limit the electrical current)
  - Input/output connections
  - Power supply connections



Name Identifier	Component
R	Resistors
C	Capacitors
L	Inductors
S	Switches
D	Diodes
Q	Transistors
U	Integrated Circuits
Y	Crystals and Oscillators

SCHEMATIC DIAGRAM



- 1 mic
- 2 resistors
- 1 transistor
- 3 capacitors
- 1 power supply
- 1 inductor
- 1 output

LETS START (FOLLOW ME)!

- Create a project and name it
- Add new schematic (.sch)
- Click to add new components: under search type the name 

LEARN TO ADD IN ADDITIONAL COMPONENTS LIBRARY

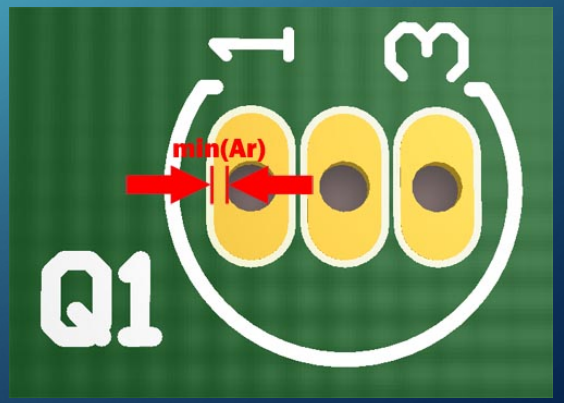
https://github.com/adafruit/Adafruit-Eagle-Library

- Extract the lbr to C drive where eagle file library is
- Library => use => select all

9D1E45F6.lbr

PAD AND TRACES

- Pads are on the PCB and are connected to Traces
- Pads have an inner diameter and an outer diameter
- Need to solder components to the pads
- Traces are essentially the wiring of the PCB
- High current traces should be wide



TYPES OF PCB DESIGN LAYERS

- Single Sided Layer

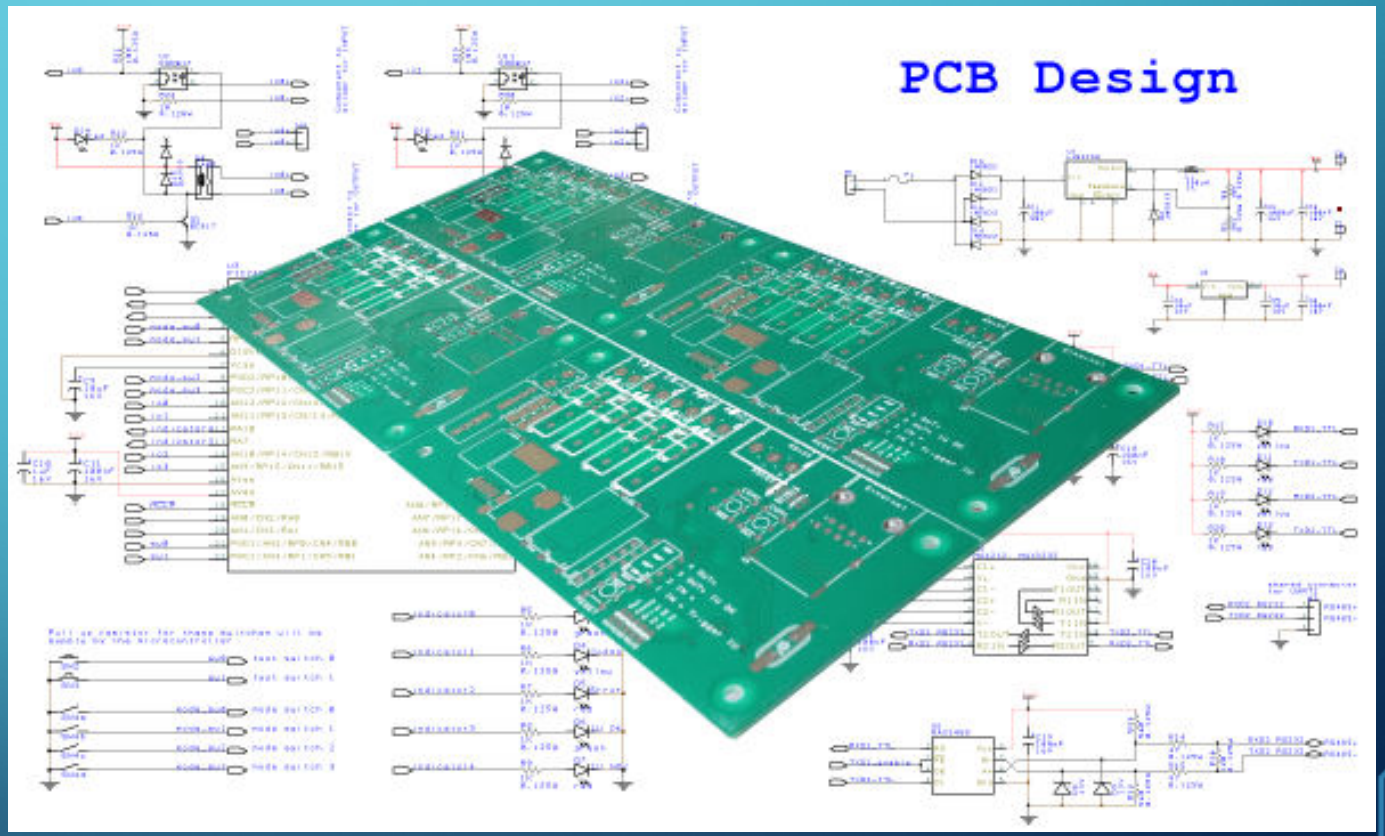
Base material clad with copper on one side

- Doubled Sided Layer

Base material on both sides

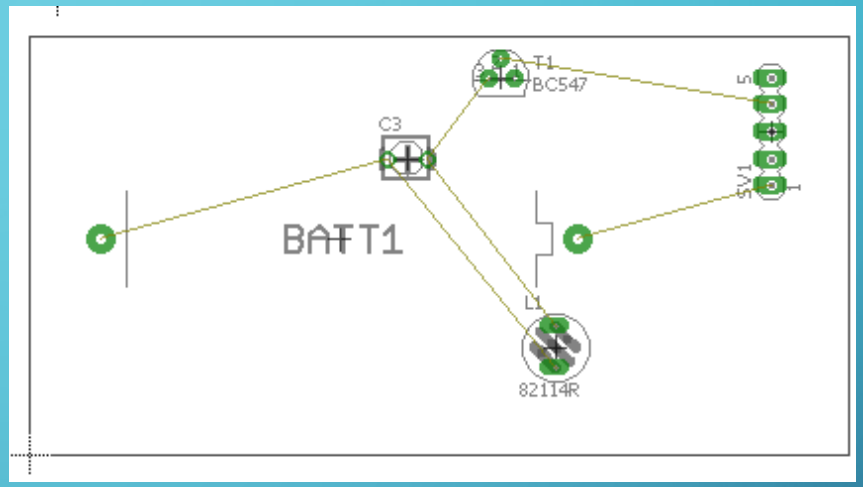
- Multiple Layers

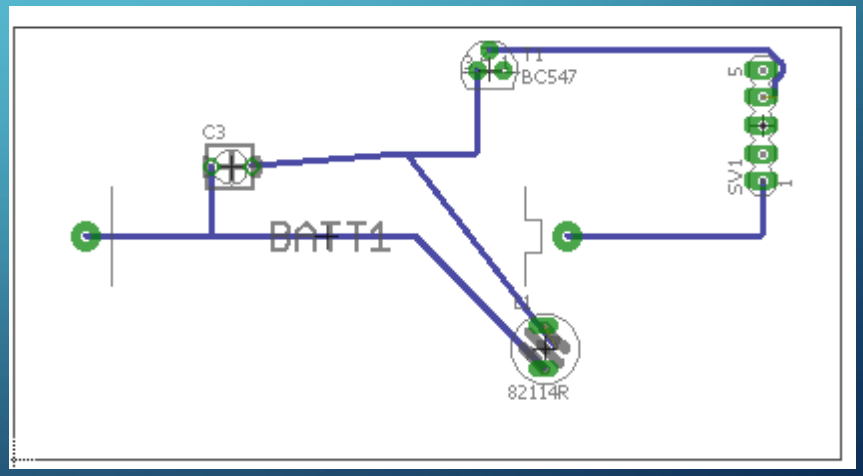
Every layer is separated by insulation



STEPS IN PCB DESIGN

- Draw
- Link
- Rename
- Board
- Routing





STEPS TO CONNECT

- Wiring up

- Name tool (naming the same equal inter link)

- Label tool (to see easily)

- Show tool (to check connections)

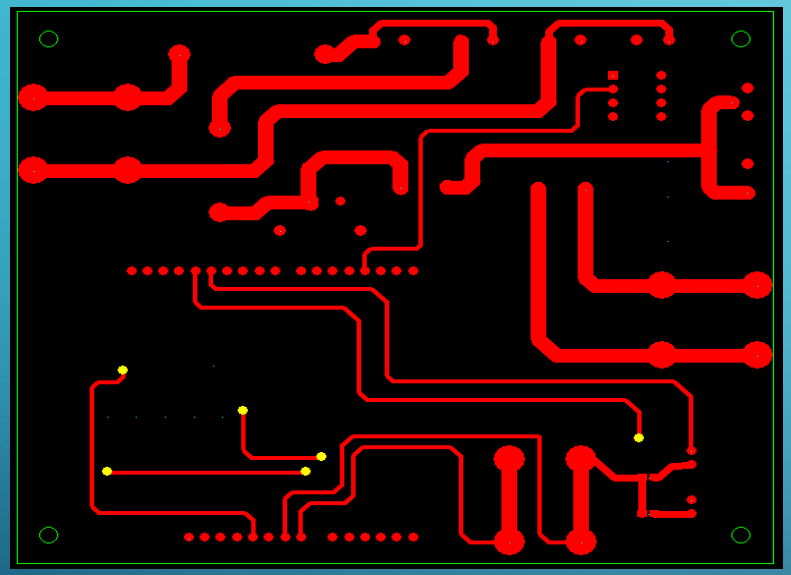
USEFUL ULP (USER LANGUAGE PROGRAM)

- File => Run
- Add in renumber-sch.ulp

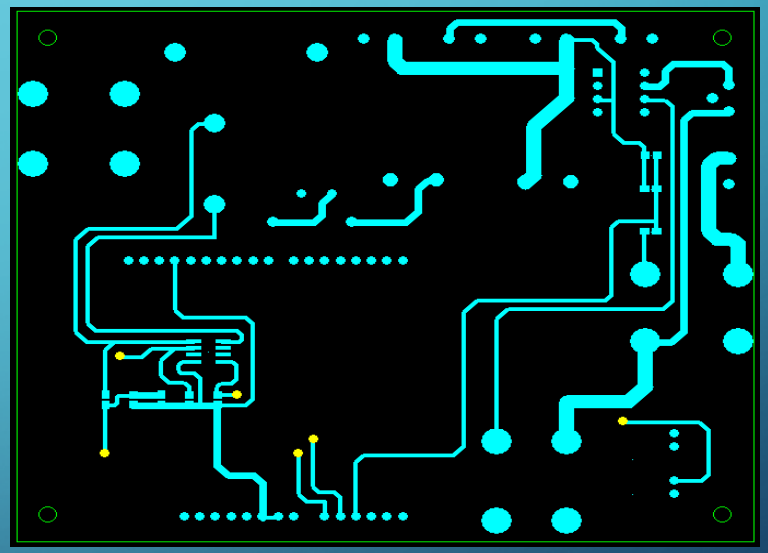
CREATE BOARD

- Press Board button
- Red top, Blue bottom
- Auto (DRC to adjust trace side then auto) and manual route
- Top left (click Grid)
- Click Polygon and draw GND common port on top layer
- Click Hole button and set drill hole size

Top



Bottom



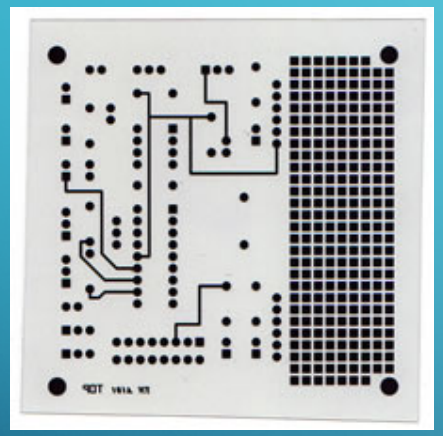
PHYSICAL DESIGN ISSUES

- Component Size and Types:
  - Ensure that components can fit the board
  - Some components come in multiple sizes (Surface mount and Through hole)
- Heat Dissipation:
  - Some components require heat sinks
  - Check datasheet of each component
- High Frequency Circuits
  - Series Inductance
  - Shunt Capacitance
  - Inductive Coupling
  - Capacitive Coupling

STEPS IN PCB DESIGN

sfe-gerb274x-JEB.cam

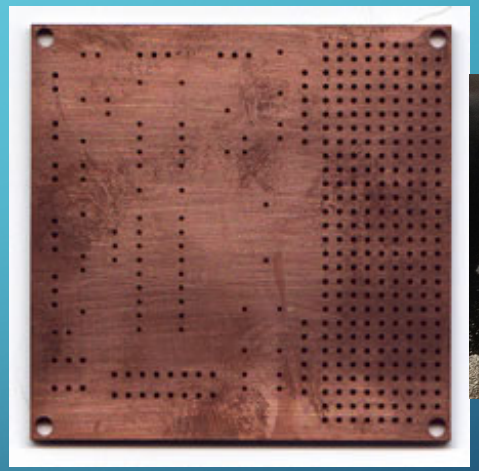
1. Film Generation

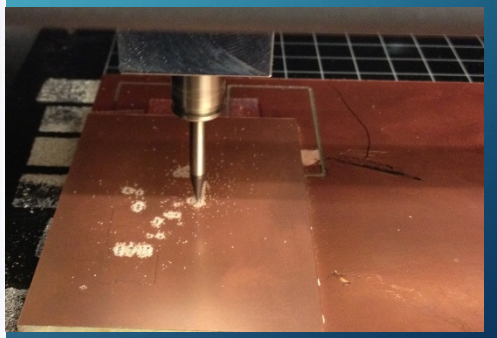


2. Shear Raw Material

Industry standard 0.059" thick, copper clad, two sides

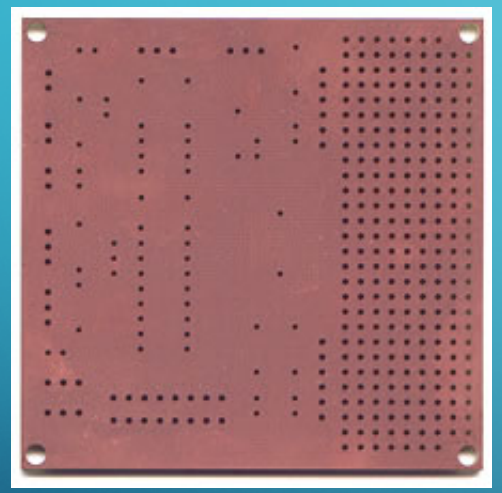
3. Drill Holes





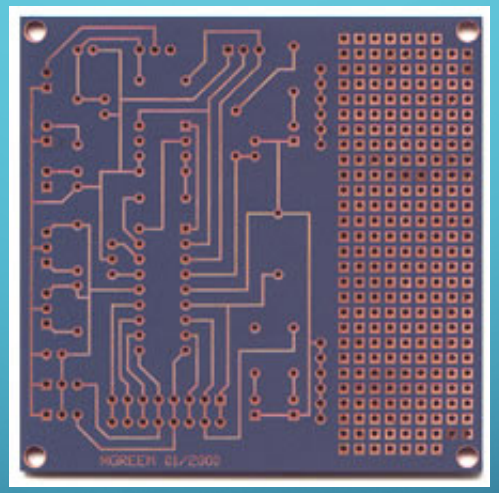
STEPS IN PCB DESIGN

4. Electrolux copper



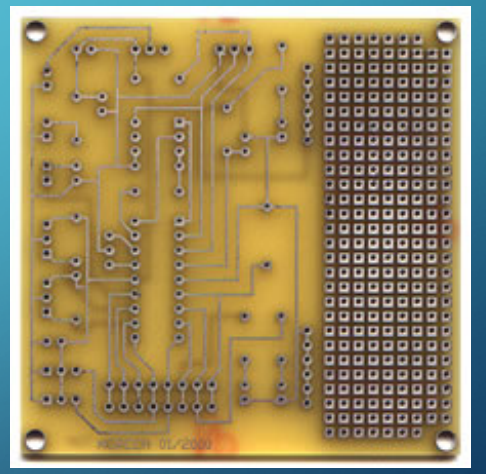
Apply copper in hole barrels

5. Apply Image



Apply Photosensitive Material to develop selected areas from panel

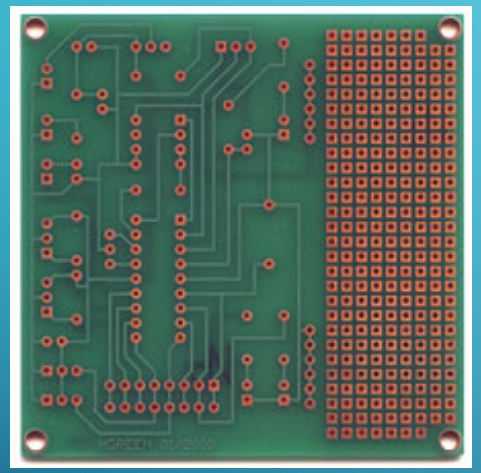
6. Strip and Etch



Remove dryfilm, then etch exposed copper

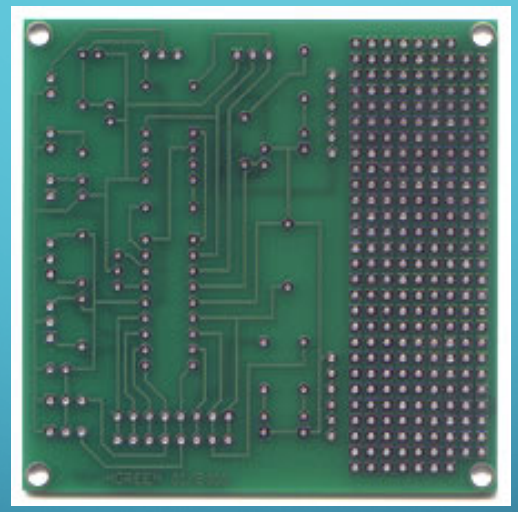
STEPS IN PCB DESIGN

7. Solder Mask



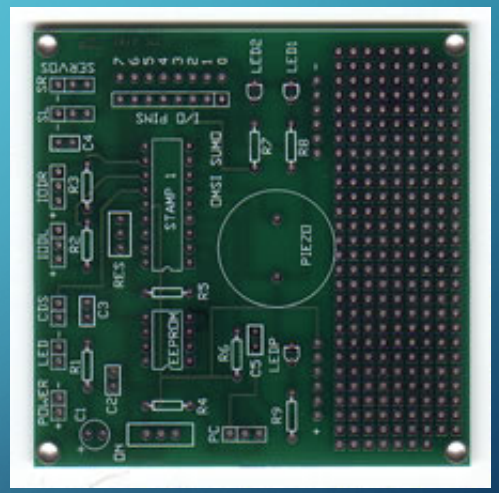
Apply solder mask area to entire board with the exception of solder pads

8. Solder Coat



Apply solder to pads

9. Silkscreen



Apply white letter marking using screen printing process


THANK YOU ALL
memegenerator.net