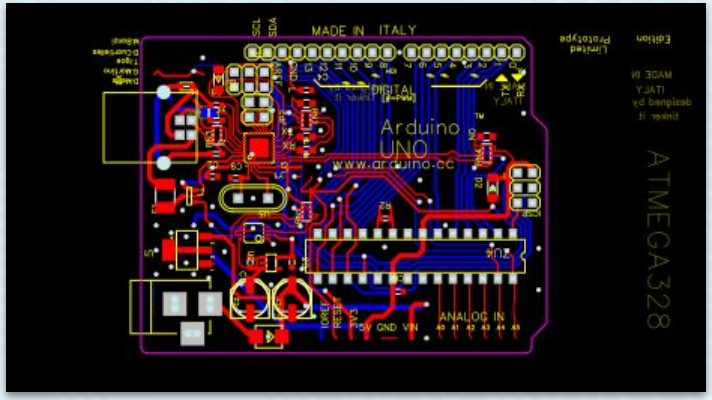
IEEE
Advancing Technology for Humanity

IEEE Virtual Workshop 3

Circuit & PCB Design using EAGLE



Thursday, October 1, 2020

What is a PCB?

From Wikipedia:

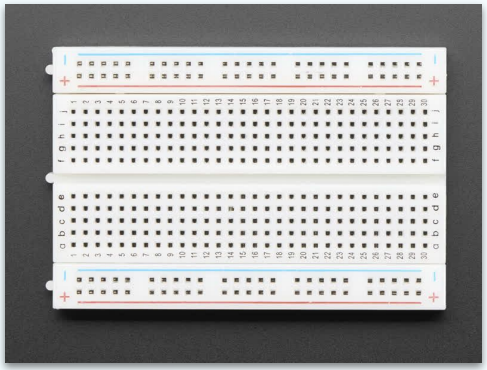
- A printed circuit board (PCB) mechanically supports and electrically connects electronic components or electrical components using conductive tracks, pads and other features etched from one or more sheet layers of copper laminated onto and/or between sheet layers of a non-conductive substrate. Components are generally soldered onto the PCB to both electrically connect and mechanically fasten them to it.

  Printed circuit boards are used in all but the simplest electronic products. They are also used in some electrical products, such as passive switch boxes.

Why PCB's (not the alternatives) ?

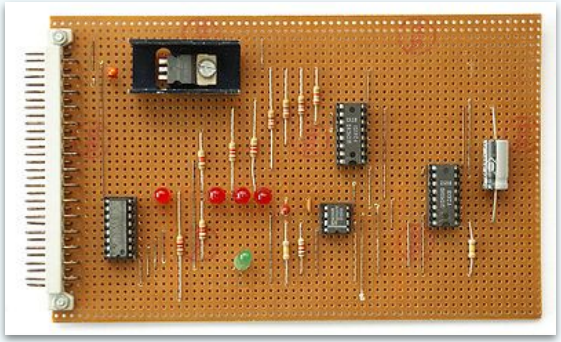
Alternative #1: Breadboard

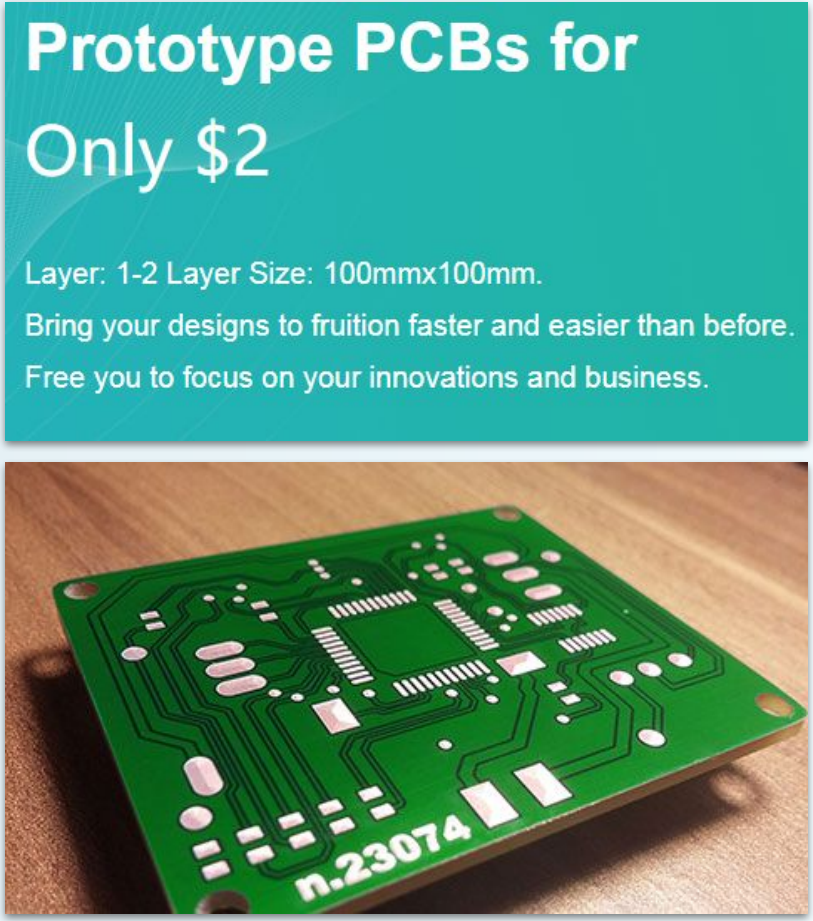
- More Expensive
- Not many different sizes (usually large)
- Parasitics (what??)
- One-Sided



Alternative #2: Perf Board

- Requires a lot of planning
- Only one sided
- Hard to troubleshoot / repair



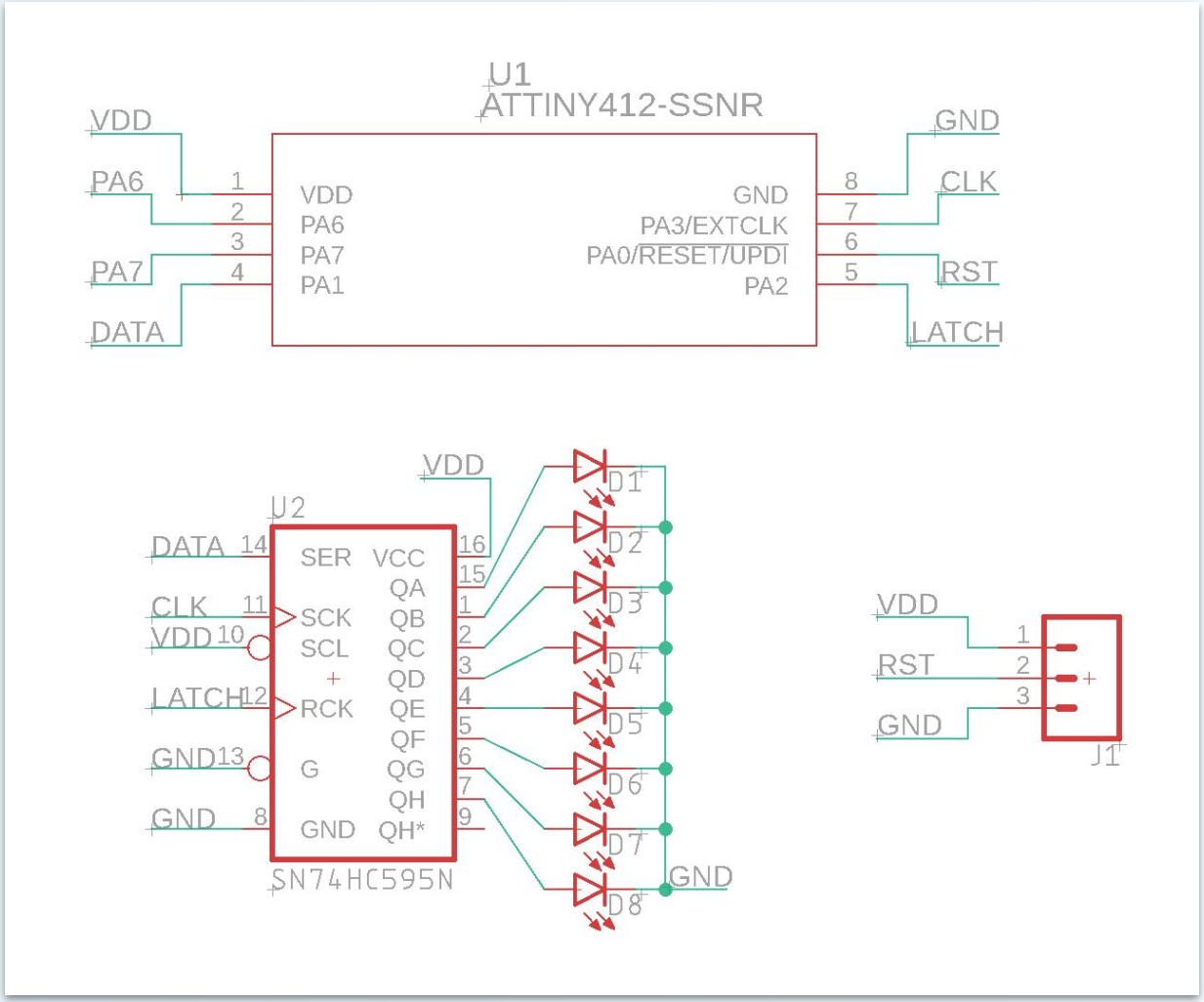


Benefits of PCBs

1. **Cost**: $2 for 5 PCBs pf 100mm X 100mm (about 4 inches square)
2. Boards are 2 sided (can be up to 24 layers for more complicated boards!)
3. Easy to scale up
4. More compact than other methods
5. Easy to adjust / troubleshoot
6. Built in double-checks for wiring
7. Allows for surface mount components

How are we doing this???

1.) Create a schematic (What we're going to place on the board)
2.) Convert this over to a board layout
3.) Move parts as necessary
4.) Wire components using 'traces'


U1
ATTINY412-SSNR
VDD
PA6
PA7
DATA
1
2
3
4
VDD
PA6
PA7
PA1
GND
PA3/EXTCLK
PA0/RESET/UPDI
PA2
8
7
6
5
GND
CLK
RST
LATCH
U2
DATA 14
CLK 11
VDD 10
LATCH 12
GND 13
GND 8
SER
SCK
SCL
RCK
G
GND
VCC
QA
QB
QC
QD
QE
QF
QG
QH
QH*
16
15
1
2
3
4
5
6
7
9
SN74HC595N
VDD
D1
D2
D3
D4
D5
D6
D7
D8
GND
VDD
RST
GND
1
2
3
J1

Some Rules:

1.) No 90 degree angles (or any other sharp angles)
2.) Cannot intersect 2 wires on the same side of the board
3.) Try to keep wires spaced apart (not too close to each other)

Time to get competitive!

The best overall PCB design will be ordered and passed out!

Deadline to submit files is October 8th at midnight