MINT - Microfluidic Netlist

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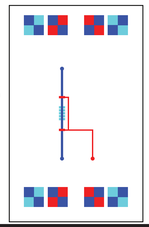
Introduction

MINT

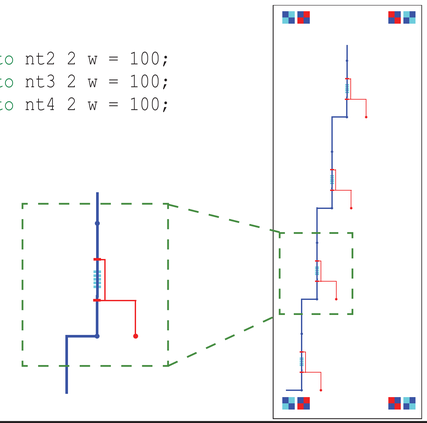
The major advaces in electronics can be attributed to the advances in CAD tools. MINT is the first step in trying to replicate the versatile toolkit available to electronics designers. With MINT, microfluidics designers can easily create large and complex microfluidics designs. This can be done using the ever increasing library of various components like cell traps, valves, ports, multiplexers, mixers, and even transposers that are being added to MINT.

Defining a Microfluidic Device using MINT

```
DEVICE net_test                          ← Declaring a Device

LAYER FLOW                               ← Defining the Flow Layer
PORT p1, p2 r=100;
V LONG CELL TRAP ct1 numChambers=10      ← Creating Components (Cell
    chamberWidth=100 chamberLength=100     Traps and Ports) in the Layer
    chamberSpacing=50 channelWidth=100;

CHANNEL c1 from p1 3 to ct1 1 w=100;     ← Connecting the Components
CHANNEL c2 from ct1 2 to p2 1 w=100;       with Channels

TERMINAL 1 p1;
TERMINAL 2 p2;

END LAYER                                ← Defining the End of the Layer

LAYER CONTROL                            ← Defining the Control Layer
PORT p3 r=100;
VALVE v1 on c1 w=300 l=100;              ← Creating Valves on the Channels
VALVE v2 on c2 w=300 l=100;
NET net1 from p3 1 to v1 4, v2 4
    channelWidth=50;
END LAYER
```



```
IMPORT net_test                          ← IMPORTING an Existing Device

DEVICE module_test

net_test nt1,nt2,nt3,nt4;                ← Instantiate the Device

LAYER FLOW

CHANNEL cx1 from nt1 1 to nt2 2 w = 100;
CHANNEL cx2 from nt2 1 to nt3 2 w = 100;
CHANNEL cx3 from nt3 1 to nt4 2 w = 100;


END LAYER
```



Why MINT ?

Standard Design Toolkit

Since all of the components in MINT are derived from existing academic literature, a standard design toolkit would ensure that all the designs would work as expected within predefined operational tolerances.

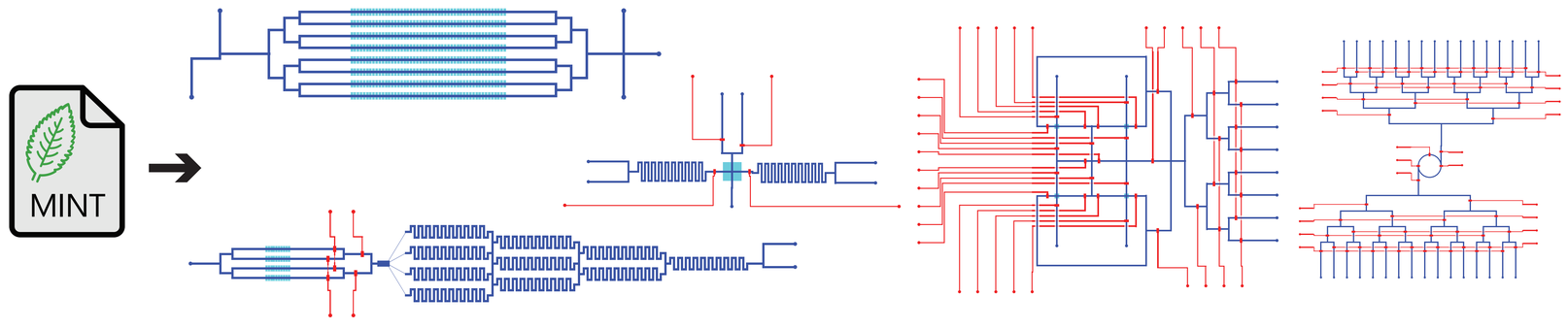
Portability Between CAD Tools

By sticking to a standard specificaiton interface we can ensure that the Microfluidic Designs can be used by different tools during the various phases of the design process. This versatility enables horizontal integration amongst tools and sets precedence for an industry wide standardization. MINT is fully supported by Fluigi.

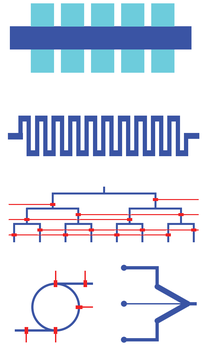
Embedded and Reusable Designs

MINT allows researchers and designers to specify their designs in a format that is human readable and easily shared in the form of a text file. In addition to this functionality, the user can also create and import existing design libraries into thier own library.

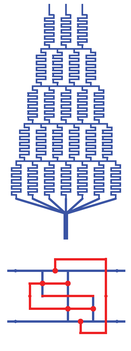
Fluigi - Automatically generates layouts for MINT



Parametric Components



CELL TRAP
MIXER
MUX
GRADIENT GENERATOR
MUX
TRANSPOSER
ROTARY
DROPLET



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