

# Demonstrate of Individual Project

Chenlibiqi 2016011382

2017.06.06

# Overview

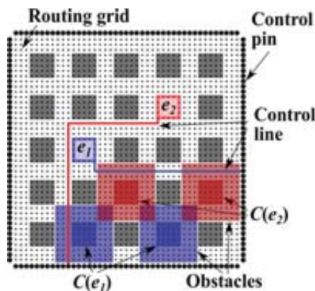
# Project

# Project

- **Escape Routing with Specific Obstacle Avoidance Constraints**

# Project

- **Escape Routing with Specific Obstacle Avoidance Constraints**



**Figure 5: Routing obstacles in control line routing: routed control lines avoid specific obstacles from conflict electrodes, i.e.,  $e_1$  only needs to avoid obstacles from  $C(e_1)$ , and  $e_2$  only needs to avoid obstacles from  $C(e_2)$ .**

# Algorithm

- The algorithm of the project is based on paper **Control-Fluidic CoDesign for Paper-Based Digital Microfluidic Biochips.**

# Algorithm

- The algorithm of the project is based on paper **Control-Fluidic CoDesign for Paper-Based Digital Microfluidic Biochips**.
- transform the problem into a minimum cost flow problem
- constantly modify the graph of flow-network problem to get a better solution.

# Algorithm

- The algorithm of the project is based on paper **Control-Fluidic CoDesign for Paper-Based Digital Microfluidic Biochips**.
- transform the problem into a minimum cost flow problem
- constantly modify the graph of flow-network problem to get a better solution.

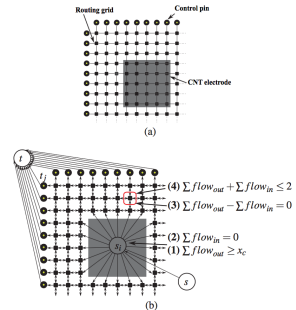


Figure 8: Network flow formulation: (a) top-left corner of the P-DMFB with one CNT electrode, and (b) the corresponding network flow graph.



# Algorithm

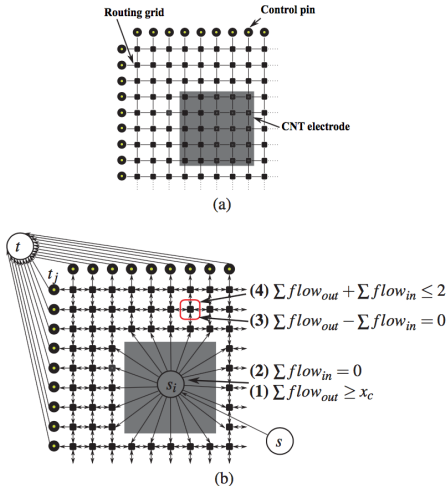
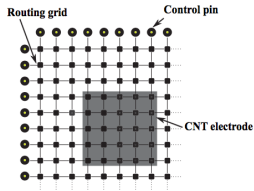


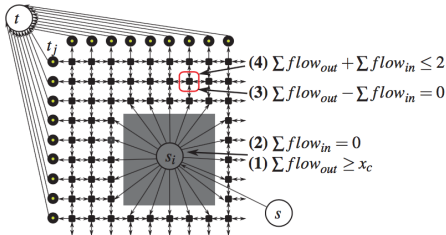
Figure 8: Network flow formulation: (a) top-left corner of the P-DMFB with one CNT electrode, and (b) the corresponding network flow graph.

# Algorithm



(a)

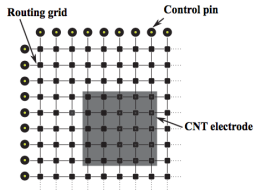
- cost of flow network



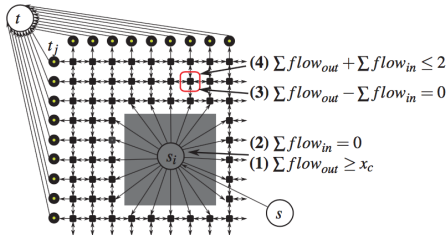
(b)

Figure 8: Network flow formulation: (a) top-left corner of the P-DMFB with one CNT electrode, and (b) the corresponding network flow graph.

# Algorithm



(a)



(b)

Figure 8: Network flow formulation: (a) top-left corner of the P-DMFB with one CNT electrode, and (b) the corresponding network flow graph.

- cost of flow network
- DFS

# Algorithm

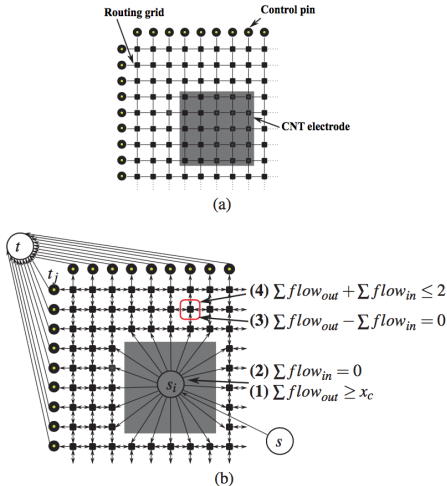


Figure 8: Network flow formulation: (a) top-left corner of the P-DMFB with one CNT electrode, and (b) the corresponding network flow graph.

- cost of flow network
- DFS
- modify costs of network

# Algorithm

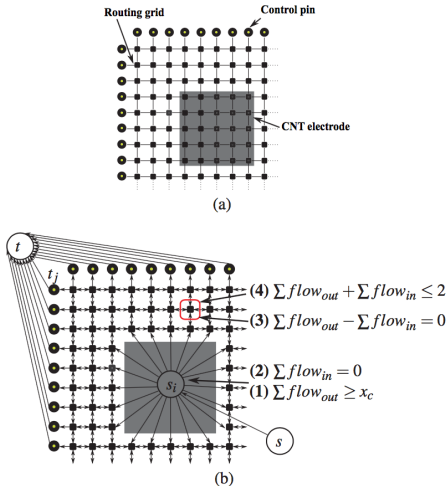


Figure 8: Network flow formulation: (a) top-left corner of the P-DMFB with one CNT electrode, and (b) the corresponding network flow graph.

- cost of flow network
- DFS
- modify costs of network
- strategy design pattern

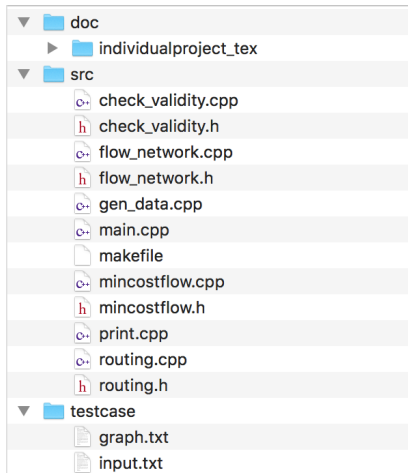
# Features

Besides the main problem, the project has some other features:

- a class to check the validity of the result
- command-line arguments to make size of electrodes and spaces changeable
- a visualization program using OpenGL.

# Overview

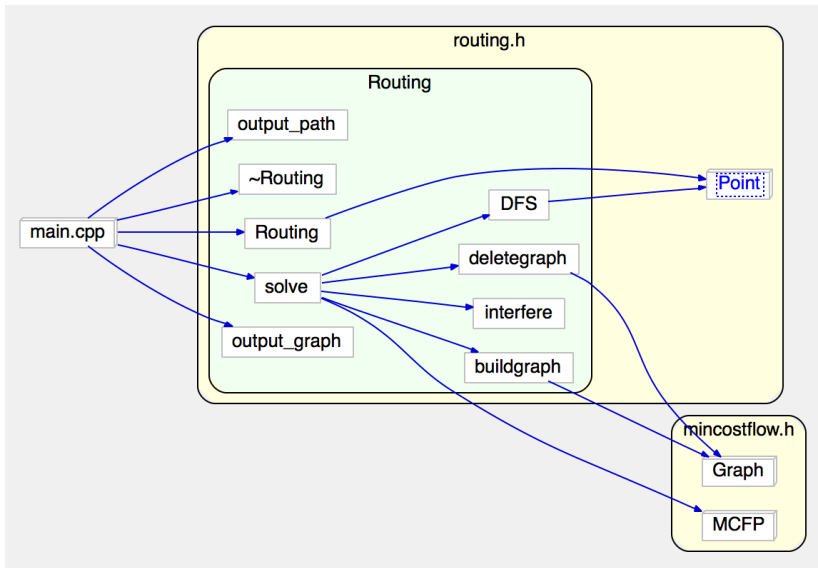
Overview of the whole project.



# Call Graph



# Call Graph



# Demo

# Statistics

# Statistics

**Table:** Table of 20 testcases results

testcase	n	m	routed number	total wirelength	time
1	15	15	192	3548	3.61
2	16	16	205	3795	3.78
3	17	17	224	4035	3.39
4	18	18	243	4349	3.42
5	19	19	257	4500	5.37
6	20	20	269	4564	6.95
7	21	21	290	5025	5.73
8	22	22	305	5206	5.14
9	23	23	315	5295	9.98
10	24	24	336	5758	9.38

# Statistics

**Table:** Table of 20 testcases results

testcase	n	m	routed number	total wirelength	time
11	25	25	354	6091	12.11
12	26	26	374	6426	9.25
13	27	27	386	6508	14.34
14	28	28	400	6859	21.91
15	29	29	417	7017	21.03
16	30	30	432	7309	25.92
17	10	20	180	3378	6.52
18	10	25	223	4325	7.71
19	10	30	272	5175	5.01
20	20	30	352	6001	14.95

# Thank you for listening.