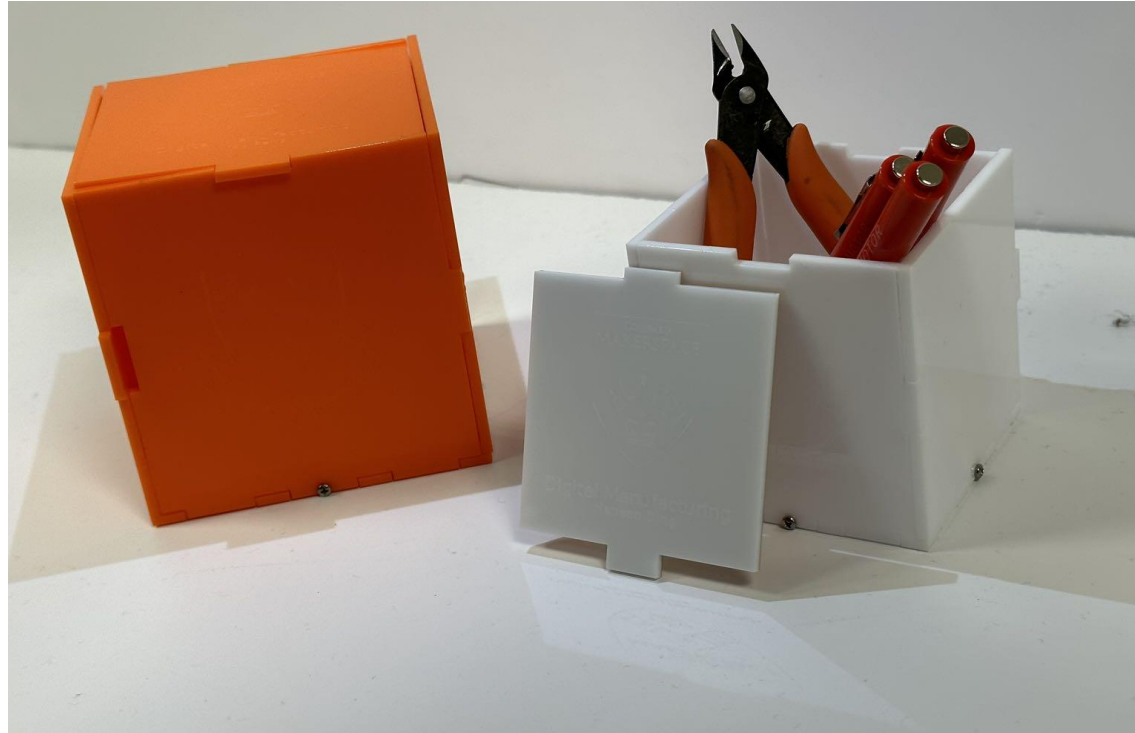


MECE4606 Digital Manufacturing Assignment 1 - Laser Cut Desk Organizer

Hansen Ding (hd2521), Yibo Peng (yp2644)

2/12/2023 19:00

Grace Hour: $96 + 5 = 101\text{h}$





The software we wrote includes only two variables, which are length and width, since we were to design a cube which height is equal to all lengths and widths. The overall idea come from our interpretation of nuts and bolts. Since the sizes of nuts and bolts, and thickness of the acrylic board are fixed, we set them as a constant numbers instead of variables. Hence, when we are changing the side lengths of the box, the side to bolt ratio will not change along.

The implementation of of the code is through “polygon” command. We draw our design on a sheet of paper first, and then calculate the location of each point. For example, the first point started at origin and goes around to form a square, then the point locations would be “0,0 x,0 x,y 0,y, 0,0”. Then we add all other features like nuts and bolts and acrylic thickness in constant number to get a 2D pattern of our final design.

If we want a different sized box, we only change X and Y value in define line. As we generate a svg file and convert into dxf file, and put into the AutoCAD, we measure the size of the bolts and then scale the box to a applicable size then laser cut it.

```
laser_cut_final.m x +
1      close all; clc;
2      % Define the size of the rectangle
3      x = 400;
4      y = 400;
5      t = 12.5;
6      l = 37.5;
7      w = 18.75;
8      h = 6.25;
9      r = 4.3;
10     % Open a new file for writing
11     fid = fopen('parttwo.svg', 'w');
12
13     % Write the header information for the SVG file
14     fprintf(fid, '<?xml version="1.0" encoding="UTF-8" standalone="no"?>\n');
15     fprintf(fid, '<!DOCTYPE svg PUBLIC "-//W3C//DTD SVG 1.1//EN"\n');
16     fprintf(fid, ' "http://www.w3.org/Graphics/SVG/1.1/DTD/svg11.dtd">\n\n');
17
18     % Define the dimensions of the plot
19     fprintf(fid, '<svg width="1800" height="1200"\n');
20     fprintf(fid, ' xmlns="http://www.w3.org/2000/svg">\n\n');
```

We didn't have an external dialog in command window to change different size, instead, we did it in the define line in our code. X and Y are desired size of length and width, T L W H R are respectively the thickness of our acrylic board, which is $\frac{1}{8}$ inch, and other necessary location of nuts and bolts

lase_cut_final.m * x +

```
1 close all; clc;
2 % Define the size of the rectangle
3 x = 400;
4 y = 400;
5 t = 12.5;
6 l = 37.5;
7 w = 18.75;
8 h = 6.25;
9 r = 4.3;
10 % Open a new file for writing
11 fid = fopen('parttwo.svg', 'w');
12
13 % Write the header information for the SVG file
14 fprintf(fid, '<?xml version="1.0" encoding="UTF-8" standalone="no"?>\n');
15 fprintf(fid, '<!DOCTYPE svg PUBLIC "-//W3C//DTD SVG 1.1//EN"\n');
16 fprintf(fid, ' "http://www.w3.org/Graphics/SVG/1.1/DTD/svg11.dtd">\n\n');
17
18 % Define the dimensions of the plot
19 fprintf(fid, '<svg width="1800" height="1200"\n');
20 fprintf(fid, ' xmlns="http://www.w3.org/2000/svg">\n\n');
21
22 % Draw
23
24 %1
25 %rect
26 fprintf(fid, '<polyline points="%2f,%2f %2f,%2f %2f,%2f %2f,%2f %2f,%2f"', 0,0,x,0,x,
27 fprintf(fid, 'fill= "none" stroke="black" stroke width="2"/>\n');
28 %small rect top
29 fprintf(fid, '<polyline points="%2f,%2f %2f,%2f %2f,%2f %2f,%2f"', 0.1*x,0,0.1*x,t,0.3*
30 fprintf(fid, 'fill= "none" stroke="black" stroke width="2"/>\n');
31
32 fprintf(fid, '<polyline points="%2f,%2f %2f,%2f %2f,%2f %2f,%2f"', 0.7*x,0,0.7*x,t,0.9*
33 fprintf(fid, 'fill="none" stroke="black" stroke width="2"/>\n');
34
35 fprintf(fid, '<polyline points="%2f,%2f %2f,%2f %2f,%2f %2f,%2f"', 0.4*x,0,0.4*x,t,0.6*
36 fprintf(fid, 'fill="none" stroke="black" stroke width="2"/>\n');
```

Result Size: 1265 x 1233

Get your own website

On the left we set both X and Y to 400, it will generate a square, which is also one of the two box-shaped organizers we have printed out eventually

laser_cut_final.m * +

Result Size: 1265 x 1233

Get your own website

```

1  close all; clc;
2  % Define the size of the rectangle
3  x = 300;
4  y = 300;
5  t = 12.5;
6  l = 37.5;
7  w = 18.75;
8  h = 6.25;
9  r = 4.3;
10 % Open a new file for writing
11 fid = fopen('parttwo.svg', 'w');
12
13 % Write the header information for the SVG file
14 fprintf(fid, '<?xml version="1.0" encoding="UTF-8" standalone="no"?>\n');
15 fprintf(fid, '<!DOCTYPE svg PUBLIC "-//W3C//DTD SVG 1.1//EN"\n');
16 fprintf(fid, ' "http://www.w3.org/Graphics/SVG/1.1/DTD/svg11.dtd">\n\n');
17
18 % Define the dimensions of the plot
19 fprintf(fid, '<svg width="1800" height="1200"\n');
20 fprintf(fid, ' xmlns="http://www.w3.org/2000/svg">\n\n');
21
22 % Draw
23
24 %1
25 %rect
26 fprintf(fid, '<polyline points="%2f,%2f %2f,%2f %2f,%2f %2f,%2f %2f,%2f"', 0,0,x,0,x,
27 fprintf(fid, 'fill= "none" stroke="black" stroke width="2"/>\n');
28 %small rect top
29 fprintf(fid, '<polyline points="%2f,%2f %2f,%2f %2f,%2f %2f,%2f"', 0.1*x,0,0.1*x,t,0.3*
30 fprintf(fid, 'fill= "none" stroke="black" stroke width="2"/>\n');
31
32 fprintf(fid, '<polyline points="%2f,%2f %2f,%2f %2f,%2f %2f,%2f"', 0.7*x,0,0.7*x,t,0.9*
33 fprintf(fid, 'fill="none" stroke="black" stroke width="2"/>\n');
34
35 fprintf(fid, '<polyline points="%2f,%2f %2f,%2f %2f,%2f %2f,%2f"', 0.4*x,0,0.4*x,t,0.6*
36 fprintf(fid, 'fill="none" stroke="black" stroke width="2"/>\n');

```

On the left we set both X and Y to 300 which is another box that we printed out, it will generate a same cube organizer with smaller dimensions, however, since we have already set “t” as the thickness of the acrylic board, “l” “w” “h” “r” as the dimensions of nuts and bolts, so even if we have changed X and Y dimensions, it changed the generated box size without changing the nuts and bolts size

laser_cut_final.m * +

1

close all; clc;

2

% Define the size of the rectangle

3

x = 300;

4

y = 500;

5

t = 12.5;

6

l = 37.5;

7

w = 18.75;

8

h = 6.25;

9

r = 4.3;

10

% Open a new file for writing

11

fid = fopen('parttwo.svg', 'w');

12

13

% Write the header information for the SVG file

14

fprintf(fid, '<?xml version="1.0" encoding="UTF-8" standalone="no"?>\n');

15

fprintf(fid, '<!DOCTYPE svg PUBLIC "-//W3C//DTD SVG 1.1//EN"\n');

16

fprintf(fid, ' "http://www.w3.org/Graphics/SVG/1.1/DTD/svg11.dtd">\n\n');

17

18

% Define the dimensions of the plot

19

fprintf(fid, '<svg width="1800" height="1200"\n');

20

fprintf(fid, ' xmlns="http://www.w3.org/2000/svg">\n\n');

21

22

% Draw

23

24

%1

25

%rect

26

fprintf(fid, '<polyline points="%.2f,%.2f %.2f,%.2f %.2f,%.2f %.2f,%.2f"', 0,0,x,0,x,)

27

fprintf(fid, 'fill= "none" stroke="black" stroke width="2"/>\n');

28

%small rect top

29

fprintf(fid, '<polyline points="%.2f,%.2f %.2f,%.2f %.2f,%.2f %.2f,%.2f "', 0.1*x,0,0.1*x,t,0.3*

30

fprintf(fid, 'fill= "none" stroke="black" stroke width="2"/>\n');

31

32

fprintf(fid, '<polyline points="%.2f,%.2f %.2f,%.2f %.2f,%.2f %.2f,%.2f "', 0.7*x,0,0.7*x,t,0.9*

33

fprintf(fid, 'fill="none" stroke="black" stroke width="2"/>\n');

34

35

fprintf(fid, '<polyline points="%.2f,%.2f %.2f,%.2f %.2f,%.2f %.2f,%.2f "', 0.4*x,0,0.4*x,t,0.6*

36

fprintf(fid, 'fill="none" stroke="black" stroke width="2"/>\n');

Result Size: 1265 x 1233

Get your own website

We tried another dimension of a rectangular. This time we adjusted the X and Y to 300 and 500; it turned out to be a rectangular box instead of a cube

laser_cut_final.m * +

Result Size: 1265 x 1233 [Get your own website](#)

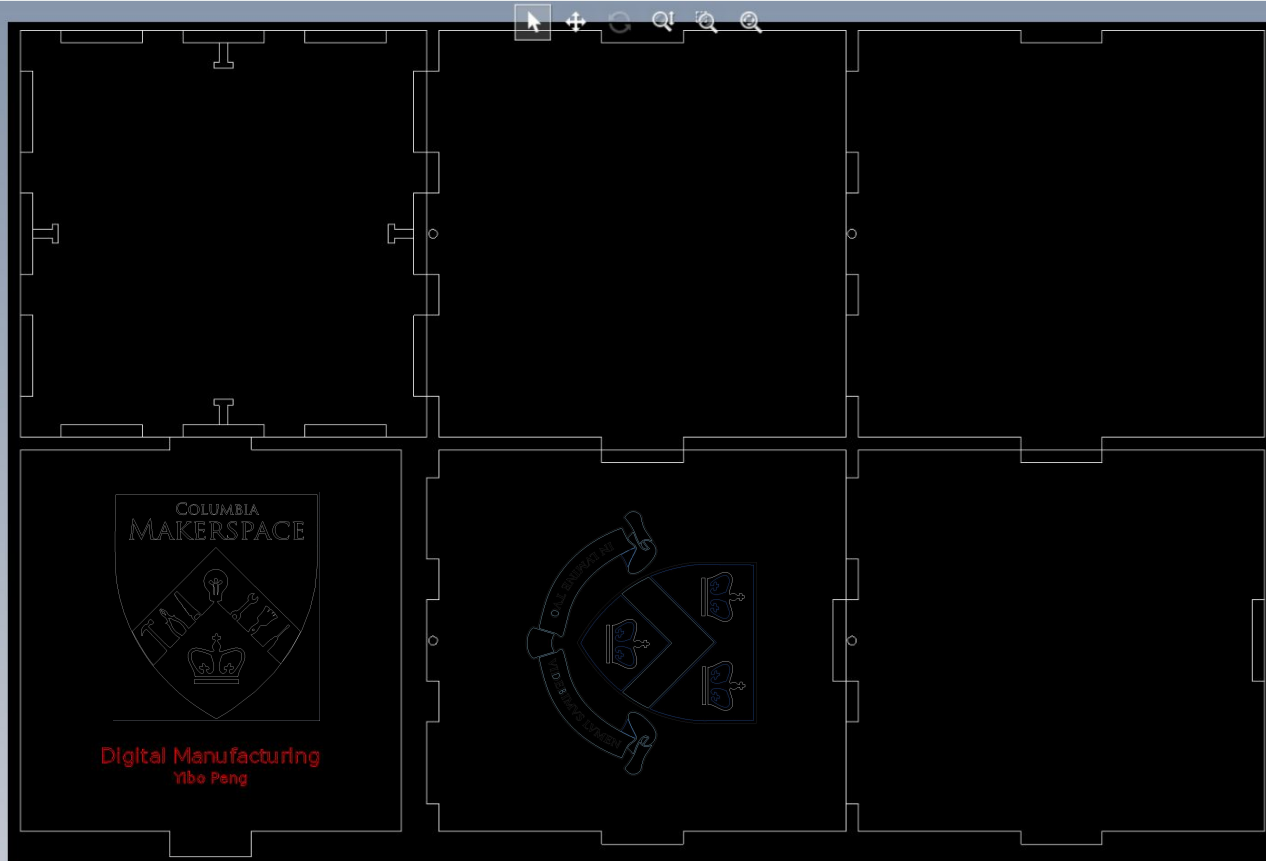
```

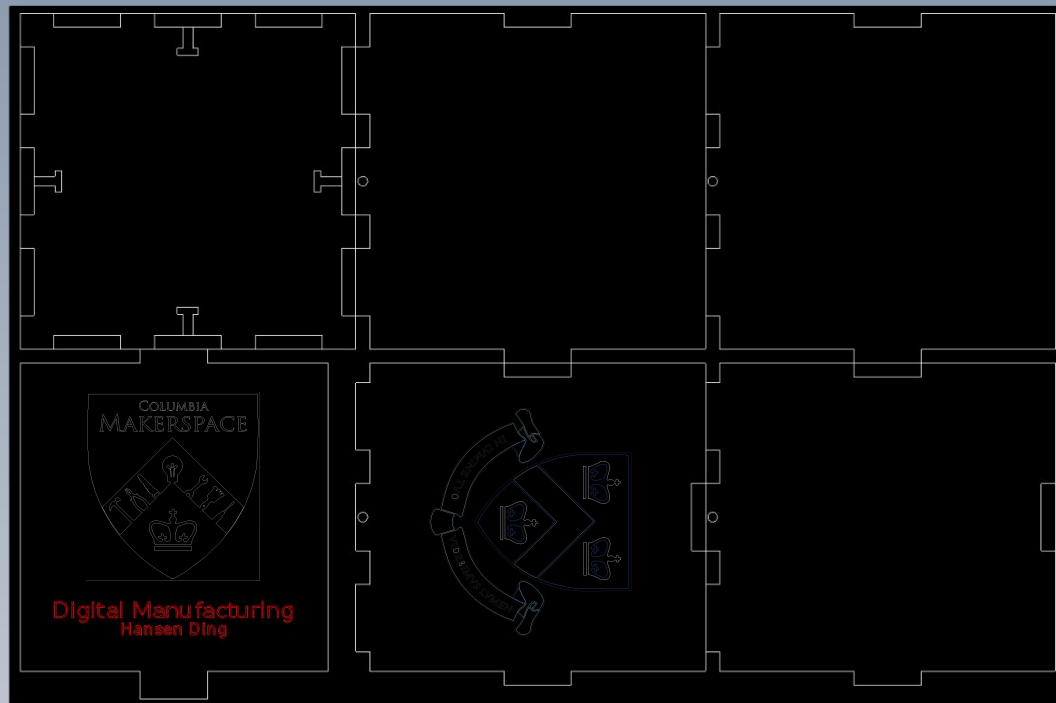
1  close all; clc;
2  % Define the size of the rectangle
3  x = 400;
4  y = 300;
5  t = 12.5;
6  l = 37.5;
7  w = 18.75;
8  h = 6.25;
9  r = 4.3;
10 % Open a new file for writing
11 fid = fopen('parttwo.svg', 'w');
12
13 % Write the header information for the SVG file
14 fprintf(fid, '<?xml version="1.0" encoding="UTF-8" standalone="no"?>\n');
15 fprintf(fid, '<!DOCTYPE svg PUBLIC "-//W3C//DTD SVG 1.1//EN"\n');
16 fprintf(fid, ' "http://www.w3.org/Graphics/SVG/1.1/DTD/svg11.dtd">\n\n');
17
18 % Define the dimensions of the plot
19 fprintf(fid, '<svg width="1800" height="1200"\n');
20 fprintf(fid, ' xmlns="http://www.w3.org/2000/svg">\n\n');
21
22 % Draw
23
24 %1
25 %rect
26 fprintf(fid, '<polyline points="%2f,%2f %2f,%2f %2f,%2f %2f,%2f"', 0,0,x,0,x,);
27 fprintf(fid, 'fill= "none" stroke="black" stroke width="2"/>\n');
28 %small rect top
29 fprintf(fid, '<polyline points="%2f,%2f %2f,%2f %2f,%2f %2f,%2f"', 0.1*x,0,0.1*x,t,0.3*);
30 fprintf(fid, 'fill= "none" stroke="black" stroke width="2"/>\n');
31
32 fprintf(fid, '<polyline points="%2f,%2f %2f,%2f %2f,%2f %2f,%2f"', 0.7*x,0,0.7*x,t,0.9*);
33 fprintf(fid, 'fill="none" stroke="black" stroke width="2"/>\n');
34
35 fprintf(fid, '<polyline points="%2f,%2f %2f,%2f %2f,%2f %2f,%2f"', 0.4*x,0,0.4*x,t,0.6*);
36 fprintf(fid, 'fill="none" stroke="black" stroke width="2"/>\n');

```

This is another rectangular box, with length of 400 and width of 300

Printouts of desired product





Organizer I



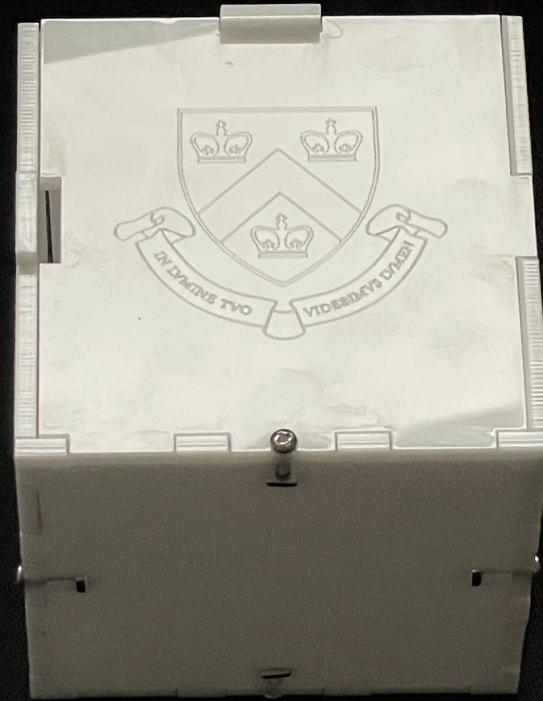
Organizer II



Top View



Front View



On the top we have engraved MakerSpace logo, digital manufacturing topic, and designer's name (The orange box has "Yibo Peng" as designer)
On the front we have engraved Columbia University logo
All engravings are a little shallow and relatively harder to see compared to transparent material

Points Achieved: 120Pt

1. 10pt Cover page correct and complete
2. 10pt Software inputs length, width and height of container and detects errors (show input dialog)
3. 10pt A description of the software you wrote – calculation steps, formulas, conditions.
4. 20pt Four examples showing input parameters and output flat pattern.
5. 20pt Printout of the two SVG files and photo of containers they produced
6. 10pt User-specified text engraved on the top of the container
7. 10pt User-specified text engraved on the front of the container
8. 10pt Columbia logo and “Digital Manufacturing” engraved on the front of the container
9. 10pt a lid to cover the container
10. 10pt container image posted on Ed at least 24h day before the deadline (show screenshot)

Desk Organizer #75

 Hansen Ding
23 hours ago in Assignments - A1

★ 45
STAR WATCHING VIEWS

 This is our group's desk organizer. We used colored acrylic. The engraving seems a little shallow somehow.



Comment Edit Delete ...

Appendix 1: Matlab Code

```
% include all; clc;  
% Define the size of the rectangle  
x = 400;  
y = 400;  
t = 12.5;  
l = 37.5;  
w = 18.75;  
h = 6.25;  
r = 4.3;  
  
% Open a new file for writing  
fid = fopen('parttwo.svg','w');  
% Write the header information for the SVG file  
fprintf(fid,'<?xml version="1.0" encoding="UTF-8" standalone="no"?>\n');  
fprintf(fid,'<!DOCTYPE svg PUBLIC "-//W3C//DTD SVG 1.1/EN"\n');  
fprintf(fid,'"http://www.w3.org/Graphics/SVG/1.1/DTD/svg11.dtd">\n\n');  
% Define the dimensions of the plot  
fprintf(fid,'%svg width="1800" height="1200"\n');  
fprintf(fid,'"xmlns="http://www.w3.org/2000/svg">\n\n\n');  
% Draw  
!1  
#rect  
fprintf(fid,'<polygon points="%.2f,%.2f %.2f,%.2f %.2f,%.2f %.2f,%.2f %.2f"%\n',0,0,x,0,y,t,0);  
fprintf(fid,'fill= "none" stroke="black" stroke width="2"/>\n');  
%small rect top  
fprintf(fid,'<polygon points="%.2f,%.2f %.2f,%.2f %.2f,%.2f %.2f,%.2f "%\n',0,1*x,0,0.1*y,t,0.3*x,t,0.3*x,0);  
fprintf(fid,'fill= "none" stroke="black" stroke width="2"/>\n');  
fprintf(fid,'<polygon points="%.2f,%.2f %.2f,%.2f %.2f,%.2f %.2f,%.2f "%\n',0,0.7*x,0,0.7*t,0.9*x,t,0.9*x,0);  
fprintf(fid,'fill="none" stroke="black" stroke width="2"/>\n');  
fprintf(fid,'<polygon points="%.2f,%.2f %.2f,%.2f %.2f,%.2f %.2f,%.2f "%\n',0,0.4*x,0,0.4*y,t,0.6*x,t,0.6*x,0);  
fprintf(fid,'fill="none" stroke="black" stroke width="2"/>\n');  
%small connect top  
fprintf(fid,'<polygon points="%.2f,%.2f %.2f,%.2f %.2f,%.2f %.2f,%.2f %.2f,%.2f %.2f,%\n',0.5*x-x,r,t,0.5*x-r,l-h,0.5*x-0.5*w,l-h,0.5*x-0.5*w,l,0.5*x+0.5*w,l,0.5*x+0.5*w,l-h,0.5*x+r,\nl-h,0.5*x+r,t);  
fprintf(fid,'fill="none" stroke="black" stroke width="2"/>\n');  
%small rect left  
fprintf(fid,'<polygon points="%.2f,%.2f %.2f,%.2f %.2f,%.2f %.2f,%.2f "%\n',0,0.1*y,t,0.1*y,t,0.3*y,0,0.3*y);  
fprintf(fid,'fill="none" stroke="black" stroke width="2"/>\n');  
fprintf(fid,'<polygon points="%.2f,%.2f %.2f,%.2f %.2f,%.2f %.2f,%.2f "%\n',0,0.7*y,t,0.7*y,t,0.9*y,0,0.9*y);  
fprintf(fid,'fill="none" stroke="black" stroke width="2"/>\n');  
fprintf(fid,'<polygon points="%.2f,%.2f %.2f,%.2f %.2f,%.2f %.2f,%.2f "%\n',0,0.4*y,t,0.4*y,t,0.6*y,0,0.6*y);  
fprintf(fid,'fill="none" stroke="black" stroke width="2"/>\n');  
%small connect left  
fprintf(fid,'<polygon points="%.2f,%.2f %.2f,%.2f %.2f,%.2f %.2f,%.2f %.2f,%.2f %.2f,%\n',0.5*y-y,r,-l,h,0.5*y-r,l-h,0.5*y-0.5*w,l,0.5*y-0.5*w,l,0.5*y+0.5*w,l-h,0.5*y+0.5*\nw,fid,'<polygon points="%.2f,%.2f %.2f,%.2f %.2f,%.2f %.2f,%.2f %.2f,%.2f %%\n',0.5*x-r,\ny-t,0.5*x-r,y-l+h,0.5*x-0.5*w,y-l+h,0.5*x-0.5*w,y-l,0.5*x+0.5*w,y-l,0.5*x+\ny-t);\nfid,'fill="none" stroke="black" stroke width="2"/>\n');\n%small rect right\nfid,'<polygon points="%.2f,%.2f %.2f,%.2f %.2f,%.2f %.2f,%.2f "%\n',x,0.1*y,x-t,0.1*y,x-t,0.3*y,x,0.3*y);\nfid,'fill="none" stroke="black" stroke width="2"/>\n');\nfid,'<polygon points="%.2f,%.2f %.2f,%.2f %.2f,%.2f %.2f,%.2f "%\n',x,0.7*y,x-t,0.7*y,x-t,0.9*y,x,0.9*y);\nfid,'fill="none" stroke="black" stroke width="2"/>\n');\nfid,'<polygon points="%.2f,%.2f %.2f,%.2f %.2f,%.2f %.2f,%.2f "%\n',x,0.4*y,x-t,0.4*y,x-t,0.6*y,x,0.6*y);\nfid,'fill="none" stroke="black" stroke width="2"/>\n');\n%small connect right\nfid,'<polygon points="%.2f,%.2f %.2f,%.2f %.2f,%.2f %.2f,%.2f %.2f,%.2f %%\n',x-t,0.5*y-r,x-l+h,0.5*y-r,x-l+h,0.5*y-0.5*w,x-l,0.5*y-0.5*w,x-l,0.5*y+0.5*w,x-l+h,\n0.5*y+0.5*w,x-l+h,0.5*y+r,x-t,0.5*y+r);\nfid,'fill="none" stroke="black" stroke width="2"/>\n');\n%2\n%polylines\nfid,'<polygon points="%.2f,%.2f %.2f,%.2f %.2f,%.2f %.2f,%.2f %.2f,%.2f %%\n',0.5*x-r,t,0.5*x-r,l-h,0.5*x-0.5*w,l-h,0.5*x-0.5*w,l,0.5*x+0.5*w,l,0.5*x+0.5*w,l-h,0.5*x+r,\nt,0.7*y,x,0.7*y,x,0.9*y,x+t,0.9*y,x+t,y);\nfid,'fill="none" stroke="black" stroke width="2"/>\n');\nfid,'<polygon points="%.2f,%.2f %.2f,%.2f %.2f,%.2f %.2f,%.2f %.2f,%.2f %%\n',x+t,y,1.4*x+t,y,1.4*x+t,y+t,1.6*x+t,y+t,1.6*x+t,y,2*x+t,0.1.6*x+t,0.1.6*x+t,t,1.4*\nx+t,t,1.4*x+t,0,x+t,0);\nfid,'fill="none" stroke="black" stroke width="2"/>\n');\nfid,'<circle cx=%.2f cy=%.2f r=%.2f" stroke="black" stroke width="2"\nfill="none" />',x+0.5*t,0.5*y,r);\n%3\n%polylines\nfid,'<polygon points="%.2f,%.2f %.2f,%.2f %.2f,%.2f %.2f,%.2f %.2f,%.2f %%\n',x+t+x+t,0,x+t+x+t,0.1*y,x+x+t,0.1*y,x+x+t,0.3*y,x+t+x+t,0.3*y,x+t+x+t,0.4*y,x+x+t,0.4*y,x+\nx+t,0.6*y,x+t+x+t,0.6*y,x+t+x+t,0.7*y,x+x+t,0.7*y,x+x+t,0.9*y,x+t+x+t,0.9*y,x+t+x+t,y);\nfid,'fill="none" stroke="black" stroke width="2"/>\n');
```

[illegible]

Appendix 2: SVG Printout Yibo Peng

```
<?xml version="1.0" encoding="UTF-8" standalone="no"?>
<!DOCTYPE svg PUBLIC "-//W3C//DTD SVG 1.1//EN"
"http://www.w3.org/Graphics/SVG/1.1/DTD/svg11.dtd">

<svg width="1800" height="1200"
xmlns="http://www.w3.org/2000/svg">

<polyline points="0.00,0.00 400.00,0.00 400.00,400.00 0.00,400.00 0.00,0.00"fill= "none"
stroke="black" stroke width="2"/>
<polyline points="40.00,0.00 40.00,12.50 120.00,12.50 120.00,0.00 "fill= "none" stroke="black"
stroke width="2"/>
<polyline points="280.00,0.00 280.00,12.50 360.00,12.50 360.00,0.00 "fill="none" stroke="black"
stroke width="2"/>
<polyline points="160.00,0.00 160.00,12.50 240.00,12.50 240.00,0.00 "fill="none" stroke="black"
stroke width="2"/>
<polyline points="195.70,12.50 195.70,31.25 190.62,31.25 190.62,37.50 209.38,37.50 209.38,31.25
204.30,31.25 204.30,12.50"fill="none" stroke="black" stroke width="2"/>
<polyline points="0.00,40.00 0.00,12.50 40.00,12.50 120.00 0.00,120.00 "fill="none" stroke="black"
stroke width="2"/>
<polyline points="0.00,280.00 12.50,280.00 12.50,360.00 0.00,360.00 "fill="none" stroke="black"
stroke width="2"/>
<polyline points="0.00,160.00 12.50,160.00 12.50,240.00 0.00,240.00 "fill="none" stroke="black"
stroke width="2"/>
<polyline points="12.50,195.70 31.25,195.70 31.25,190.62 37.50,190.62 37.50,209.38 31.25,209.38
31.25,204.30 12.50,204.30"fill="none" stroke="black" stroke width="2"/>
<polyline points="40.00,400.00 40.00,387.50 120.00,387.50 120.00,400.00 "fill= "none"
stroke="black" stroke width="2"/>
<polyline points="280.00,400.00 280.00,387.50 360.00,387.50 360.00,400.00 "fill="none"
stroke="black" stroke width="2"/>
<polyline points="160.00,400.00 160.00,387.50 240.00,387.50 240.00,400.00 "fill="none"
stroke="black" stroke width="2"/>
<polyline points="195.70,387.50 195.70,368.75 190.62,368.75 190.62,362.50 209.38,362.50
209.38,368.75 204.30,368.75 204.30,387.50"fill="none" stroke="black" stroke width="2"/>
<polyline points="400.00,40.00 387.50,40.00 387.50,120.00 400.00,120.00 "fill="none"
stroke="black" stroke width="2"/>
<polyline points="400.00,280.00 387.50,280.00 387.50,360.00 400.00,360.00 "fill="none"
stroke="black" stroke width="2"/>
<polyline points="400.00,160.00 387.50,160.00 387.50,240.00 400.00,240.00 "fill="none"
stroke="black" stroke width="2"/>
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Appendix 2: SVG Printout Hansen Ding

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