

**Department of Computer Science &Engineering(CSE)**

**LAB – 11**

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Course Code : CSE-4742

Course Title : Computer Graphics Lab

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**clipping a polygon using Sutherland-Hodgman :**

#include<bits/stdc++.h>

#include<conio.h>

#include<graphics.h>

using namespace std;

#define round(a) ((int)(a+0.5))

int k;

float xmin,ymin,xmax,ymax,arr[20],m;

void clipl(float x1,float y1,float x2,float y2)

{

if(x2-x1)

m=(y2-y1)/(x2-x1);

else

m=100000;

if(x1 >= xmin && x2 >= xmin)

{

arr[k]=x2;

arr[k+1]=y2;

k+=2;

}

if(x1 < xmin && x2 >= xmin)

{

arr[k]=xmin;

arr[k+1]=y1+m\*(xmin-x1);

arr[k+2]=x2;

arr[k+3]=y2;

k+=4;

}

if(x1 >= xmin && x2 < xmin)

{

arr[k]=xmin;

arr[k+1]=y1+m\*(xmin-x1);

k+=2;

}

}

void clipt(float x1,float y1,float x2,float y2)

{

if(y2-y1)

m=(x2-x1)/(y2-y1);

else

m=100000;

if(y1 <= ymax && y2 <= ymax)

{

arr[k]=x2;

arr[k+1]=y2;

k+=2;

}

if(y1 > ymax && y2 <= ymax)

{

arr[k]=x1+m\*(ymax-y1);

arr[k+1]=ymax;

arr[k+2]=x2;

arr[k+3]=y2;

k+=4;

}

if(y1 <= ymax && y2 > ymax)

{

arr[k]=x1+m\*(ymax-y1);

arr[k+1]=ymax;

k+=2;

}

}

void clipr(float x1,float y1,float x2,float y2)

{

if(x2-x1)

m=(y2-y1)/(x2-x1);

else

m=100000;

if(x1 <= xmax && x2 <= xmax)

{

arr[k]=x2;

arr[k+1]=y2;

k+=2;

}

if(x1 > xmax && x2 <= xmax)

{

arr[k]=xmax;

arr[k+1]=y1+m\*(xmax-x1);

arr[k+2]=x2;

arr[k+3]=y2;

k+=4;

}

if(x1 <= xmax && x2 > xmax)

{

arr[k]=xmax;

arr[k+1]=y1+m\*(xmax-x1);

k+=2;

}

}

void clipb(float x1,float y1,float x2,float y2)

{

if(y2-y1)

m=(x2-x1)/(y2-y1);

else

m=100000;

if(y1 >= ymin && y2 >= ymin)

{

arr[k]=x2;

arr[k+1]=y2;

k+=2;

}

if(y1 < ymin && y2 >= ymin)

{

arr[k]=x1+m\*(ymin-y1);

arr[k+1]=ymin;

arr[k+2]=x2;

arr[k+3]=y2;

k+=4;

}

if(y1 >= ymin && y2 < ymin)

{

arr[k]=x1+m\*(ymin-y1);

arr[k+1]=ymin;

k+=2;

}

}

int main()

{

int gdriver=DETECT,gmode,n,poly[20];

float xi,yi,xf,yf,polyy[20];

int i;

getch();

system("clear");

cout<<"Coordinates of rectangular clip window :\nxmin,ymin :";

cin>>xmin>>ymin;

cout<<"xmax,ymax :";

cin>>xmax>>ymax;

cout<<"\n\nPolygon to be clipped :\nNumber of sides :";

cin>>n;

cout<<"Enter the coordinates :";

for(int i=0;i < 2\*n;i++)

cin>>polyy[i];

polyy[i]=polyy[0];

polyy[i+1]=polyy[1];

for(i=0;i < 2\*n+2;i++)

poly[i]=round(polyy[i]);

initgraph(&gdriver,&gmode,"C:\\TC\\BGI");

setcolor(RED);

rectangle(xmin,ymax,xmax,ymin);

cout<<"\t\tUNCLIPPED POLYGON";

setcolor(WHITE);

fillpoly(n,poly);

getch();

cleardevice();

k=0;

for(i=0;i < 2\*n;i+=2)

clipl(polyy[i],polyy[i+1],polyy[i+2],polyy[i+3]);

n=k/2;

for(i=0;i < k;i++)

polyy[i]=arr[i];

polyy[i]=polyy[0];

polyy[i+1]=polyy[1];

k=0;

for(i=0;i < 2\*n;i+=2)

clipt(polyy[i],polyy[i+1],polyy[i+2],polyy[i+3]);

n=k/2;

for(i=0;i < k;i++)

polyy[i]=arr[i];

polyy[i]=polyy[0];

polyy[i+1]=polyy[1];

k=0;

for(i=0;i < 2\*n;i+=2)

clipr(polyy[i],polyy[i+1],polyy[i+2],polyy[i+3]);

n=k/2;

for(i=0;i < k;i++)

polyy[i]=arr[i];

polyy[i]=polyy[0];

polyy[i+1]=polyy[1];

k=0;

for(i=0;i < 2\*n;i+=2)

clipb(polyy[i],polyy[i+1],polyy[i+2],polyy[i+3]);

for(i=0;i < k;i++)

poly[i]=round(arr[i]);

if(k)

fillpoly(k/2,poly);

setcolor(RED);

rectangle(xmin,ymax,xmax,ymin);

cout<<"\tCLIPPED POLYGON";

getch();

closegraph();

}