```
#include "15W4Kxxxx.h"
#include "oled.c"
#include "bmp.h"
sbit l=P0^4;
sbit r=P5^2;
int ls;
int rs;
int n;
int wall=0;
int xh=0;
int yh=0;
void delay1s(void);
int length=4;
int i;
int flag=1;
int n=0;
int count=0;
sbit p70=P7^0;
sbit p71=P7^1;
sbit p72=P7^2;
sbit p73=P7^3;
unsigned char p_m;
unsigned char m_m;
unsigned char i_m=0;
unsigned char n_m=0;
unsigned char code
    xiaoge[]={0x2c,0x18,0x2c,0x48,0x27,0x18,0x2c,0x24,0x32,0xc,0x35,0x18,0x3b,0x18,0x43,
  0x48,0x3b,0x18,0x59,0x30,0xff,0xff,0xff,0xff,0xff,0x59,0x18,0x4f,0x30,0x59,0x30,0x43,0x24,0x35,0xc,
  0x2c,0x18,0x35,0x18,0x27,0x90,0xff,0xff,0xff,0xff,0xff,0xff,0xff,0xff,0xff,0xff,0x2c,0x48,0x27,0x18,
  0x2c,0x30,0x35,0x24,0x43,0xc,0x3b,0x30,0x35,0x18,0x2c,0x18,0x3b,0x30,0xff,0xff,0xff,0xff,0xff,0x2c,
  0x18,0x2c,0x30,0x27,0x18,0x2c,0x24,0x32,0xc,0x35,0x18,0x3b,0x18,0x43,0x24,0x43,0xc,0x43,0x18,0x3b,
  0x18,0x59,0x30,0xff,0xff,0xff,0xff,0xff,0x4f,0x30,0x59,0x18,0x59,0x18,0x43,0x24,0x35,0xc,0x2c,0x18,
  0x27,0x18,0x35,0x90,0xff,0xff,0xff,0xff,0xff,0xff,0xff,0xff,0xff,0xff,0x2c,0x18,0x2c,0x30,0x27,0x18,
  0x2c,0x48,0x35,0x18,0x3b,0x30,0x35,0x18,0x27,0x18,0x2c,0x30,0xff,0xff,0xff,0xff,0xff,0xff,0xff,0xff,
  0xff,0xff,0x35,0x30,0x35,0x18,0x35,0x18,0x35,0x18,0x35,0x30,0x35,0x18,0x3b,0x24,0x35,0xc,0x3b,0x18,
  0x43,0x18,0x4f,0x30,0xff,0xff,0xff,0xff,0xff,0x59,0x18,0x43,0x24,0x35,0xc,0x2c,0x18,0x27,0x18,0x2c,
  0x30,0xff,0xff,0xff,0xff,0xff,0xff,0xff,0xff,0xff,0xff,0x3b,0x24,0x35,0xc,0x3b,0x18,0x43,0x18,0x3b,
  0x30,0xff,0xff,0xff,0xff,0xff,0x59,0x18,0x35,0x24,0x35,0xc,0x35,0x18,0x35,0xc,0x3b,0x30,0x35,0x30,
  0x3b,0x24,0x35,0xc,0x3b,0x18,0x43,0x18,0x4f,0x30,0xff,0xff,0xff,0xff,0xff,0x59,0x18,0x2c,0x24,0x2c,
  0xc,0x2c,0x18,0x2c,0x18,0x27,0x30,0x27,0x18,0x27,0x18,0x2c,0x30,0x3b,0x30,0x2c,0x60,0x27,0x24,0x27,
  0xc,0x2c,0x18,0x27,0x18,0x35,0x30,0x3b,0x24,0x2c,0xc,0x35,0x18,0x43,0x18,0x3b,0x30,0x59,0x18,0xff,
  0xff,0xff,0xff,0xff,0xff,0xff,0xff,0xff,0xff,0x43,0x18,0xff,0xff,0xff,0xff,0xff,0xff,0xff,0xff,0xff,
  0xff,0x2c,0x18,0xff,0xff,0xff,0xff,0xff,0xff,0xff,0xff,0xff,0xff,0x35,0x18,0xff,0xff,0xff,0xff,0xff,
```

```
  0xff,0xff,0xff,0xff,0xff,0x3b,0x24,0x3b,0xc,0x27,0x30,0x2c,0x30,0xff,0xff,0xff,0xff,0xff,0xff,0xff,
  0xff,0xff,0xff,0x27,0x18,0x27,0x30,0x27,0x18,0x2c,0x30,0x27,0x30,0x2c,0x30,0x35,0x18,0x43,0x18,0x3b,
  0x30,0x4f,0x18,0x59,0x18,0x43,0x30,0xff,0xff,0xff,0xff,0xff,0xff,0xff,0xff,0xff,0xff,0xff,0x3b,0x30,0xff,
  0xff,0xff,0xff,0xff,0xff,0xff,0xff,0xff,0xff,0x35,0x30,0xff,0xff,0xff,0xff,0xff,0xff,0xff,0xff,0xff,0xff,
  0xff,0x2c,0x30,0xff,0xff,0xff,0xff,0xff,0xff,0xff,0xff,0xff,0xff,0xff,0x27,0x90,0x27,0x30,0x2c,0x90,0X00};
      //music
unsigned char code
    erquanyingyue[]={0x43,0x48,0x4f,0x24,0x43,0x24,0x35,0x48,0x35,0x24,0x3b,0x24,0x43,0x48,
  4f,0x24,0x43,0x36,0x3b,0x12,0x35,0x24,0x35,0x32,0x3b,0x48,0x43,0x36,0x43,0x12,0x4f,0x24,0x43,0x24,0x3b,
  0x24,0x35,0x24,0x35,0x24,0x59,0x120,0xff,0xff,0xff,0xff,0xff,0xff,0xff,0xff,0x35,0x9,0x2c,0x24,0xff,
  0xff,0xff,0xff,0x35,0x24,0x2c,0x24,0x27,0x24,0x2c,0x24,0x27,0x24,0x21,0x24,0x2c,0x6c,0x35,0x24,0x2c,
  0x24,0x2c,0x48,0x21,0x24,0x27,0x48,0x27,0x48,0x2c,0x24,0x27,0x24,0x2c,0x24,0x2c,0x24,0x35,0x6c,0x59,
  0x24,0x35,0x48,0x35,0x24,0x2c,0x24,0x3b,0x36,0x35,0x12,0x3b,0x24,0x43,0x24,0x4f,0x24,0x43,0x24,0x4f,
  0x48,0x43,0xfc,0x3b,0x24,0x35,0x24,0x2c,0x24,0x43,0x48,0x3b,0x24,0x2c,0x24,0x35,0x24,0x27,0x24,0x2c,
  0x120,0xff,0xff,0xff,0xff,0xff,0xff,0xff,0xff,0xff,0xff,0xff,0xff,0xff,0xff,0xff,0xff,0xff,0xff,0xff,
  0xff,0xff,0xff,0xff,0xff,0xff,0xff,0xff,0xff,0xff,0xff,0xff,0xff,0xff,0xff,0xff,0xff,0xff,0xff,0xff,
  0xff,0xff,0xff,0xff,0X00};
int direction=4;
int cordinate_X=9;
int cordinate_Y=5;
unsigned char x[50]={4,3,2,1};
unsigned char y[50]={2,2,2,2};
void move();
void key();
int rand();
void showscore();
void generate(int);
void timer_init();
void int0();
int j;
int judge();
void delay();
sbit s1=P0^0;sbit s2=P0^1;sbit s3=P0^2;sbit s4=P0^3;
int te;
sbit Beep=P0^6;
void delay_m(unsigned char);
void delayms_m(unsigned char a_m)
{
int temporary=100*a_m;
  while(--temporary);
}
unsigned char code
    seg7[16]={0xc0,0xf9,0xa4,0xb0,0x99,0x92,0x82,0xf8,0x80,0x98,0x88,0x83,0xc6,0xa1,0x86,0x82};//diaplay
```

```
    0123456789AbCdEF
int main(void)
{
P0M0=0X00;P0M1=0X00;
P5M0=0X00;P5M1=0X00;
P7M0=0X00;P7M1=0X00; //P7¶Ë¿ÚÄ£Ê½Éè¶¨
P1M0=0X00;P1M1=0X00; //P1¶Ë¿ÚÄ£Ê½Éè¶¨
P2M0=0X00;P2M1=0X00;
P4M0=0X1E;P4M1=0X00; //initiate number display
P0M0=0X00;P0M1=0X00;
P0M0=0x40;P0M1=0x00; //initiate beep
restart:OLED_Init();   //³õÊ¼»¯OLED
OLED_Clear();
timer_init();
OLED_ShowString(24,0,"select mode");
OLED_ShowString(10,2,"switch 0:fast");
OLED_ShowString(10,4,"switch 1:slow");
while(1)
{
  if(s1==0||s2==0)
  {
    if(s1==0)n=30;
    if(s2==0)n=60;
    break;
  }

}
OLED_ShowString(24,0,"select mode");
OLED_ShowString(10,2,"switch 2:wall");
OLED_ShowString(10,4,"switch 3: no wall");
while(1)
{
if(s3==0||s4==0)
  {
    if(s3==0)wall=1;
    if(s4==0)wall=0;
    break;
  }
}
OLED_Clear();
while(1)
{
```

```
OLED_Clear();
if(wall==1)
{
for(i=0;i<16;i++)
{OLED_DrawBMP(8*i,0,8*i+8,1,BMP9);OLED_DrawBMP(8*i,7,8*i+8,8,BMP9);}
for(i=0;i<8;i++)
{OLED_DrawBMP(0,i,8,i+1,BMP8);OLED_DrawBMP(119,i,127,i+1,BMP8);}
}
for(i=1;i<length;i++)
OLED_DrawBMP(8*x[i],y[i],8*x[i]+8,y[i]+1,BMP6);
OLED_DrawBMP(8*x[0],y[0],8*x[0]+8,y[0]+1,BMP10);
generate(flag);
OLED_DrawBMP(8*cordinate_X,cordinate_Y,8*cordinate_X+8,cordinate_Y+1,BMP7);
delay1s();
move();
if(judge()==1)
{
   i_m=0;
   OLED_Clear();
   OLED_ShowString(24,4,"Game over!");
   OLED_ShowString(24,6,"Score:");
   OLED_ShowChar(72,6,(length-4)/10+48);
   OLED_ShowChar(80,6,(length-4)%10+48);
   //showscore();

   play:
while(1)
{
   //OLED_Clear();OLED_ShowChar(72,6,(count)/10+48);
// OLED_ShowChar(80,6,(count)%10+48);
if(s1==1&&s2==1&&s3==1&&s4==1)
   {
   length=4;
   y[0]=2;y[1]=2;y[3]=2;y[4]=2;
   x[0]=4;x[1]=3;x[3]=2;x[4]=1; direction=4;
   goto restart;
   }
if(count<50&&length<10)
   {OLED_Clear();OLED_ShowString(24,2,"you lose!");OLED_ShowString(12,4,"turn switch
       off");OLED_ShowString(24,6,"to restart");p70=~p70;p71=~p71;p72=~p72;p73=~p73;}
if(count<50&&length>=10)
   {OLED_Clear();OLED_ShowString(0,2,"you reached the goal");OLED_ShowString(0,4,"turn
       switch off");OLED_ShowString(24,6,"to
```

```
      restart");p70=~p70;p71=~p71;p72=~p72;p73=~p73;}
if(count>50&&length>=10)
   {OLED_Clear();OLED_DrawBMP(0,0,128,8,BMP4);p70=~p70;p71=~p71;p72=~p72;p73=~p73;}
if(length>=10)
{
 a1:p_m=xiaoge[i_m];

  if(p_m==0x00)
  {
    i_m=0,delayms_m(1000);goto play;
  }
  else if(p_m==0xff)
  {
    i_m=i_m+1;delayms_m(1000),TR0=0;goto a1;
  }
  else
  {
    m_m=xiaoge[i_m++],n_m=xiaoge[i_m++];
  }
  TR0=1;


  while(n_m!=0)
     Beep=~Beep,delay_m(2*m_m);
  TR0=0;
}
else
{
   a2:p_m=erquanyingyue[i_m];

  if(p_m==0x00)
  {
    i_m=0,delayms_m(1000);goto play;
  }
  else if(p_m==0xff)
  {
    i_m=i_m+1;delayms_m(1000),TR0=0;goto a2;
  }
  else
  {
    m_m=erquanyingyue[i_m++],n_m=erquanyingyue[i_m++];
  }
  TR0=1;
```

```
    while(n_m!=0)
       Beep=~Beep,delay_m(2*m_m);
    TR0=0;
  }
  }
  }
}
}


void delay1s(void)
{
unsigned char i,j,k;
for(i=n;i>0;i--)
for(j=25;j>0;j--)
for(k=1;k>0;k--)
showscore();

}
/*
void draw(void)
{
int i=0,j=0;
for(i=0;i<16;i++)
  for(j=0;j<8;j++)
    {
    if(cordinate[i][j])
      OLED_DrawBMP(8*i,j,8*i+8,j+1,BMP6);
    }
}
*/

/*void key()
{
  if(l==0){direction++;while(l==0)showscore();if(direction==0)direction=4;
   if(direction==5)direction=1;goto end;}
   else if(r==0){direction--;while(r==0)showscore();if(direction==0)direction=4;
   if(direction==5)direction=1;goto end;}
   else delay1s();
  end: if(direction==0)direction=4;
   if(direction==5)direction=1;
}*/
void move()
```

```
{
   xh=x[0];
   yh=y[0];
   switch(direction)
   {
   case 1:yh--;break;
   case 2:xh--;break;
   case 3:yh++;break;
   case 4:xh++;break;
   }
   for(i=length-1;i>=1;i--)
   {
   x[i]=x[i-1];
   y[i]=y[i-1];
   }
   if(wall==0){
   if(xh>15)xh=0;
   else if(xh<0)xh=15;
   if(yh>8)yh=0;
   else if(yh<0)yh=7;}
   x[0]=xh;y[0]=yh;

}
void generate(int p)
{
if(p==0)
{
back: cordinate_X=rand()%16;
      i=100;while(i--);                // delay to generate different rand()
      cordinate_Y=rand()%8;
      for(i=0;i<length;i++)
        if(x[i]==cordinate_X&&y[i]==cordinate_Y) //avoid generating on the snake
             goto back;
      if(wall==1)
        if(cordinate_X==0||cordinate_X==15||cordinate_Y<=1||cordinate_Y>=7) //avoid
            generating on the edge
        goto back;
flag=1;
}
}
int judge()
{
   for(i=1;i<length;i++)
```

```
      if(x[i]==x[0]&&y[i]==y[0]) //hit itself
        return 1;
   if(x[0]==cordinate_X&&y[0]==cordinate_Y)
   {
        flag=0;
        length++;
   for(i=length-1;i>=1;i--)
   {
        x[i]=x[i-1];
        y[i]=y[i-1];
   }
   }
   if(wall==1)
   {
   if(x[0]<=0||x[0]>=15)return 1;
   if(y[0]<=0||y[0]>=7)return 1;
   }

   return 0;
}
int rand()
{
   return(TL0);
}
void timer_init()
{
   TMOD=0X03; //timer t0 to count
   TL0=0X00; //low:starting value
   TH0=0X00;
   TL1=0Xef;
   TH1=0Xd8; //high:starting value
   EA=1; //allow interrupt
   ET0=1; //timer0 can interrupt
   ET1=1;
   TR0=1; //set mode:start counting
   TR1=1;
}
void key0() interrupt 1 //timer 0 interrupts at 0 while timer1 interrupts at 3
{
   TH0=0x3c;
   TL0=0XB0;
   count++;
   if(count>=100)count=0;
```

```
   if(l==0){direction++;while(l==0)showscore();if(direction==0)direction=4;
    if(direction==5)direction=1;goto end;}
    else if(r==0){direction--;while(r==0)showscore();if(direction==0)direction=4;
    if(direction==5)direction=1;goto end;}
   end: if(direction==0)direction=4;
    if(direction==5)direction=1;
}

void showscore()
{
   int t,a,b;
   t=length-4;
   a=t%10;t=t/10;
   b=t%10;t=t/10;
   P2=seg7[b];
   P4=0x04;
   delay();
   P2=seg7[a];
   P4=0x02;
   delay();
}
void delay(void)
{
   unsigned char i,j,k;
   for(i=3;i>0;i--)
   for(j=14;j>0;j--)
   for(k=1;k>0;k--);
}

void int0() interrupt 3
{
   TH1=0xd8;
   TL1=0xef;
   n_m--;
}
void delay_m(unsigned char m_m)
{
 unsigned i_m=2*m_m;
// unsigned i=m;
   while(--i_m);
}
```