

LeTao 3D8S Light Cube No Need for Programming DIY User Guide

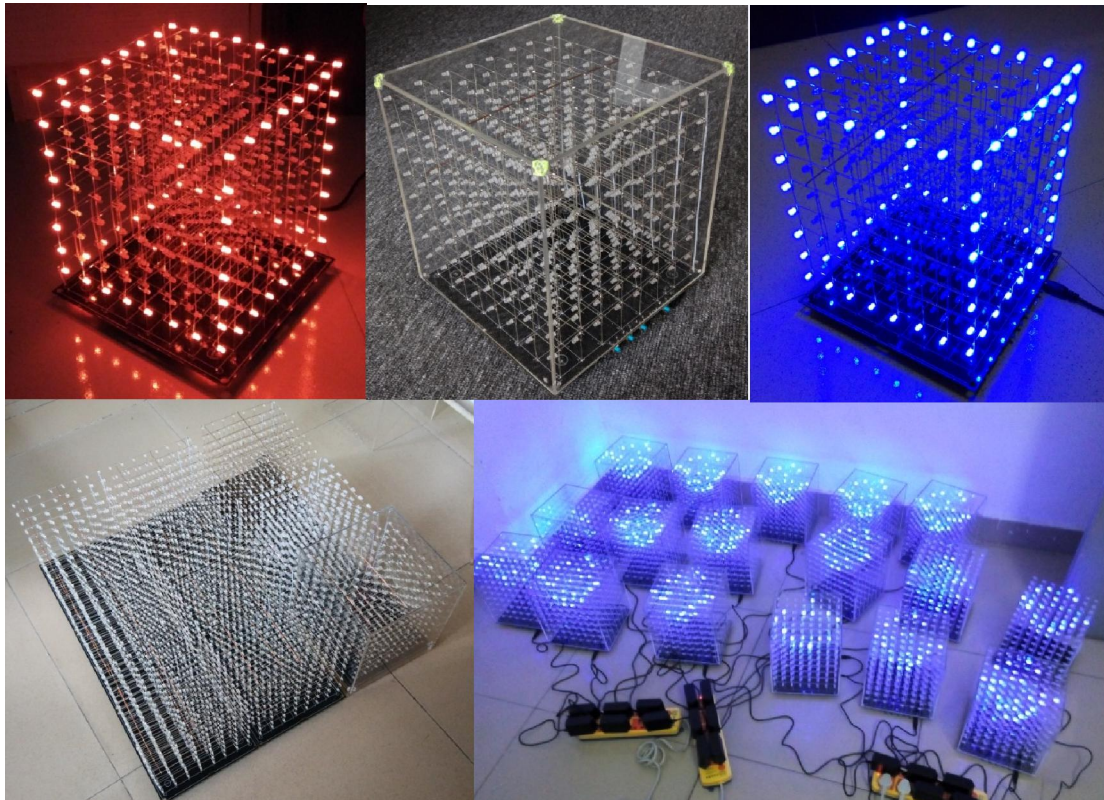
1	LeTao 3D8S Light Cube, the light cbe without programming.....	2
1.1	The introduction of the LeTao 3D8S Light Cube without programming...	2
1.2	LeTao 3D8S related websites and QQ group.....	4
2	LeTao 3D8S light cube solder tutorial.....	5
2.1	Use mould to solder LED lights.....	5
2.2	Assemble the cube.....	10
3	LeTao 3D8S light cube flash software tutorial.....	14
3.1	Menu of the software.....	17
3.1.1	Files.....	18
3.1.2	Debug.....	19
3.1.3	Configure.....	19
3.2	Introduction and explanation of interface division.....	20
3.2.1	Animation group.....	20
3.2.2	Preview area.....	20
3.2.3	Graphical resource list.....	21
3.2.4	Operating area.....	26
3.2.5	Resource index table.....	27
3.3	Introduction about the operation of making animation.....	25
3.3.1	Brief introduction about the operation of animation.....	27
3.3.2	Detailed introduction about animation parameter Settings box..	27
3.3.3	Detailed introduction about animation operation.....	29
3.4	Instances of making animation.....	31
3.4.1	Drawing a line with a point (Point operation).....	31
3.4.2	X rotation animation (Line operation).....	37
3.4.3	3D8S Movement (Plane operation)	40
3.4.4	Fluctuating animation (Plane operation).....	43
3.4.5	Cubic mobile animation (3d operation).....	40
4	LeTao3D8S control panel tutorial for download and debug.....	42
4.1	Picture of 3D8S light cube baseboard.....	42
4.2	Install serial driver.....	43
4.3	Download the program to the small board.....	49
4.4	Test small board.....	
5	LeTao 3D8S light cube in several exhibitions.....	49
5.1	China International Technology Expo.....	52
5.2	International Lighting Fair in Guangzhou.....	51

1 LeTao 3D8S Light Cube, the light cube without programming

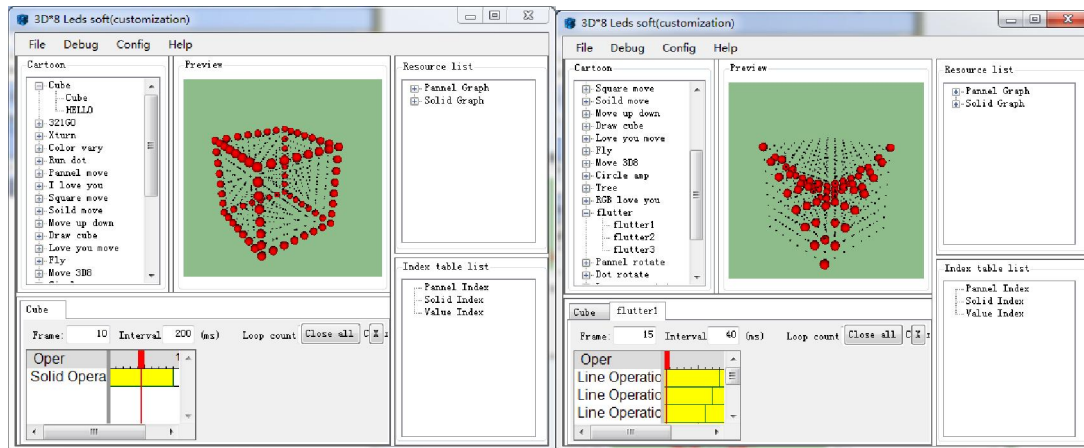
1.1 The introduction of the LeTao 3D8S Light Cube without programming

It was in 2009 that *Shenzhen LeTao electronic design studio* developed an ordinary 8x8x8 light cube, and began to provide light cube lovers with DIY accessories. They found that what fans considered most before they bought suites is how to modify the animation effect after they made it, for the reason that most fans are not in the electronic industry, or they don't know how to programming, what they can do is having the official animation recycled from time to time, and losing the feeling of freshness in the end. For this reason, *Shenzhen LeTao electronic design studio* began to adopt the advanced computer control technology , pack program in the computer application software , **no programming** and you can also simply use flash software to modify animations displayed by the light cube. We can say that it is the real **light cube without programming**. Once brought to public, the software become popular among fans, and turns to be the only cube animation software inland at present, and it also received a number of utility model patent .

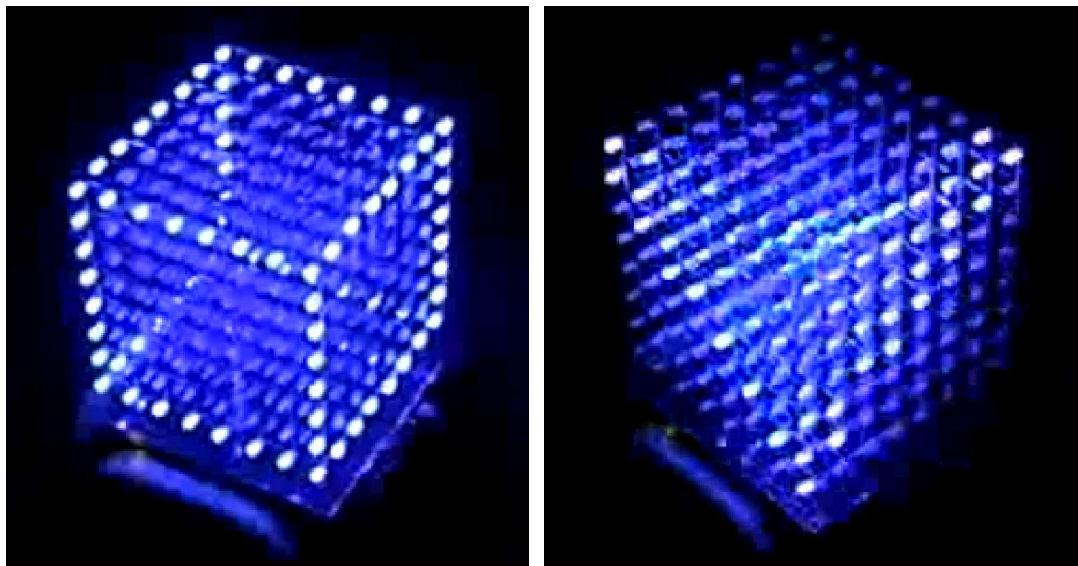
Here are entity pictures of LeTao 3D8S light cube, we use a block of 18 cm * 18.5 cm PCB as cubic panel, the stereoscopic effect are demonstrated after all the lights into the PCB after being welded.



After the entity has been welded, and the animation has been made by the flash software, generate HEX file directly and download it in the light cube, then the animation can display. The interface of the animation group is as follows, the software support simulation. You can use simulation on the computer after the animation is made. As the simulation effect is the same as entity, download it to the entity when you are satisfied with the animation effect.



The animation effect of the entity is the same as the one the software made.

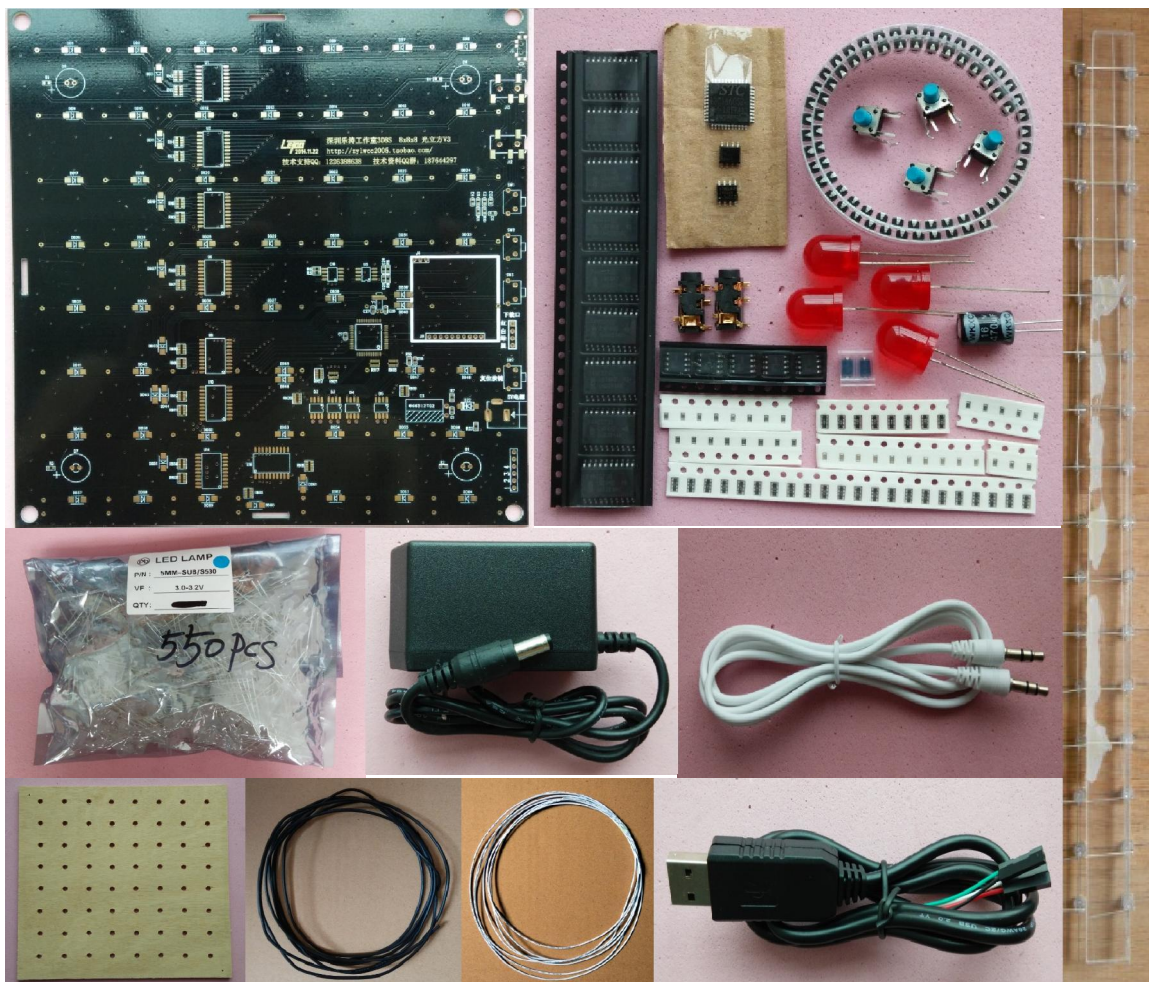


So you only need to make the animation by the computer simulation software, then export the HEX data file and download it to the light cube. In this way, fans who don't know how to program can also make and modify light cube easily, meanwhile, feel all kinds of pleasure brought by science and technology.

1.2 LeTao 3D8S Parts list

Letoo 3D8 light cube suites are consist of 10 members as follows:

	Name	Number	Note
1	5mm Blue LED	550PCS	Actual use 512PCS
2	Download line	1	Used to download the program to the controller
3	Controller PCB	1 PCS	18cm*18.5cm PCB
4	Components package	1 Package	Include Controller PCB use IC and components
5	Welding mold	1 PCS	2.3cm spacing
6	power adapter	1 PCS	5V/1A 5.5-2.5mm
7	conductor	Volume 1	Used to connect to the bottom
8	Fixed copper wire	Volume 1	For fixed LED
9	Bending mold	1 PCS	Used in the lights bend
10	Audio line	1 PCS	Audio input

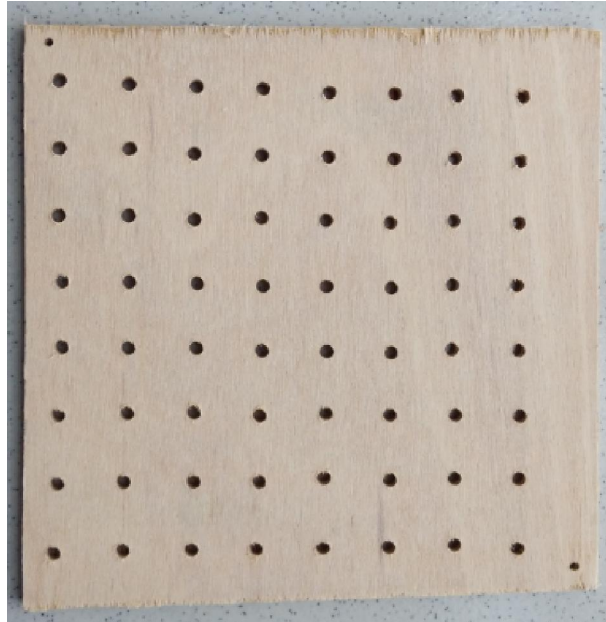


2 LeTao 3D8S light cube solder tutorial

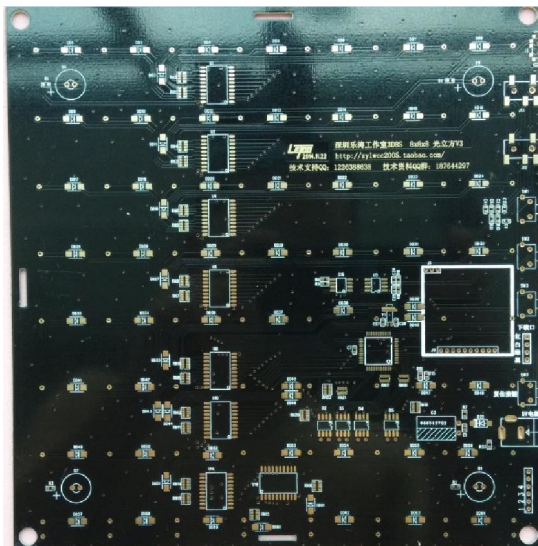
2.1 Use mould to solder LED lights

Here, we are going to introduce how to make a light cube entity. After all, all the later processing is based on the entity, so please be patient and persistent, and let's make our cube entity first.

Here is the picture of the mould for soldering, used for 8x8x8 light cube.

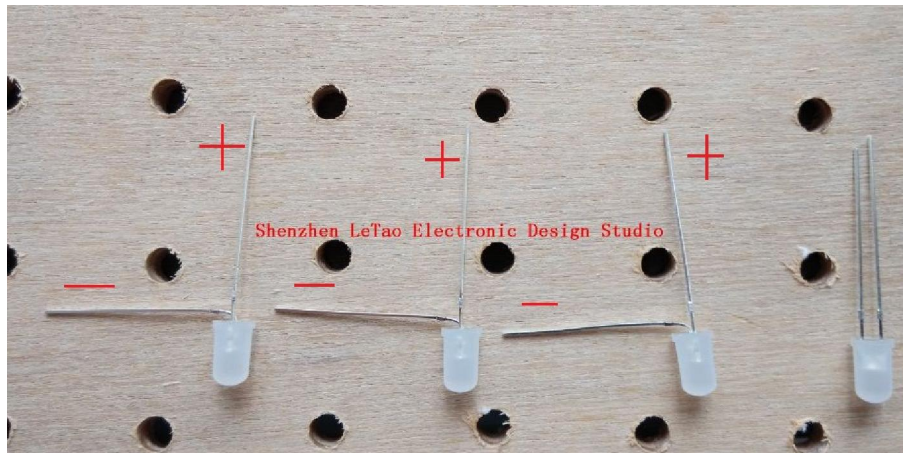


Here is a photo of baseboard and lights, and the size of baseboard is 18cm*18.5cm,



The number of LED lights is totally 512.

Then the first step, bend the **short** foot of the LED light at a 90 degree angle, just like the photo shows. **Make sure that it is the short foot**, saying the negative electrode. If you make mistakes here, then it is over from the very beginning.

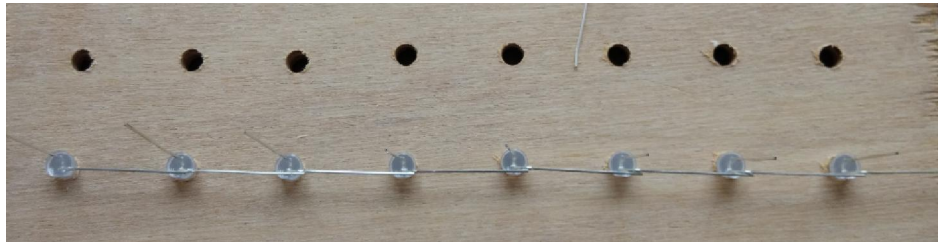


Bend all the 512 LED lights, the number is huge, be patient.

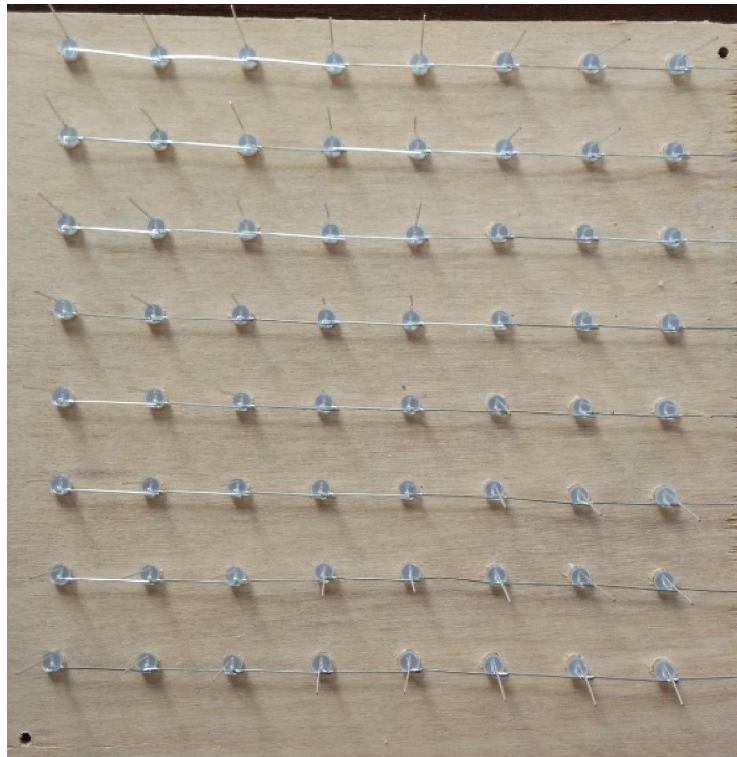


Then, insert the lights into mould holes, and make sure that they all are in the same direction, no matter what direction is.

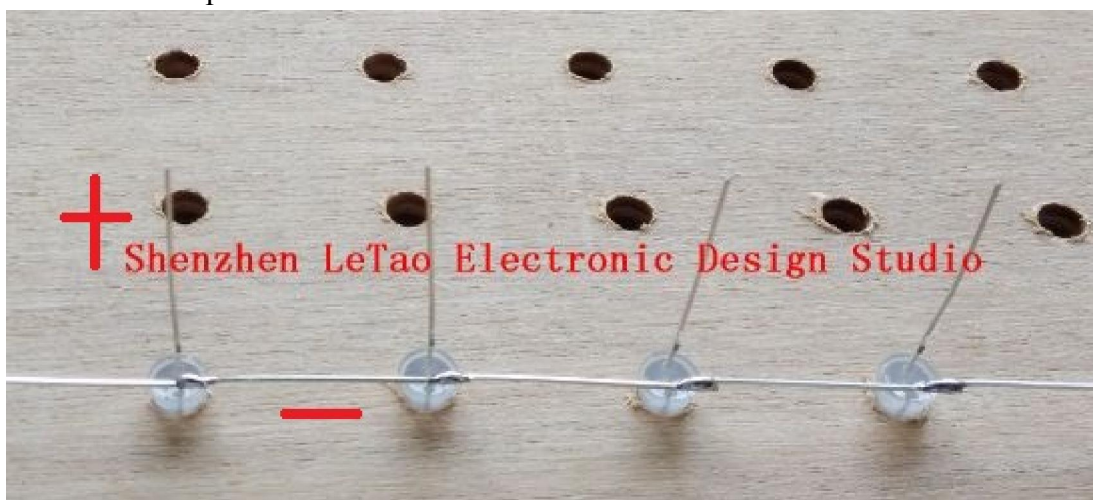


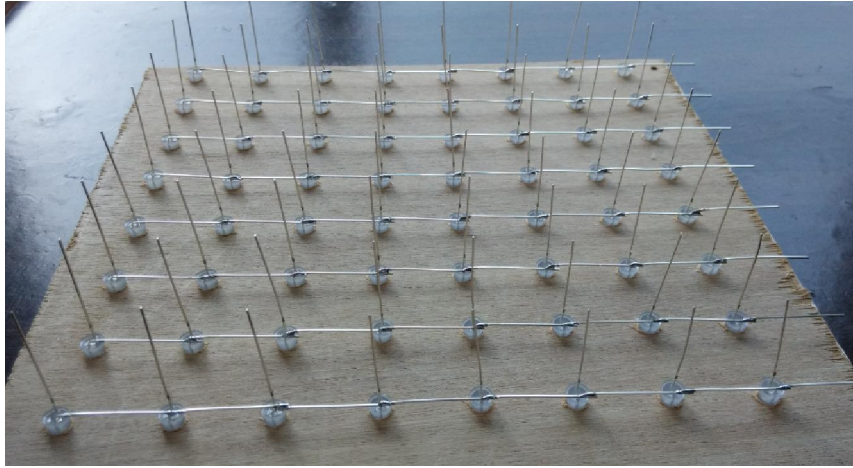


Just like this photo shows, one line, two line...
Do not stop until your mould is full of your lights,

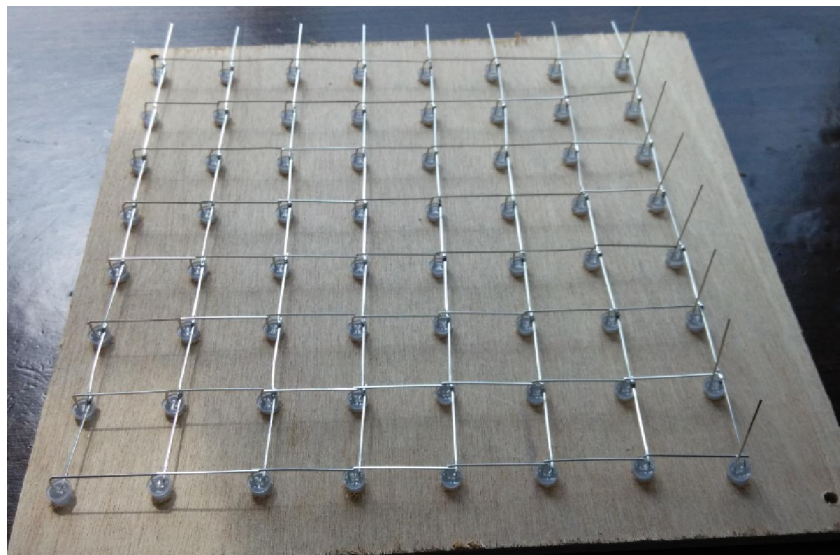
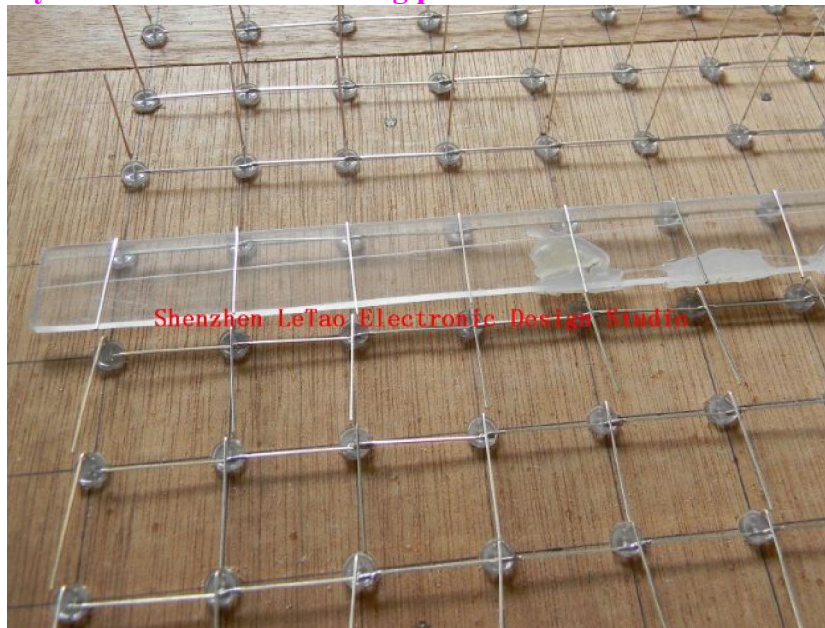


After that, you can start soldering, one by one, and there are 64 points for you to solder. Like the picture shows below.

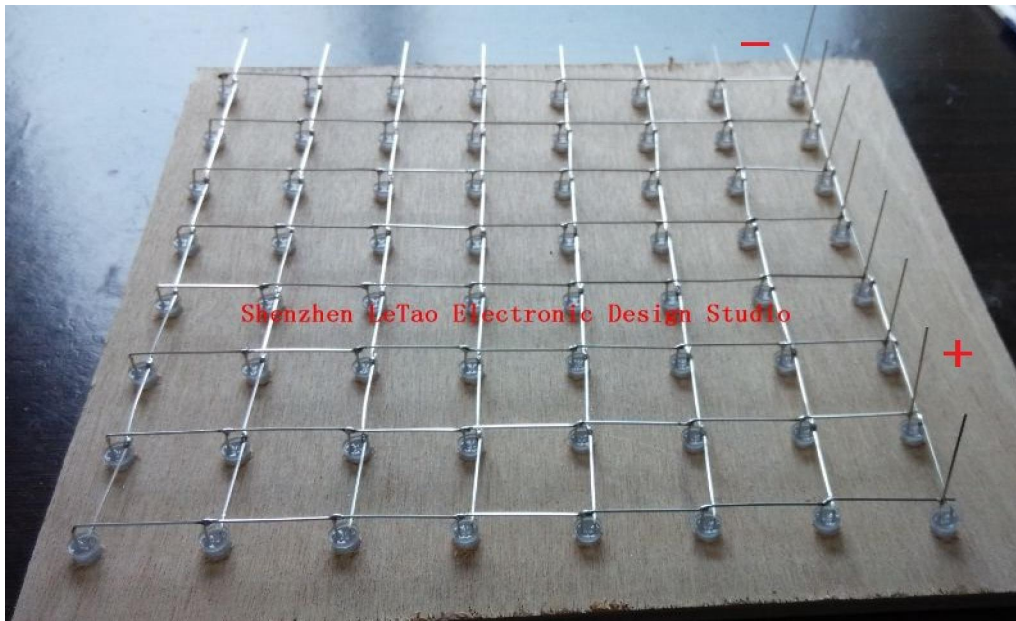




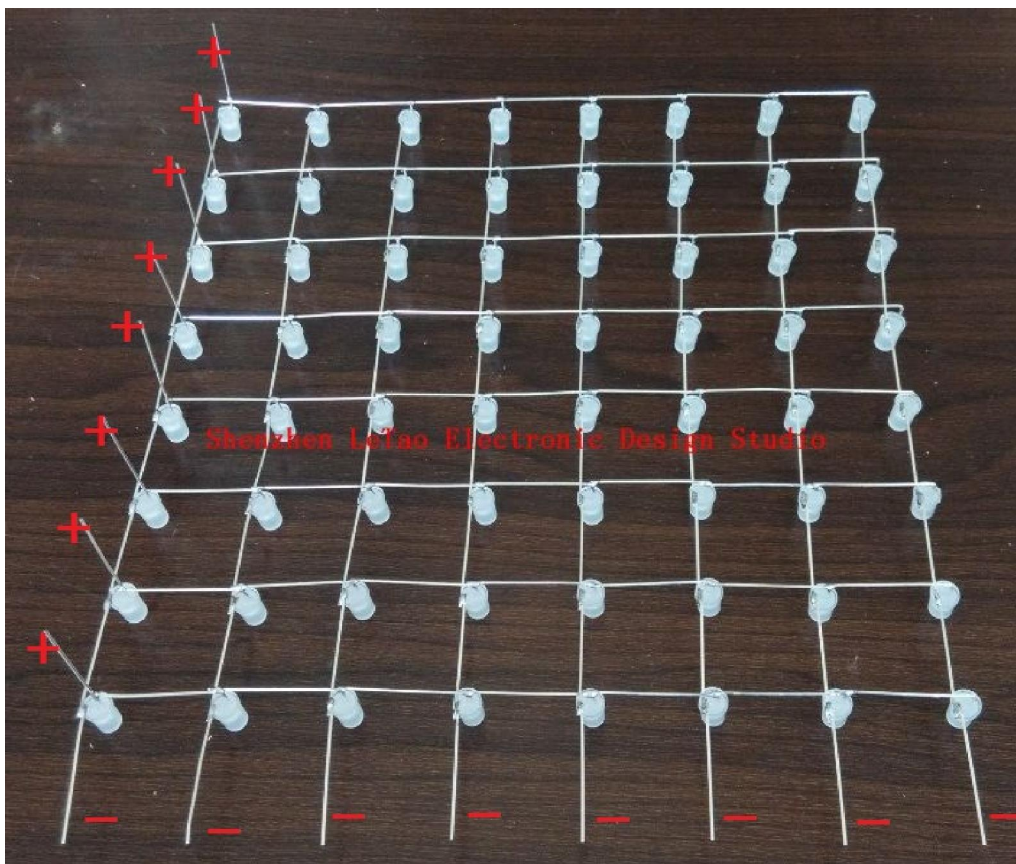
Then, put an acrylic bar with 2mm thick, or a ruler, besides the final line. And bend the standing feet in the direction toward the bar, like the photo shows. Make sure that this time it is the long foot, saying positive electrode. **Importantly, do not bend the first line, as you can see in the following photo.**



After bending, you can start soldering again.

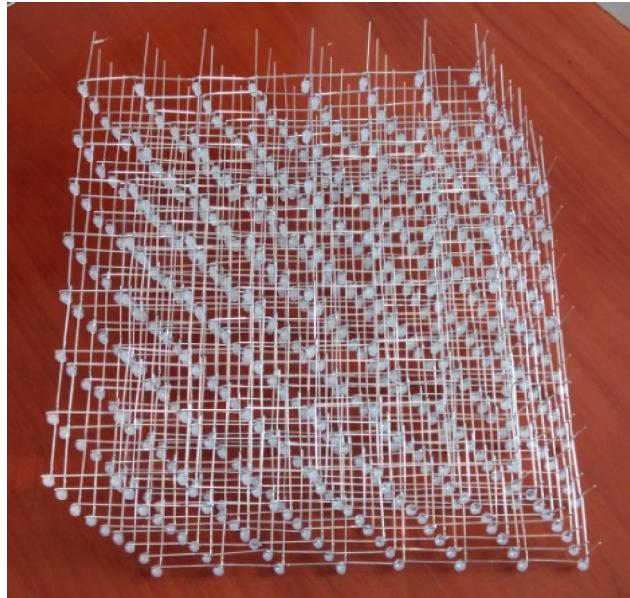


After that, the first layer is OK, and you would pull this layer out cautiously.



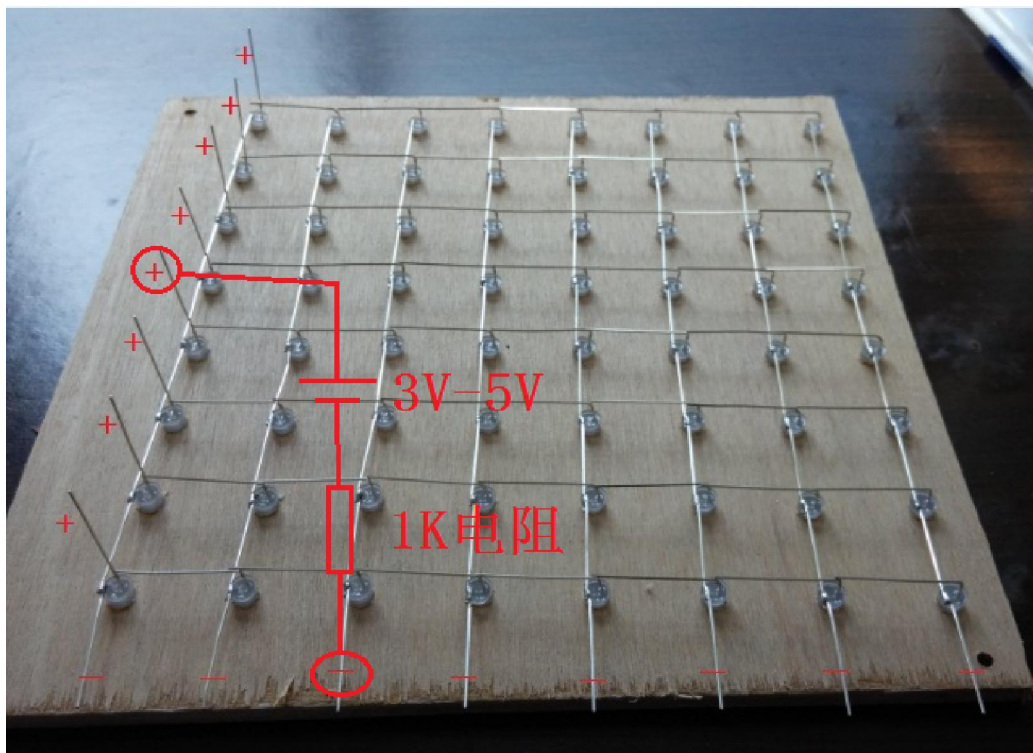
Then here comes the greatest work in the process—that is, copy 8 layers just the same as the first layer you have made.

That part is time costly, and maybe you will spend few days to finish the work. Please be persistent.



After all 8 layers are finished do not install the lights into baseboard in a hurry. **Never forget to test all the lights, every line, every layer. Do make sure that every single lights is OK and at good condition. This test is quite essential!** Otherwise, it is a wishful thinking to change malfunction lights once you have finished all the other later work.

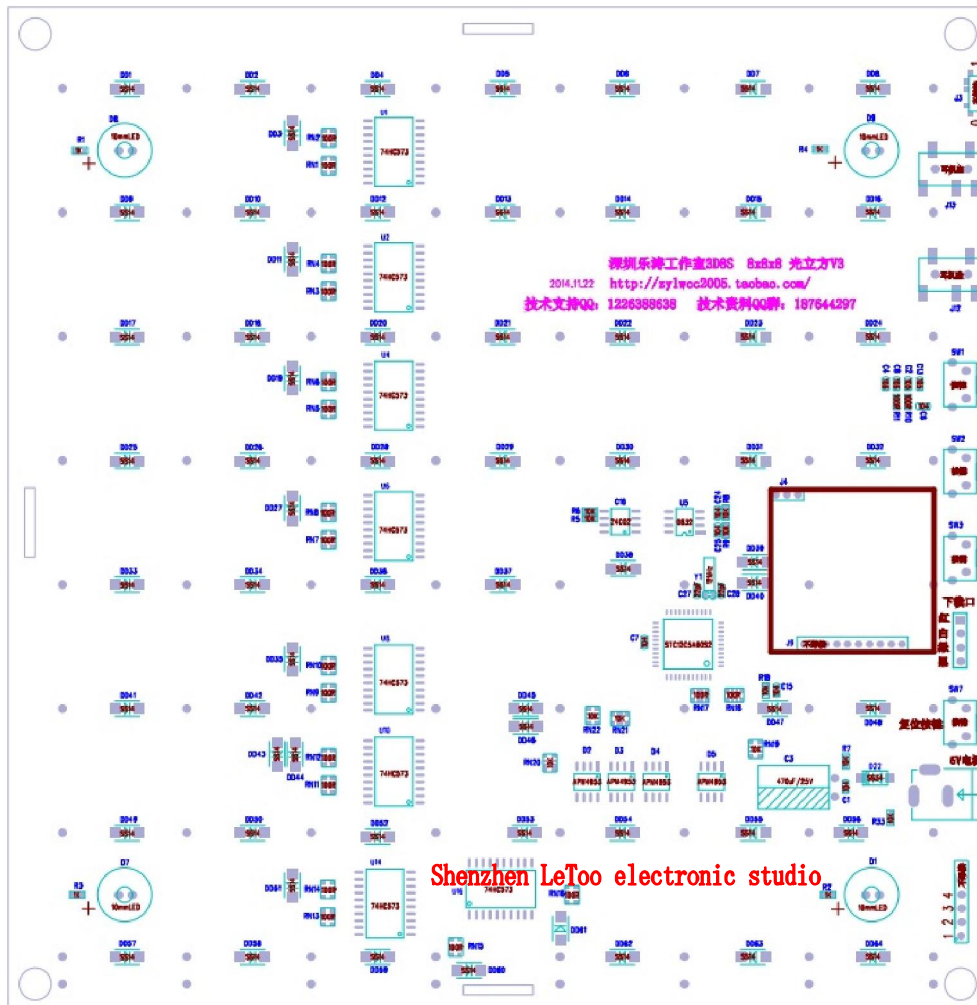
Test method is as follows, use of 3v battery or 5v power adapter, Battery positive electrode connected to the LED anode, battery cathode series 1 k resistor connected the LED cathode, as follows, each LED is need light test, confirm the LED can light up, in order to prevent the LED welding bad or welding reverse.



2.2 Welding control board PCB components

Then welding the components according to the welding drawings, buy welding debugging good control board can skip this step, assembling cubic matrix can be directly.

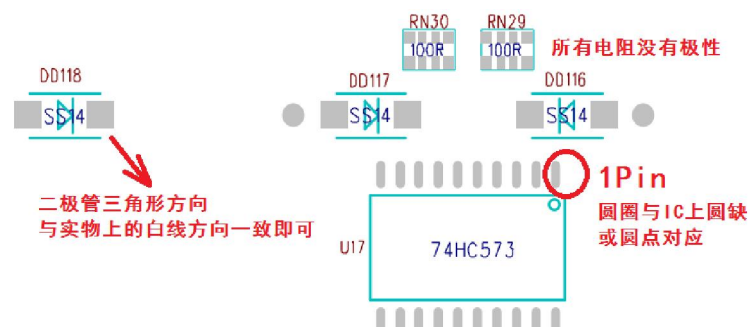
The parameters of the control board, according to the file package of “3D8 Welding drawings.pdf”.



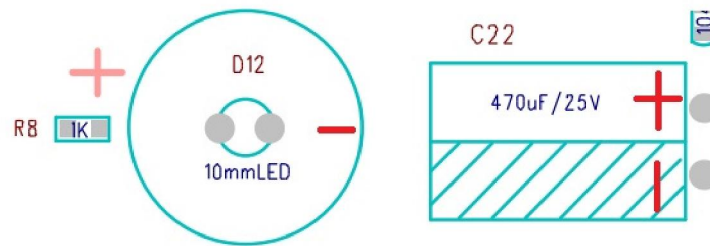
All resistance no polarity.

Diode cathode white line with the board on the screen printing on the triangle direction of the corresponding welding.

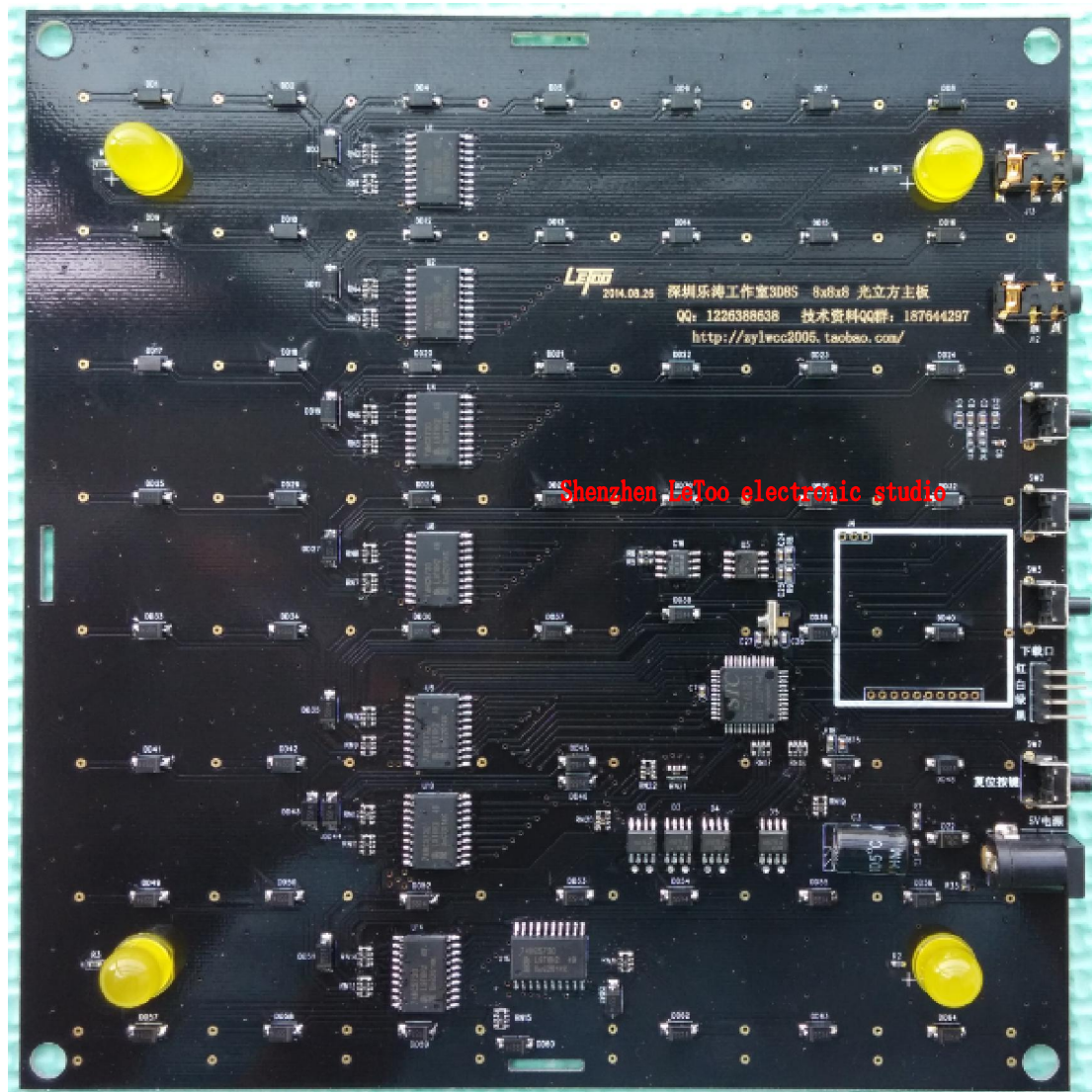
All of the IC, dot is the first foot.

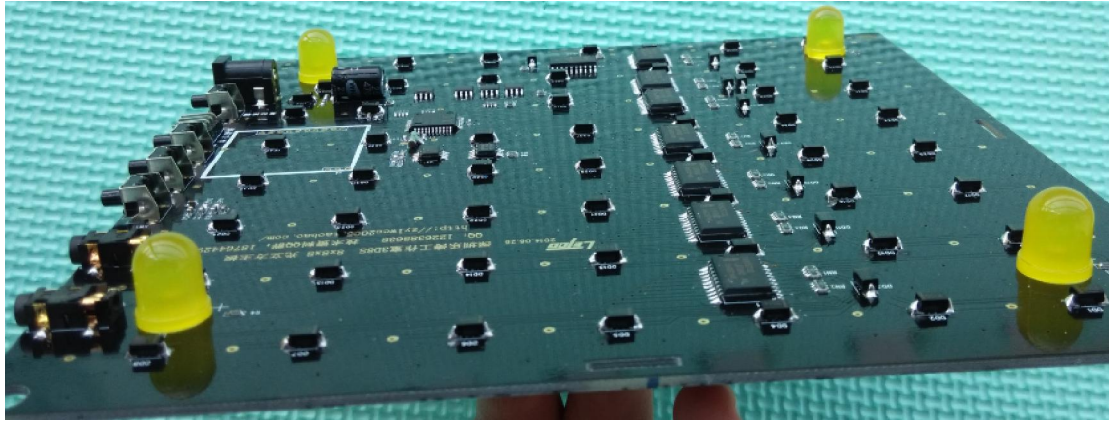


Base led long feet correspond to the anode, electrolytic capacitor long feet correspond to the anode.



The welding control board is as follows:

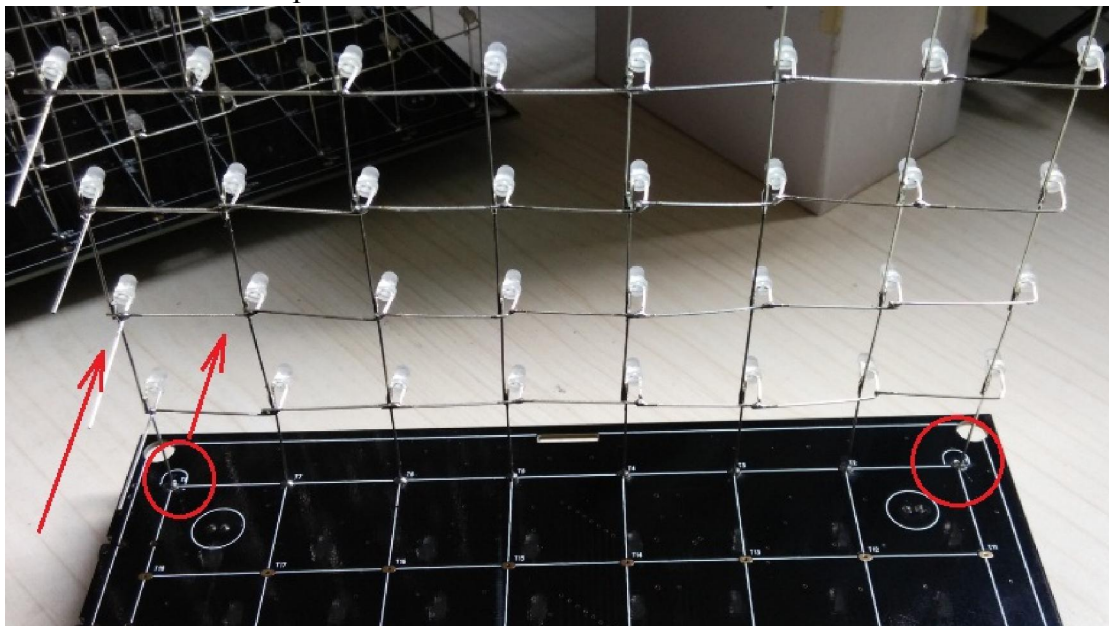




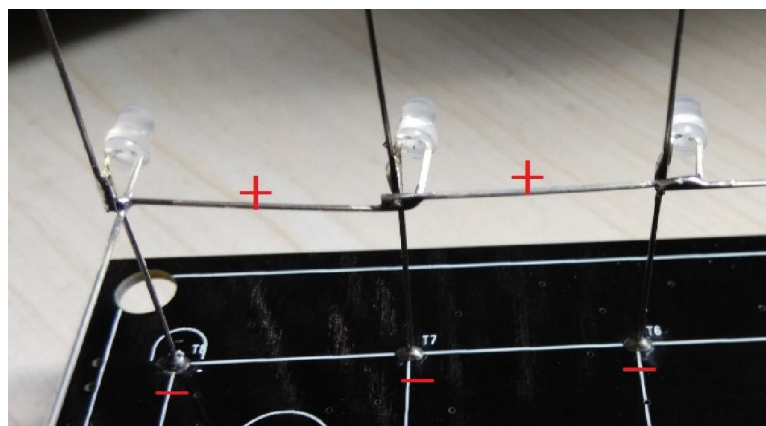
2.3 Assemble the cube

Followed by welding on the PCB, The direction of the LED are consistent with the direction of the identifier on the PCB, the following figure.

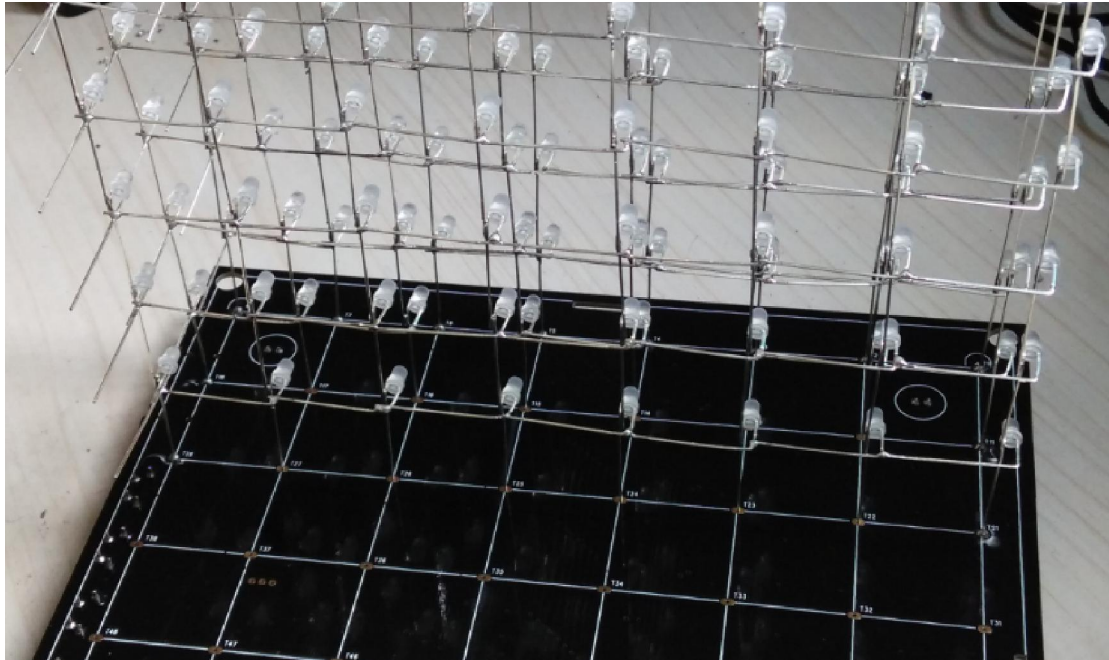
Then put these negative electrodes of your top layer toward the welding plate of the baseboard like the photo shows.



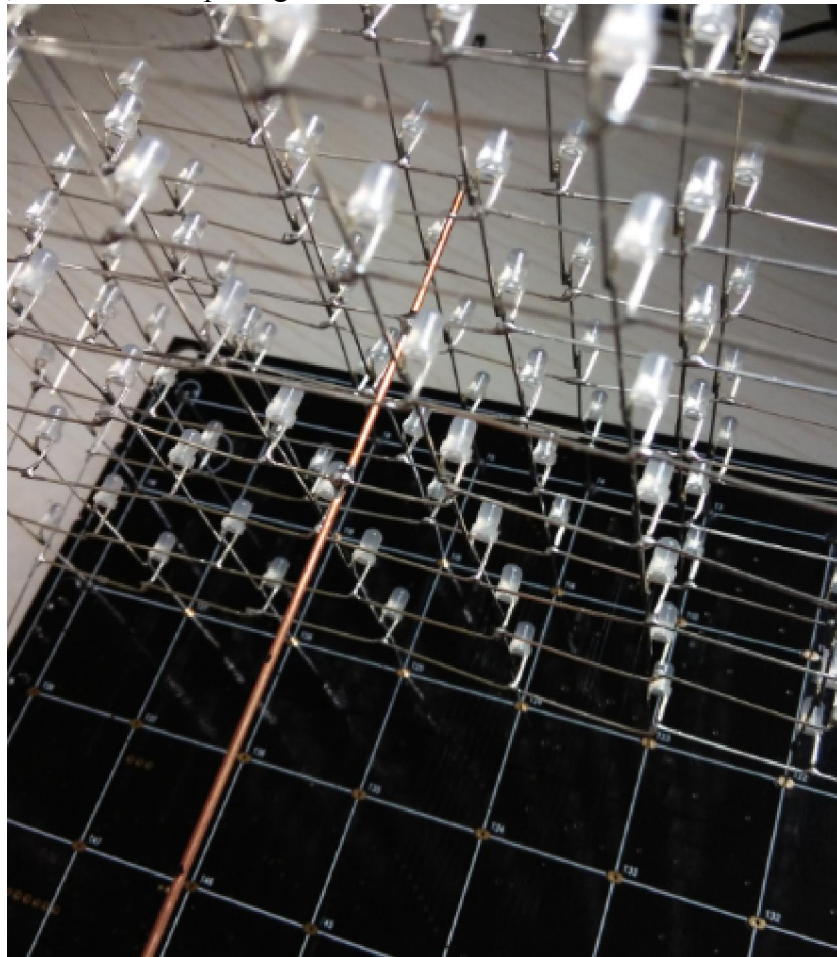
Then weld these negative electrodes to the baseboard directly.



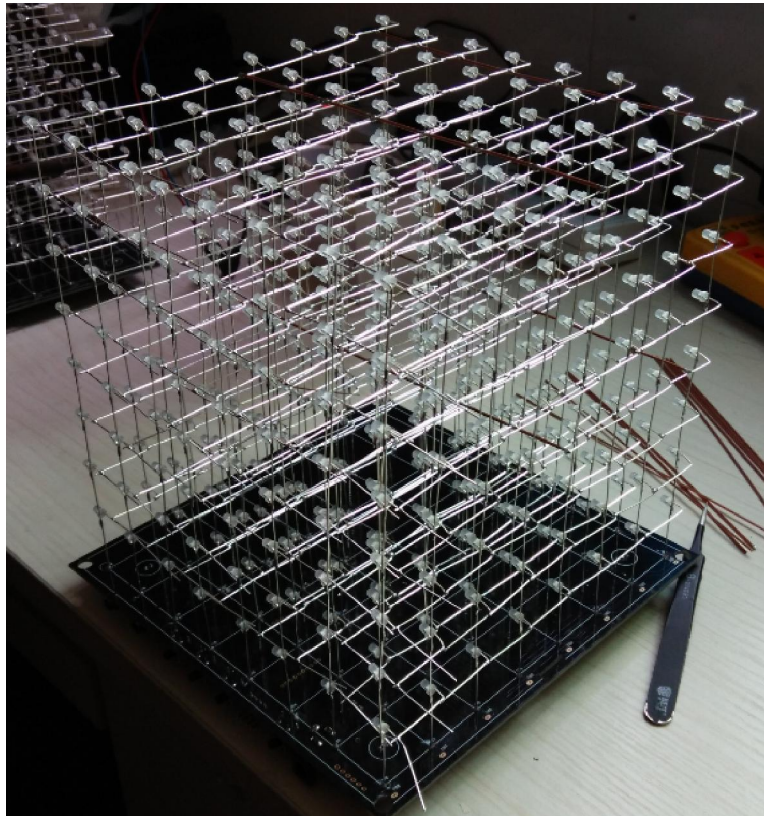
Then the second layer, the third layer...welds all of them into the baseboard like the photos below.



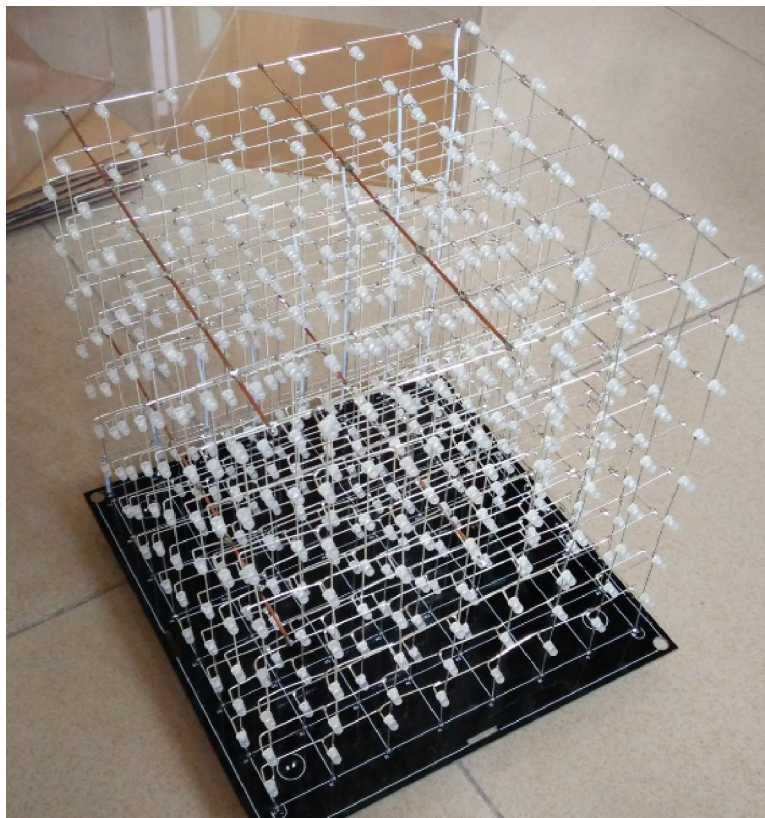
Then welding a piece of copper wire in the middle of the cubic. Let the cubic more solid, 23 mm weld spacing.



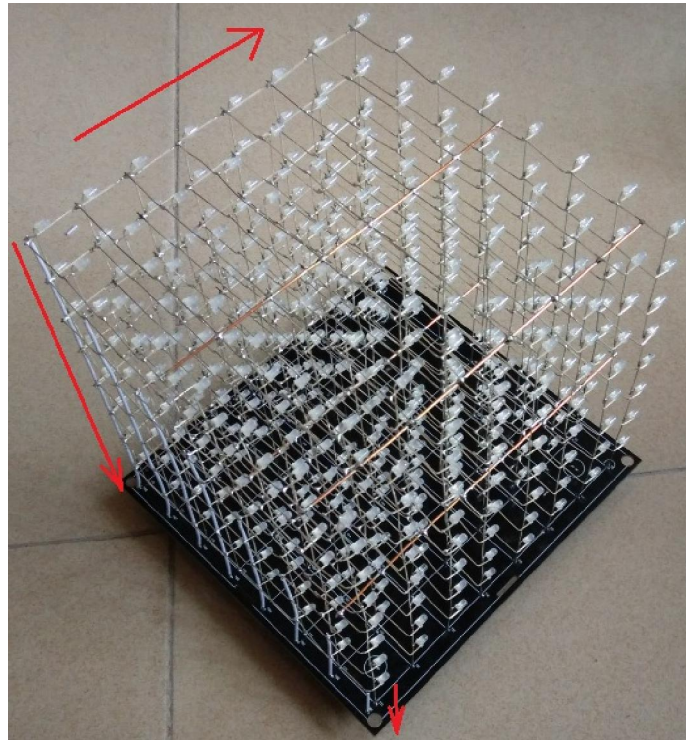
Do not stop until all 64 foots of the baseboard have been weld, then weld foots between every two layer, Cut the feet of the final line, then the cube is basically ok...



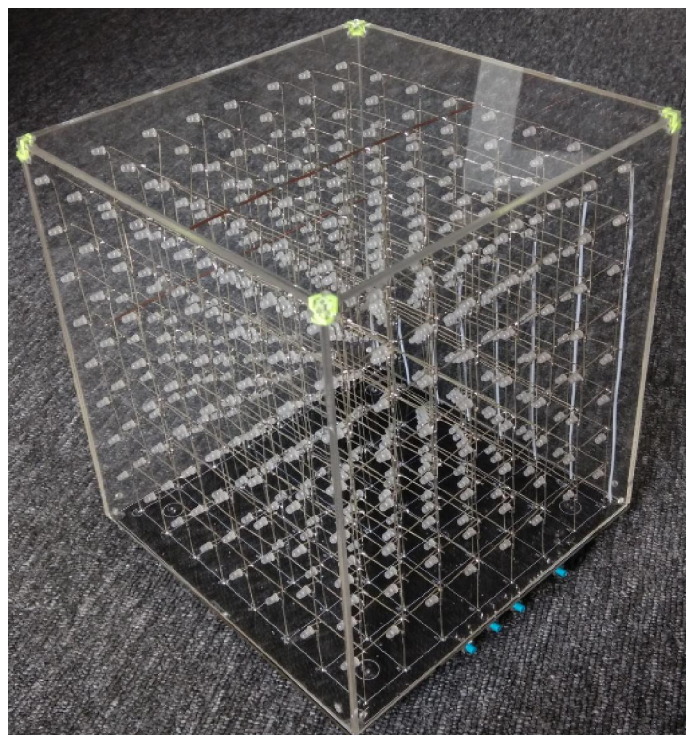
We add 3 copper wires, each of which is 1mm, to make the cube firm.



After that, use electric wires to fasten all the layers to the baseboard, 8 altogether. You should pay attention to the order. **The top layer should be soldered at the far left, and the bottom layer should be soldered at the far right.** If the order is not right, then the order of letters is reverse. Given that circumstance, you would have to either solder again or reverse the letters when using the software, which are both complex. So you'd better stop that from happening.






Now, our light cube entity is ready.
At last, use the acrylic cover box to provide protection .



3 LeTao 3D8S light cube flash software tutorial

Then we need to make flashes. I will introduce every procedure in detail, and make a video tutorial to bring benefits to all the fans. Amateurs do not need to programme anymore, and everyone will appreciate the power brought by high technology.

This software is easy to manipulate, you don't need to install, just double click the icon to start the software.

	LET3D8S20150218EN.gpro8	2015/2/27 17:11	GPRO8 文件	148 KB
	Letoo 3D8 software.exe	2015/2/13 15:14	应用程序	1,360 KB
	output.hex	2015/2/27 16:31	HEX 文件	168 KB

If your computer can not use that software, please check whether you have installed two platform software--.net framework 2.0 and DX9, or if your version is too old.

You can also download our software from the below website. We have already tested that both XP and win7 system are available.

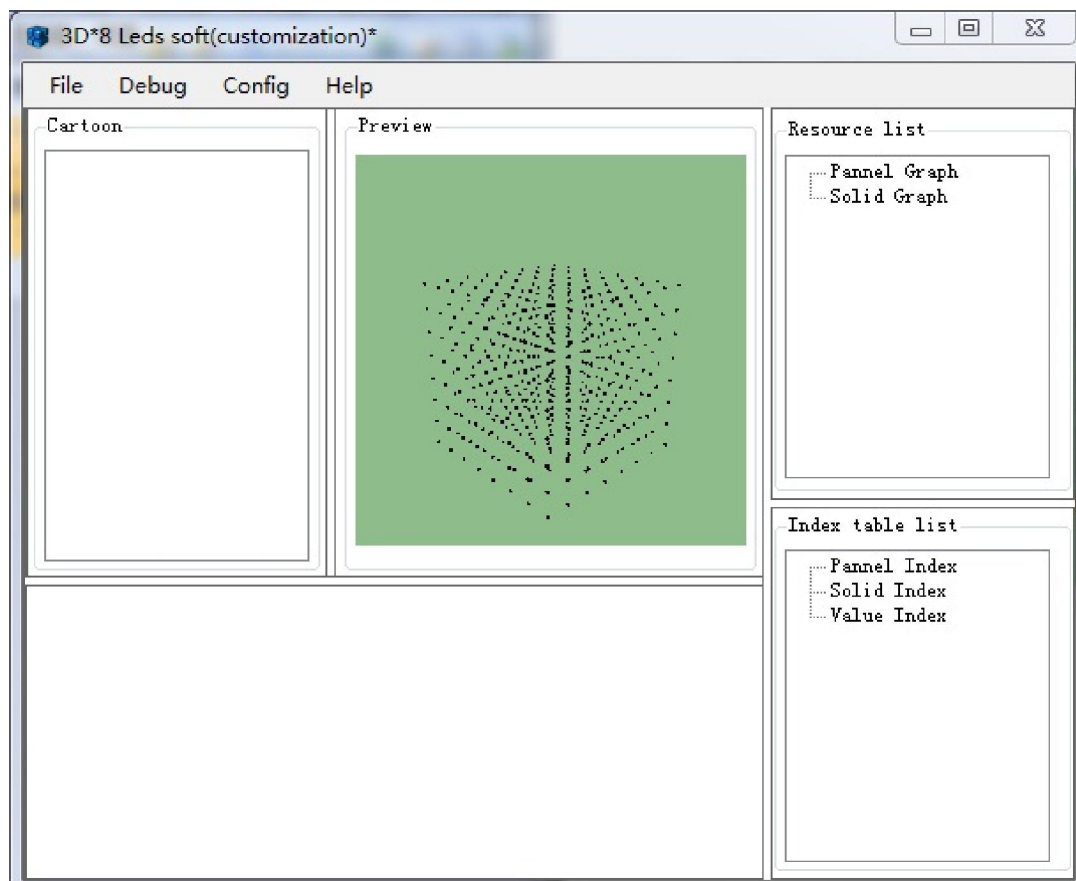
For .net framework 2.0: <http://www.crsky.com/soft/4818.html>

For DX9: <http://xiazai.zol.com.cn/detail/10/90905.shtml>

Next, we are going to introduce the tutorial in detail.

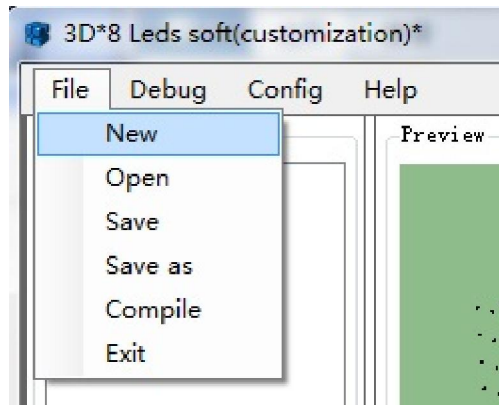
3.1 Menu of the software

The operation interface of our software is like the photo shows. Menu is consist of "Files", "Debug", "Configure" and "Help".

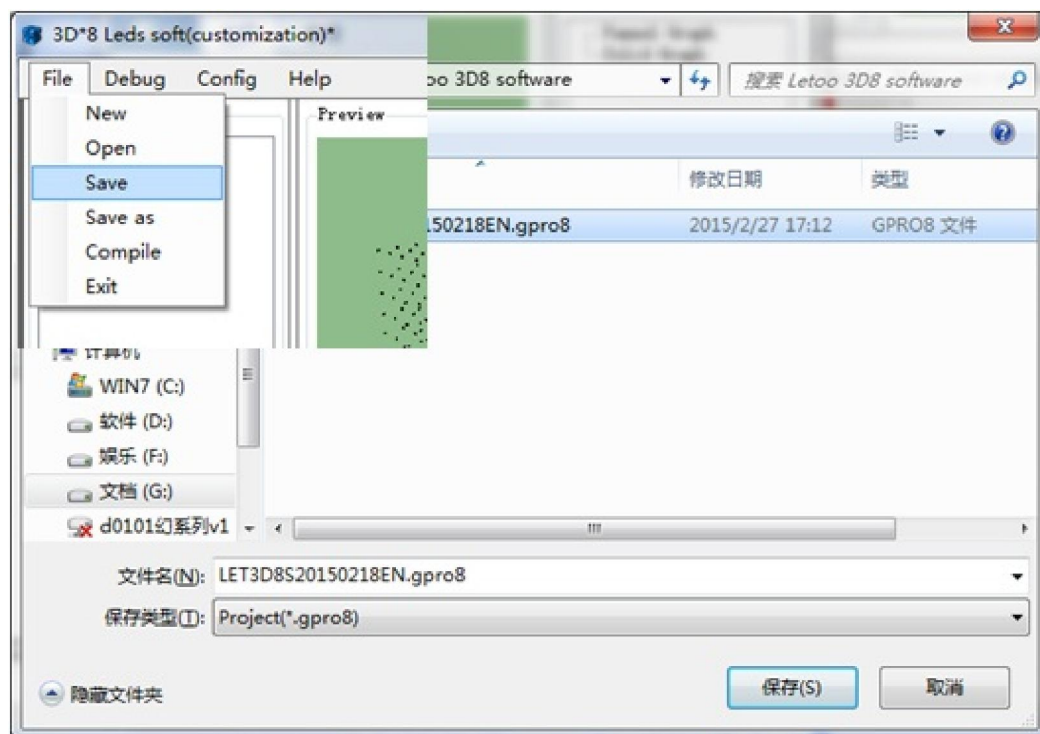


3.1.1 Files

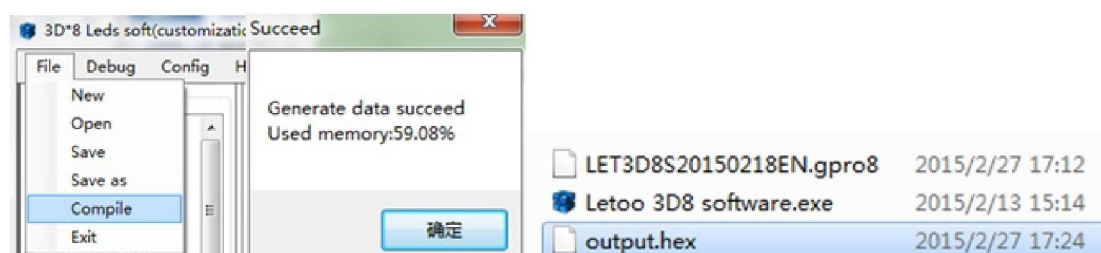
The “Files” contains several basic operations, like new, save, exit...



You can fill in a file name, Chinese or English, when you want to save a file. The file defaults to.gpro8.

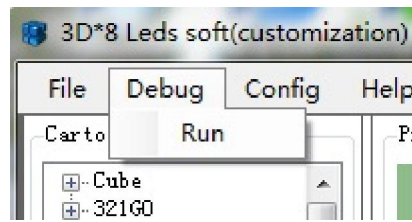


Choose “compile to generate burn files” to export “hex” files when you finish making flashes. Then a dialog box will come up to show how much memory has been occupied by the files, and the files will be automatically saved to the same file folder as the software, with the name “output.hex”, just like the photo shows. Burn the files to your control panel, and you can run your flashes. Burning tutorial see also “tutorial for download and debug”

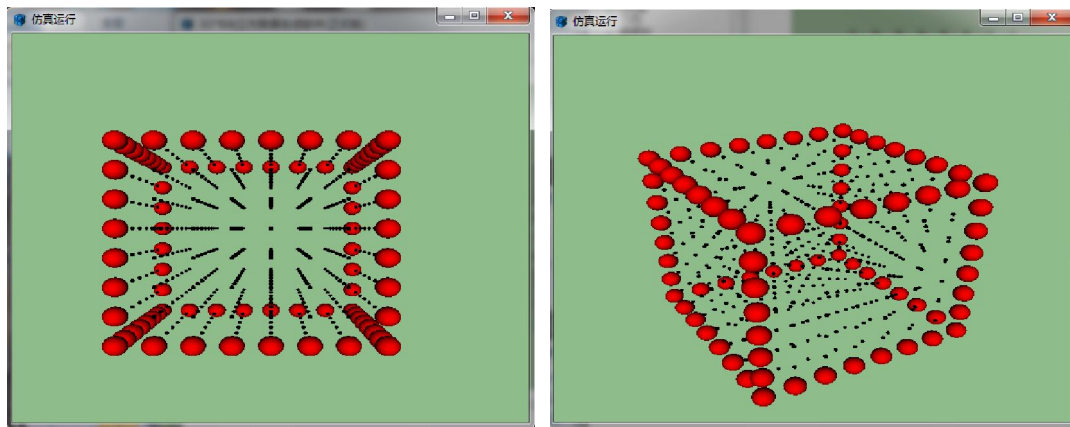


3.1.2 Debug

The “Debug” part is mainly used for simulating flashes in computer.

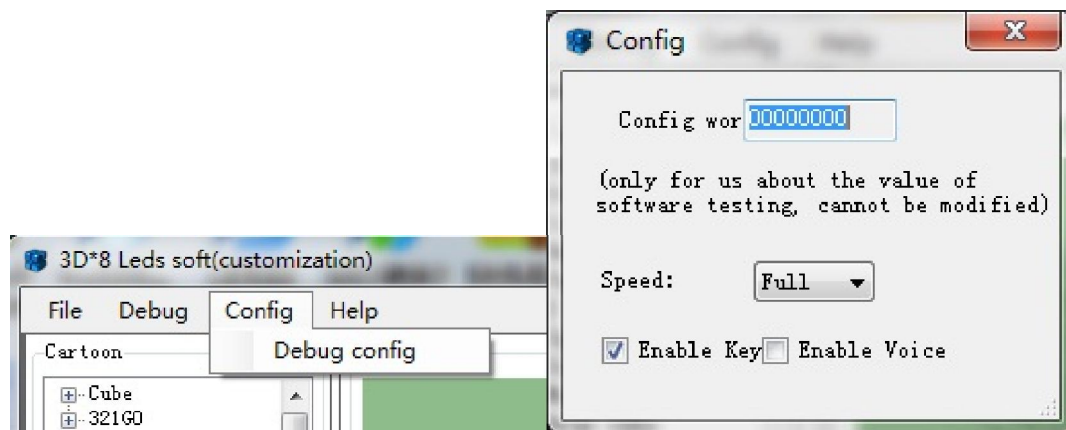


Click “simulation in computer”, then you will see the effect picture. Moreover, you can also drag the mouse to see from different angle.



3.1.3 Configure

The “Configure” part is used to configure the hardware equipments. Hardware contains button and audio, which could be regulated by the software. The interface is as follows, when you click, the hook-like mark would show, and that means that hardware function is on.



You have to pay attention here, when you choose “open audio test”, the light cube is completely controlled by audio, which means that you must plug in audio wires to play audio, or the flashes in your light cube will not run.

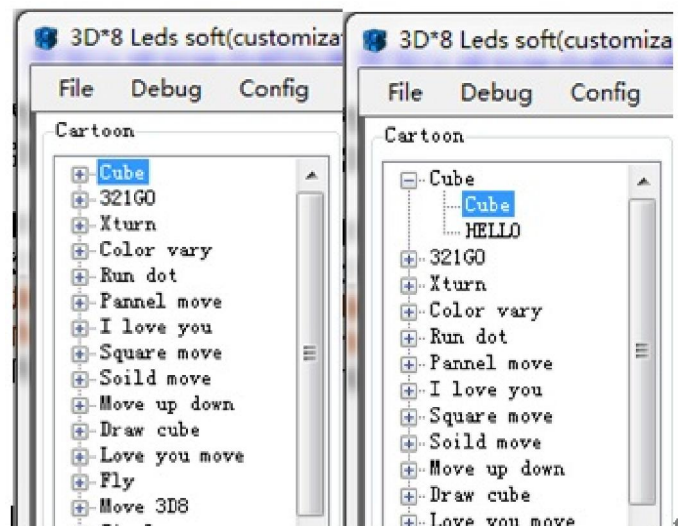
3.2 Introduction and interpretation of interface division

The interface is divided into five parts, they are animation group、preview、graphical resource list、operating area and resource index table. Next, we'll introduce the function of each part.

3.2.1 Animation group

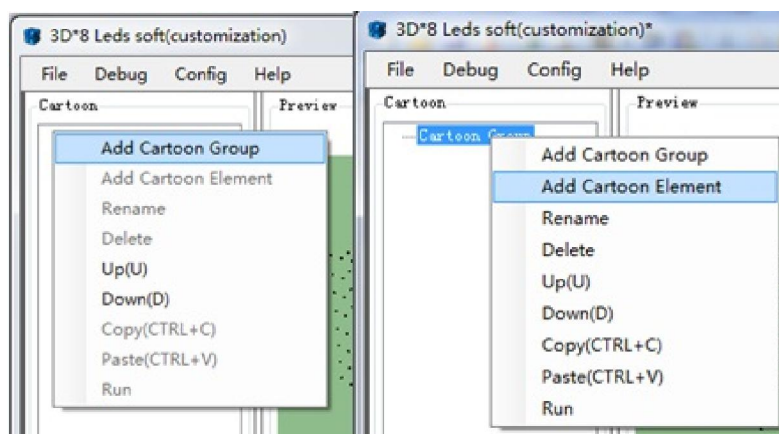
The animation production of this software is conducted by making flash, the animation effect of each word or picture is made frame by frame, and then, play those frames by order.

The definition of animation group: Animation group is a collection of all animation, the demo animation that we have seen includes a lot of different animations which are playing, besides, each of the different animation effect is an independent animation group, and every animation group has many different animation units .

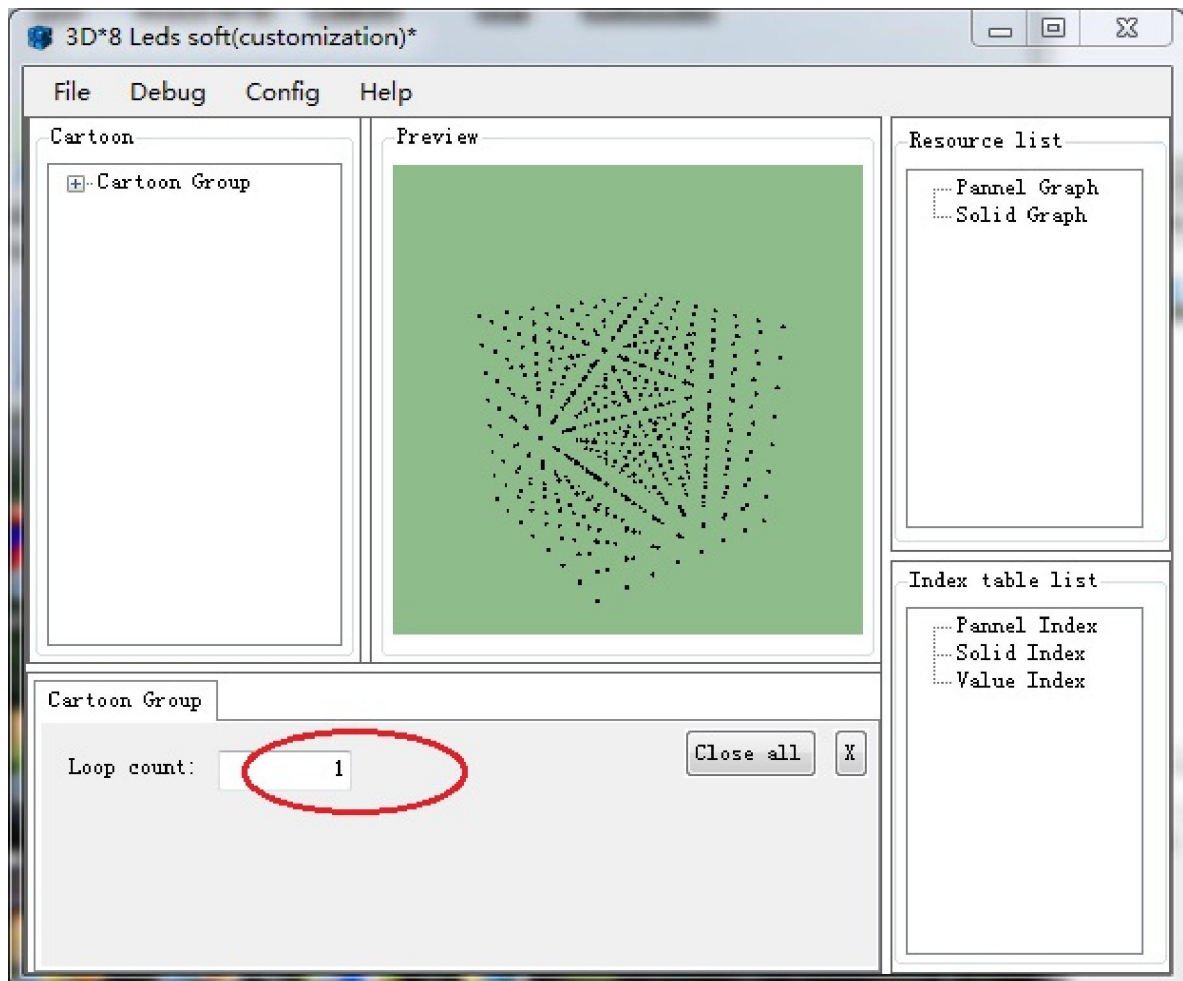


All the animation effects is arranged in animation groups, which support adding a variety of animations, copying or pasting animation, mobile animation effects and so on, what's more, you can also preview a single animation effects.

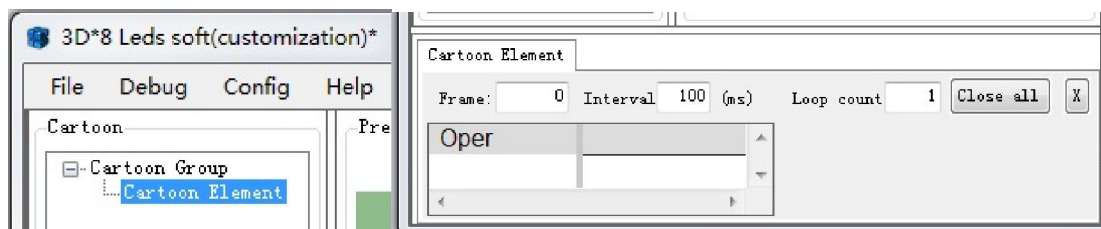
After right-click in the animation group margin, you can add animation group, then select that animation group, after that you can right-click to add animation unit, which is an independent animation, then you can make a series of operations, like setting its operation time and the number of cycles.



Double-click the animation group, and then you can set the cycles of animation group. This group of animation will not be played if cycles is set to 0. Sometimes you want to shield some animation but you don't want to delete them directly, then you can set the cycles of this group of animation to 0.

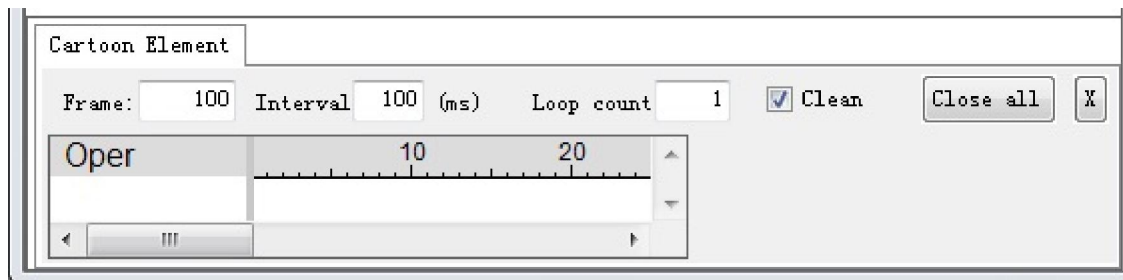


Double-click the animation unit that below the animation group, and then you will see each operation of animation unit displayed in the box of the operating area. See also:



After animation unit has been establish, you must set the number of animation frames, which is the length of the animation. Otherwise you can't do anything else, because the default number is 0.

If you don't know how long the animation is, you can set it to a larger one. Here we set it to 100 frames. The results are as follows, after setting, there comes out a frame scale like the one in flash making.

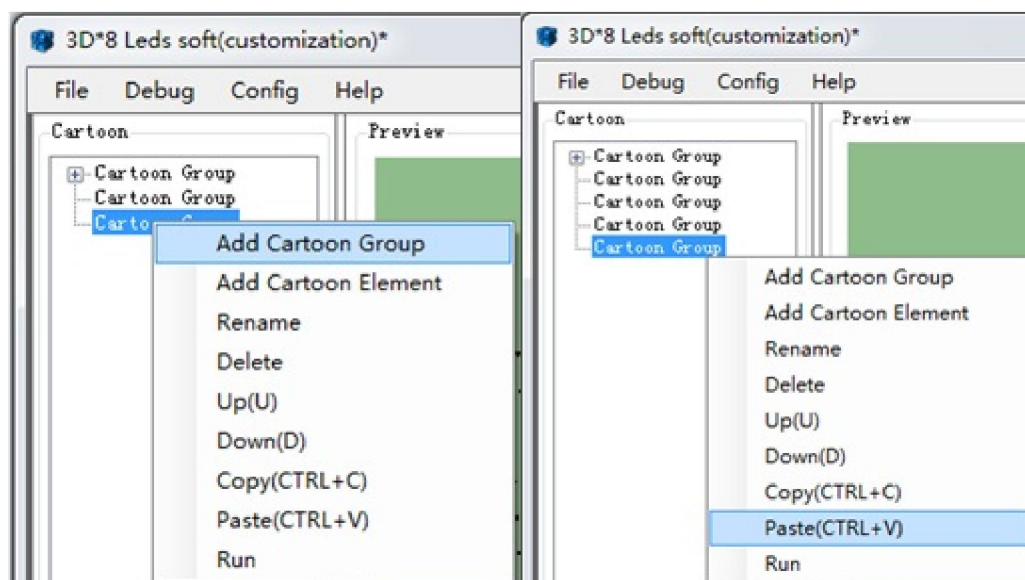


Frame interval is the interval time between each frame, the longer the time, the animation runs slower.

The number of cycles is the number the whole frame play circularly. You can set it here, or you can set it in animation group. (Pay attention: The cycle that set here is a cycle of a single animation, while the cycle that set in animation group is a cycle of all animation group, please notice the difference)

In order to inter-cut animation arbitrarily, the animation group support such operation, like mobile and copying, as follow:

(Pay attention: Do not cross software when you copy and paste, or it will go wrong)

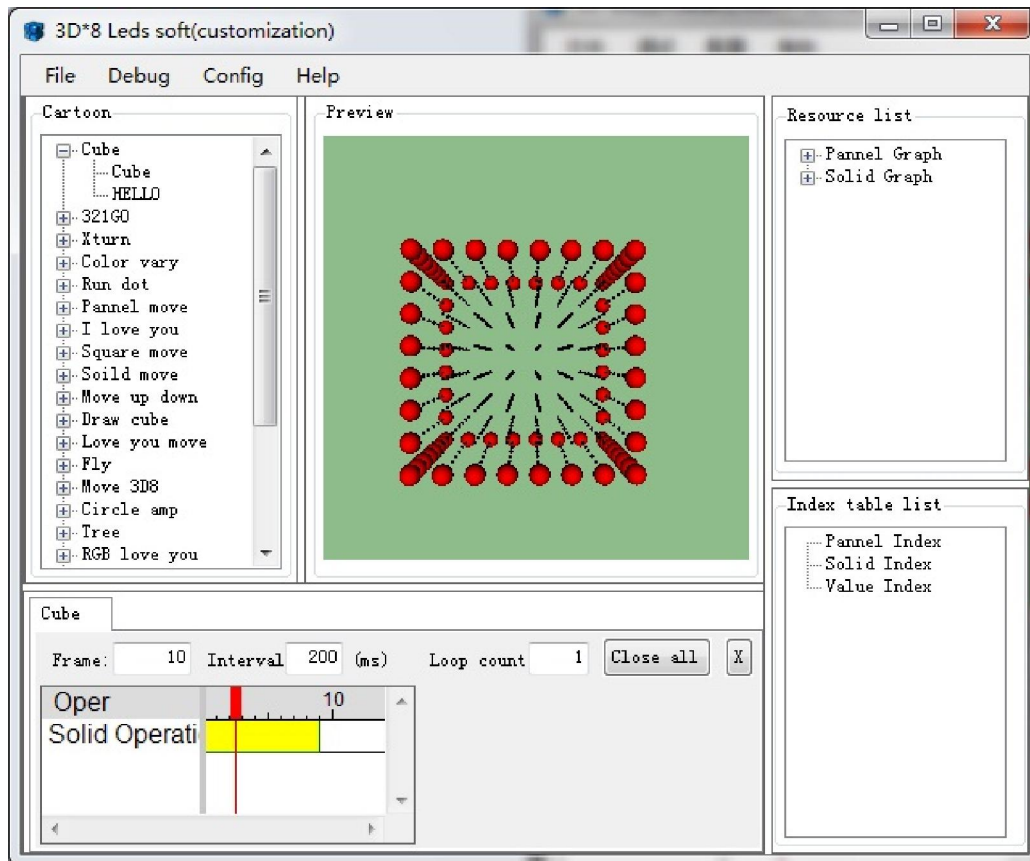


【Preview the running effect】in the animation group only preview the current animation, so that you can save time, as you have to wait until the previous animation been played when you preview in “debugging” part.

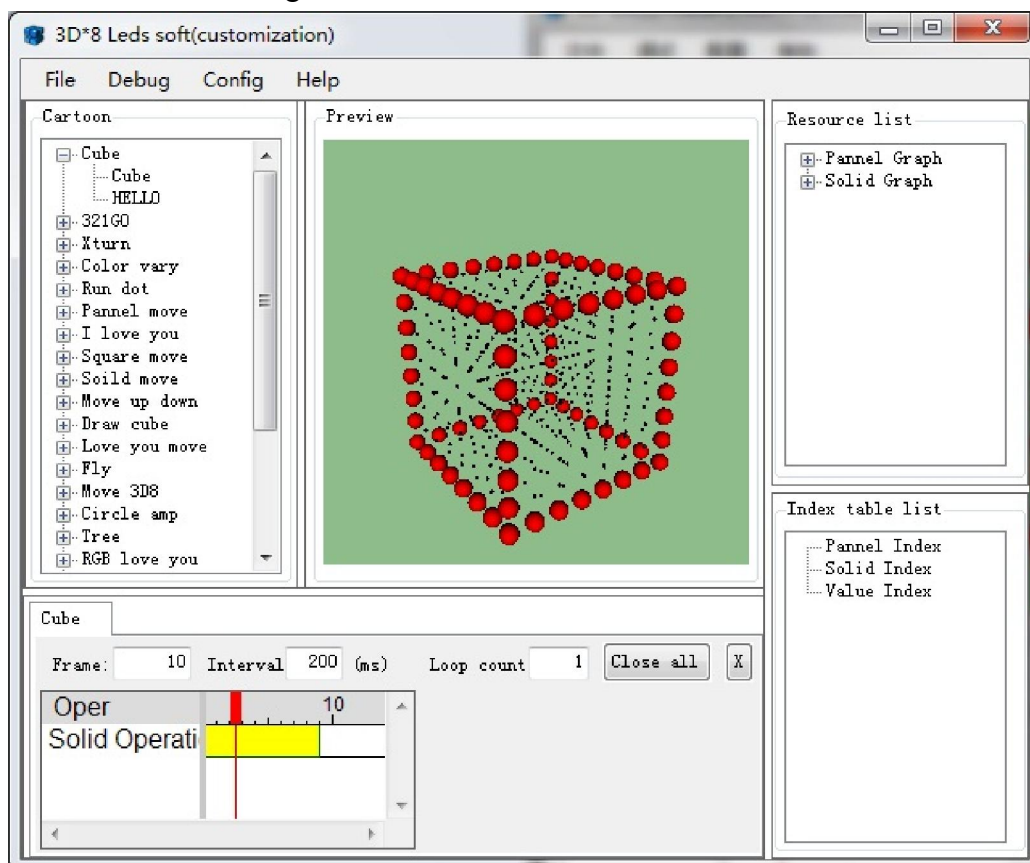
3.2.2 Preview area

Preview area is mainly used to view the effect of the animation you made in real time.

When you double-click the animation unit in animation group, each frame of the animation will be shown in the operation area, then click the frame scaleplate, and you will see the effect picture of this frame in the preview box as follows:

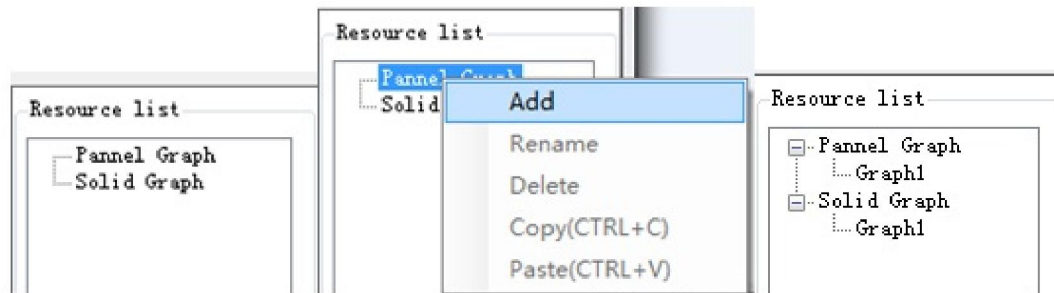


You can use the mouse to pull the position of **Preview** to view the preview picture from different angles. As follow:

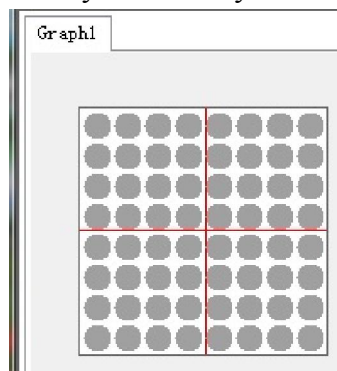


3.2.3 Graphical resource list

Graphical resource list contains all of the animation resources, mainly includes plane figure and the three-dimensional graphics. Graphical resources support copying, so to improve the efficiency of animation, you can modify graphics that is relatively small after copy them.

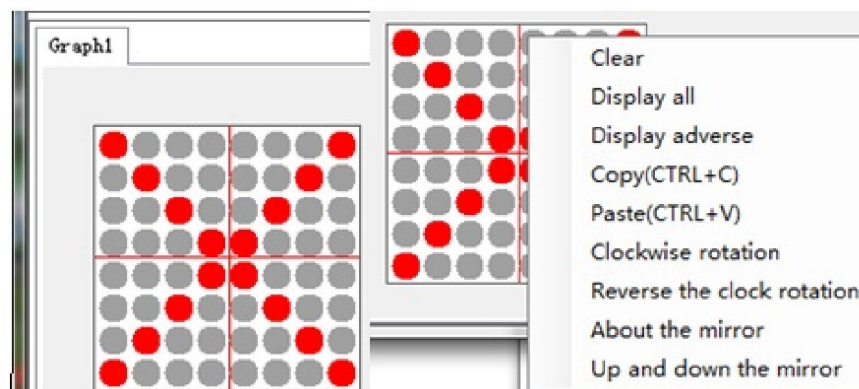


Right-click to add graphics, default sorting by number, then double-click the 【Plane figure 1】under plane figure, and there will pop up the operation interface of figure1 in operation area. The plane figure only has one layer.

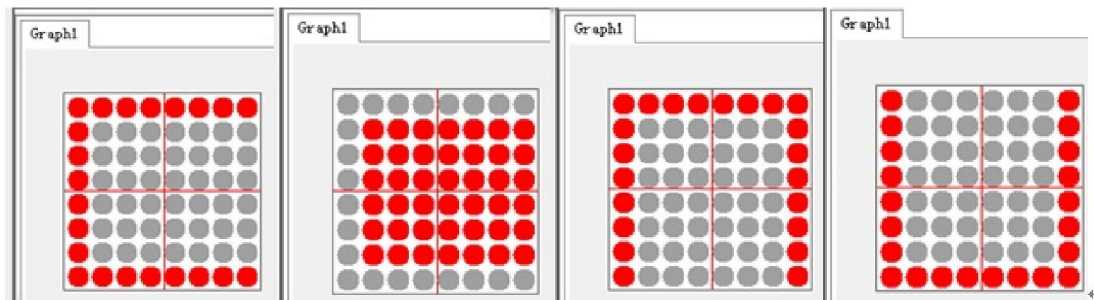


For the reason that the plane figure only has one layer, and you can see the effect directly, there is no need to preview.

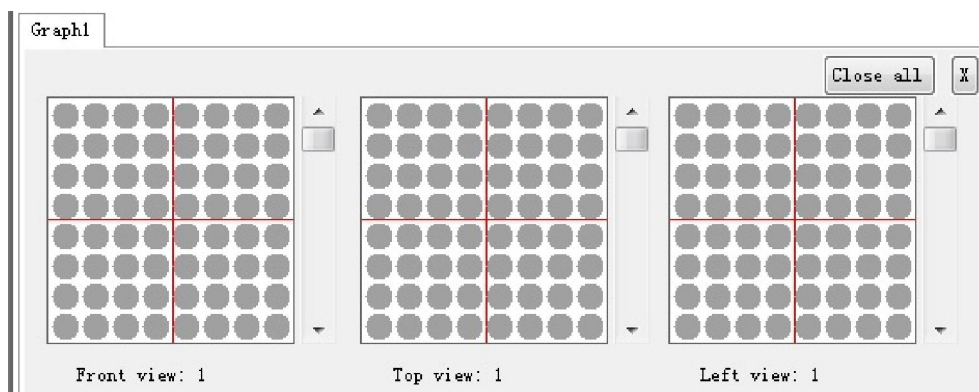
You can draw plane figure in operation interface directly, using the left key of the mouse as draw point when you are drawing, and pressing ctrl along with the left key of the mouse when you need to delete a point.



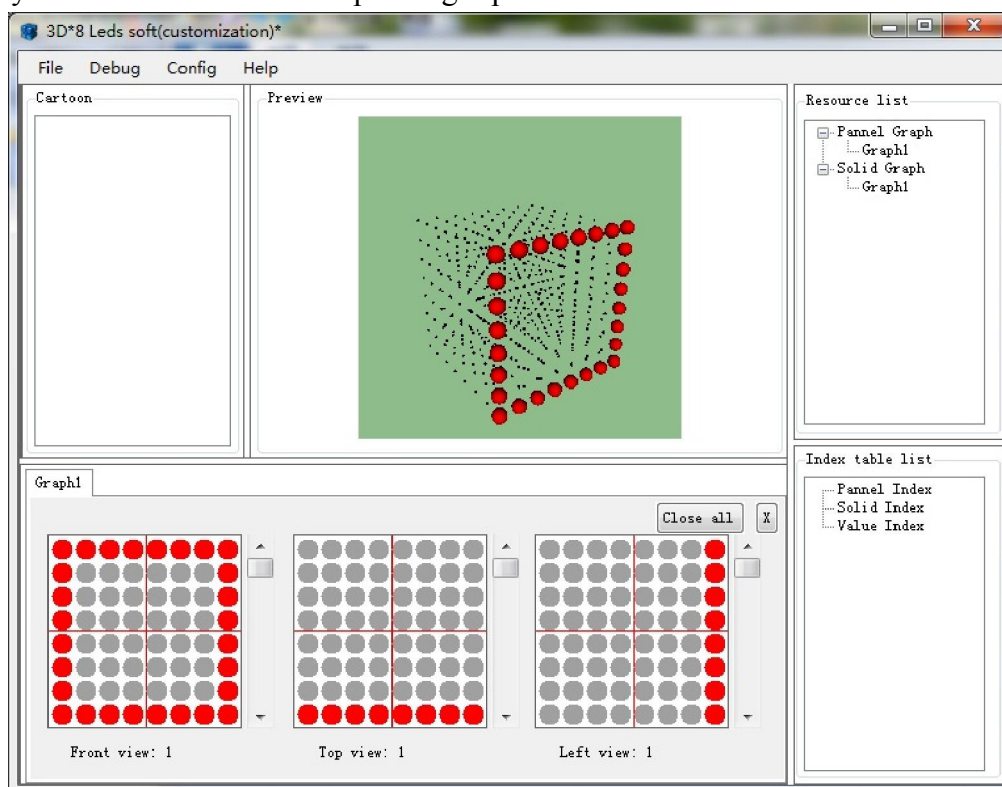
Right-click the plane graphic interface, and there will come out a lot of options, including empty all, display all, copy, paste, rotation, mirror, etc.



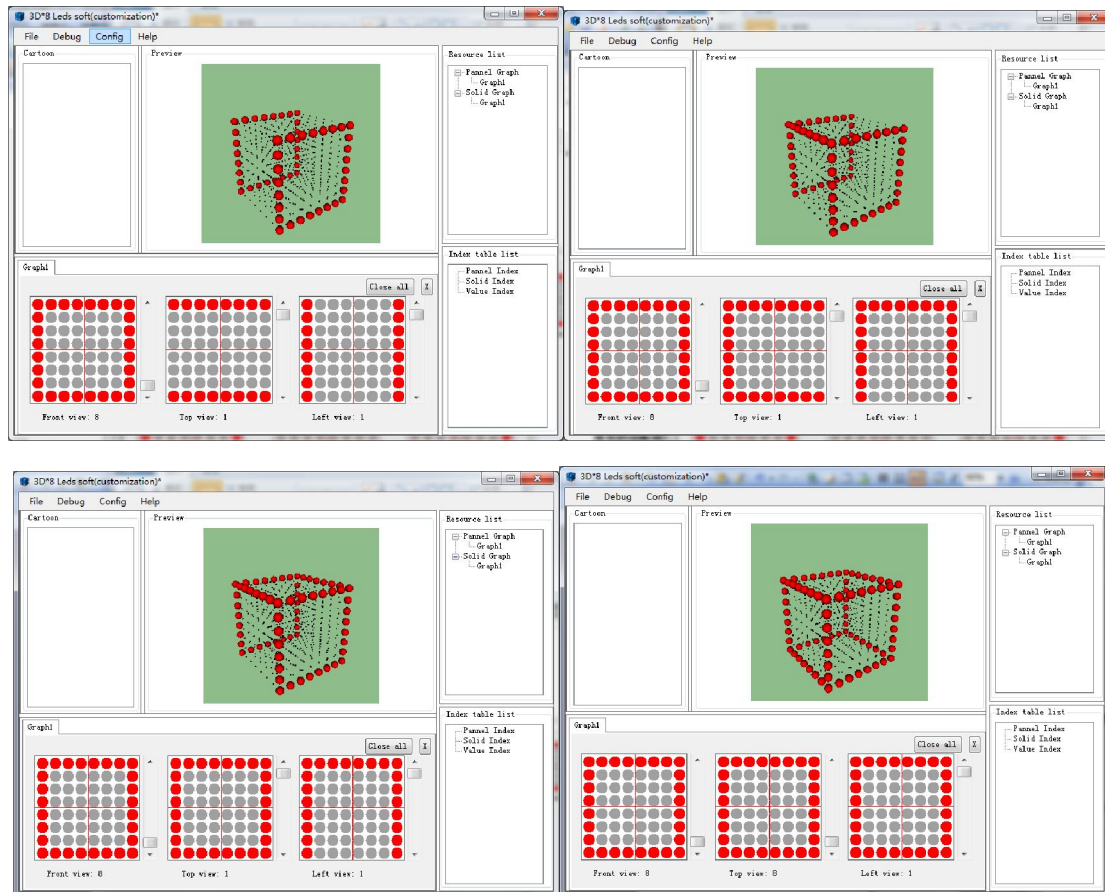
Double-click the **【Three-dimensional graphics 1】** in graphical resources, and there will pop up a three-dimensional graphics edit box. Three-dimensional graphics is a solid, it is divided into 8 layers, and each layer displays different content which lead to the stereoscopic effect.



Draw a frame in the first layer, then you can see the preview in the preview area, and you can also see the corresponding top view and left view next to it. As follows:



Use your imagination! If you need to draw a frame of a cube, you just need to draw a frame in the first and the 8th layer, and four points at four corners in the other 2-7 layers. As follows:

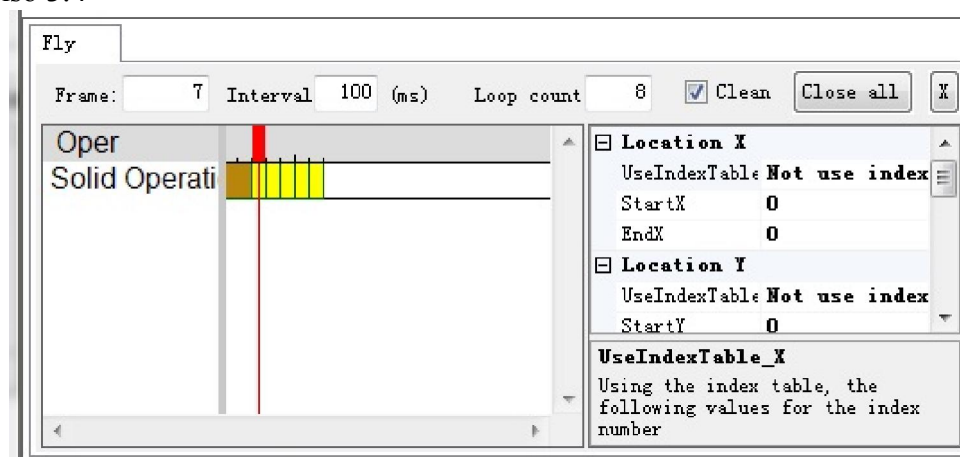


The operation of other 3d graphics is like this. You can draw the picture you like directly.

3.2.4 Operating area

Operating area is where all the animation is made, and every animation is made in this area. You can see the positional value and parameter settings of all animation on the right side of the operating area.

Later, we'll explain all the operation methods of this area by some examples, see also 3.4



3.2.5 Resource index table

Resource index table enables the animation resources making a variety animation according to an index function.

As we won't use the resource index table in making basic animation presently, we skip it temporarily.

3.3 Introduction about the operation of making animation

3.3.1 Brief introduction about the operation of animation

The operation of animation includes point operation, line operation, plane operation, 3d operation, etc.

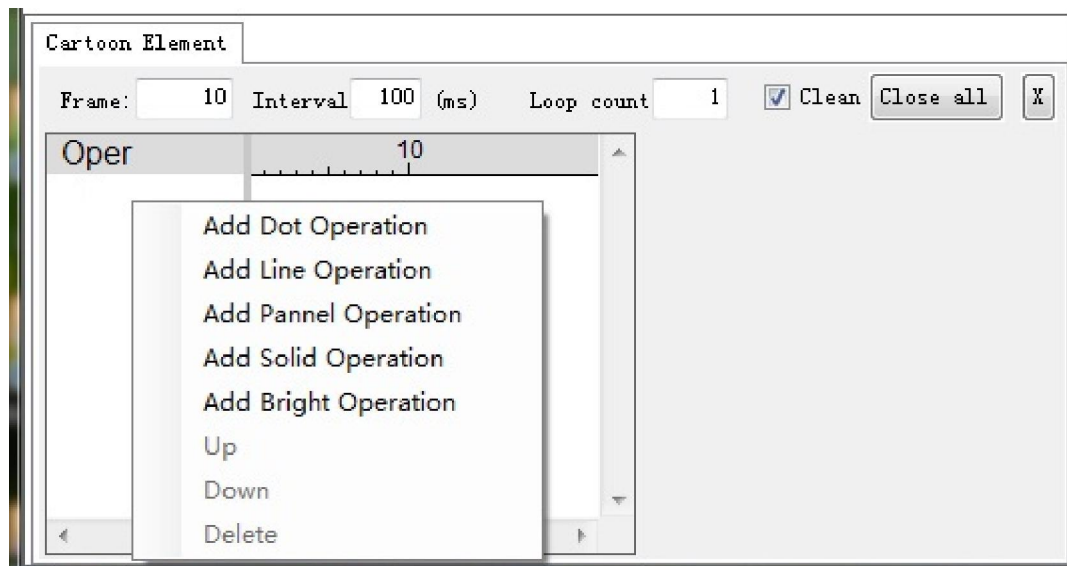
Point operation: Set a movement trajectory for a point in the animation frames.

Line operation: Set a movement trajectory for a line in the animation frames.

Plane operation: Set a movement trajectory for plane resources selected in the animation frames.

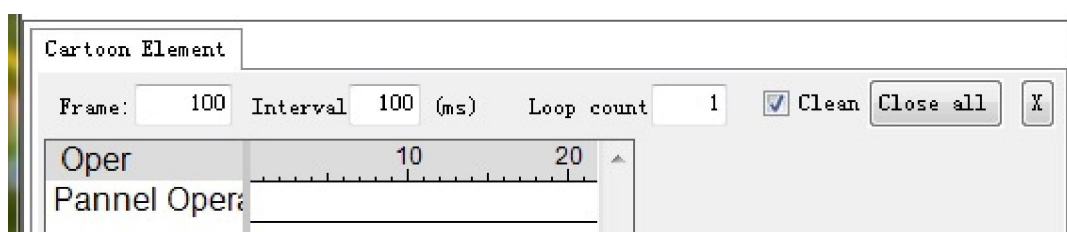
3d operation: Set a movement trajectory for 3d resources selected in the animation frames.

First, you should establish animation group, and then establish animation unit under it, double-click the animation unit, and you will see the detailed interface of the animation unit in the operating area, then you should set the number of the frame, and after that, you can add other operations. Picture is as follow, right-click to add other operations.

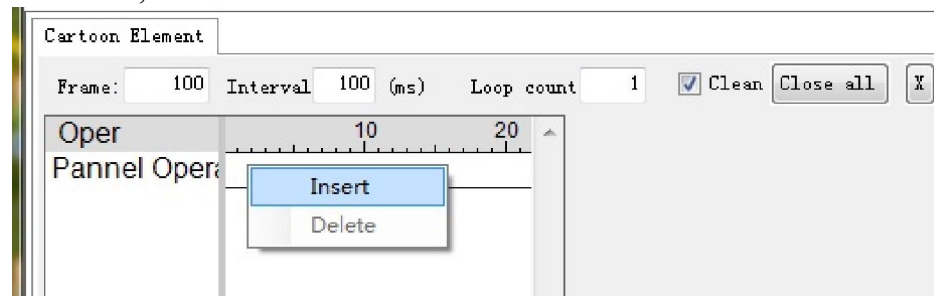


3.3.2 Detailed introduction about animation parameter Settings box

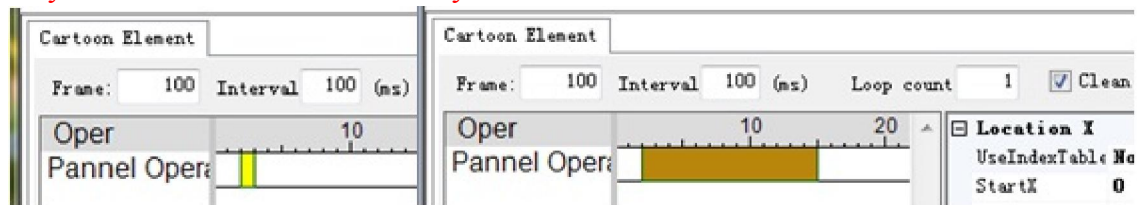
First, we add a plane operation, as follow:



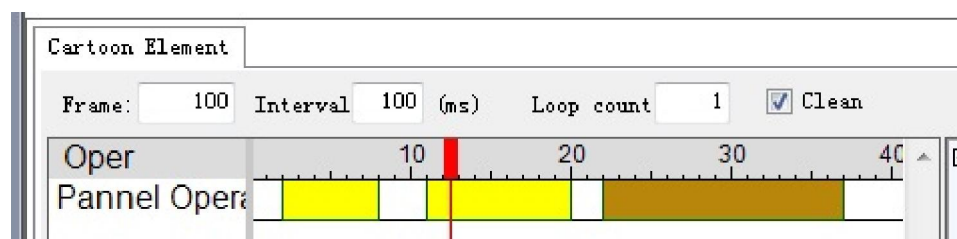
Then we right-click the time line corresponding to the operation to add animation frame, as follow:



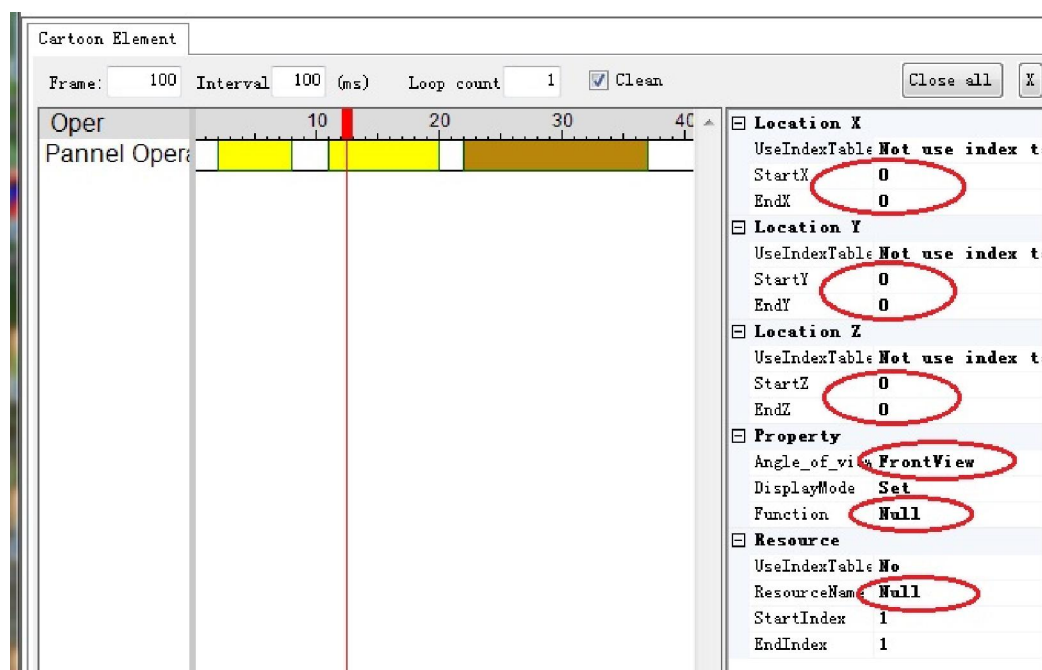
After you insert a frame, you can move the mouse to the edge of frame, and then drag it to a lot of frames. **It is those frames of pictures that the system finally runs; they become animation when the system runs fast.**



Right-click to insert a lot of different animation frames, you can select a frame with the mouse click on it, and then the selected frame will turn brown.



When a frame is selected, there will pop up an animation parameters settings box right next the animation frame, **you can set various animation effects there to finally complete the animation making.**

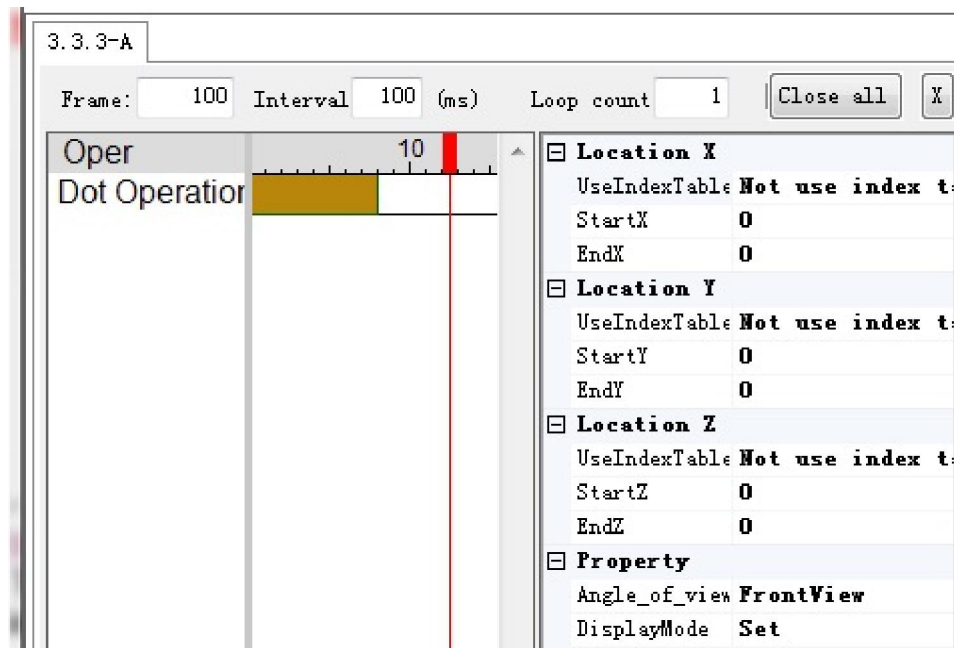


3.3.3 Detailed introduction about animation operation

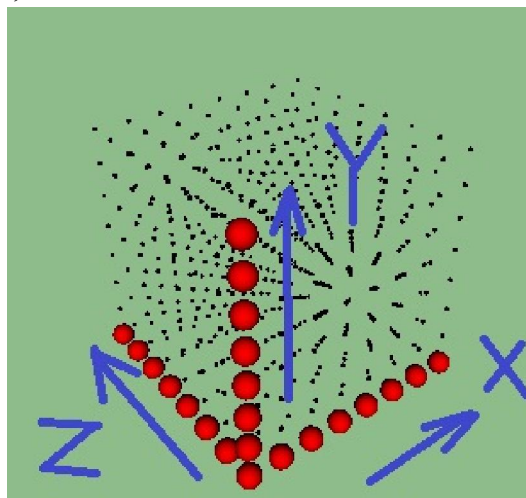
Next, we will tell you how to make the animation effects by various operations.

A: Point operation

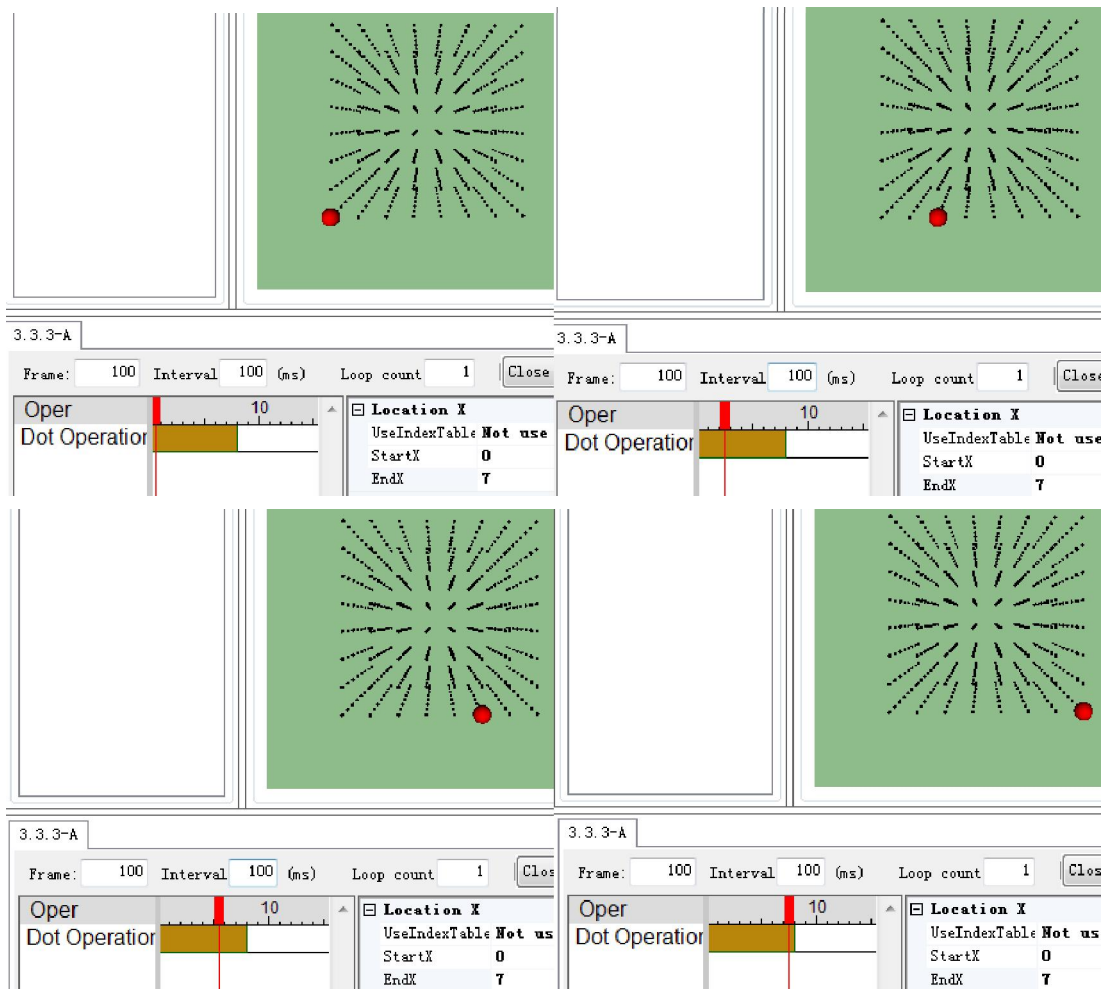
Point operation is to use a certain point to complete the animation effects. First, you should add a point operation, then new an animation frame, 16 frames long, select the animation frame, and there comes out the settings box. There is a xyz coordinate of the point in the box and the initial position of the point, the moving trajectory. The animation of different point's moving trajectory can be shown by changing the coordinate value.



The point's direction of the xyz coordinate is as follows, coordinates of the joint point is 0, then 1, 2,,,7, in the direction of the arrowhead. The top coordinates are 7.



As follow, set the frame length to 8, the starting value is 0, and the ending value is 7, besides, the interval is 1. The animation effect is shown as the following picture: select a frame, then there will appear a red vertical bar in this frame, and the preview of the animation will be shown in the preview box.

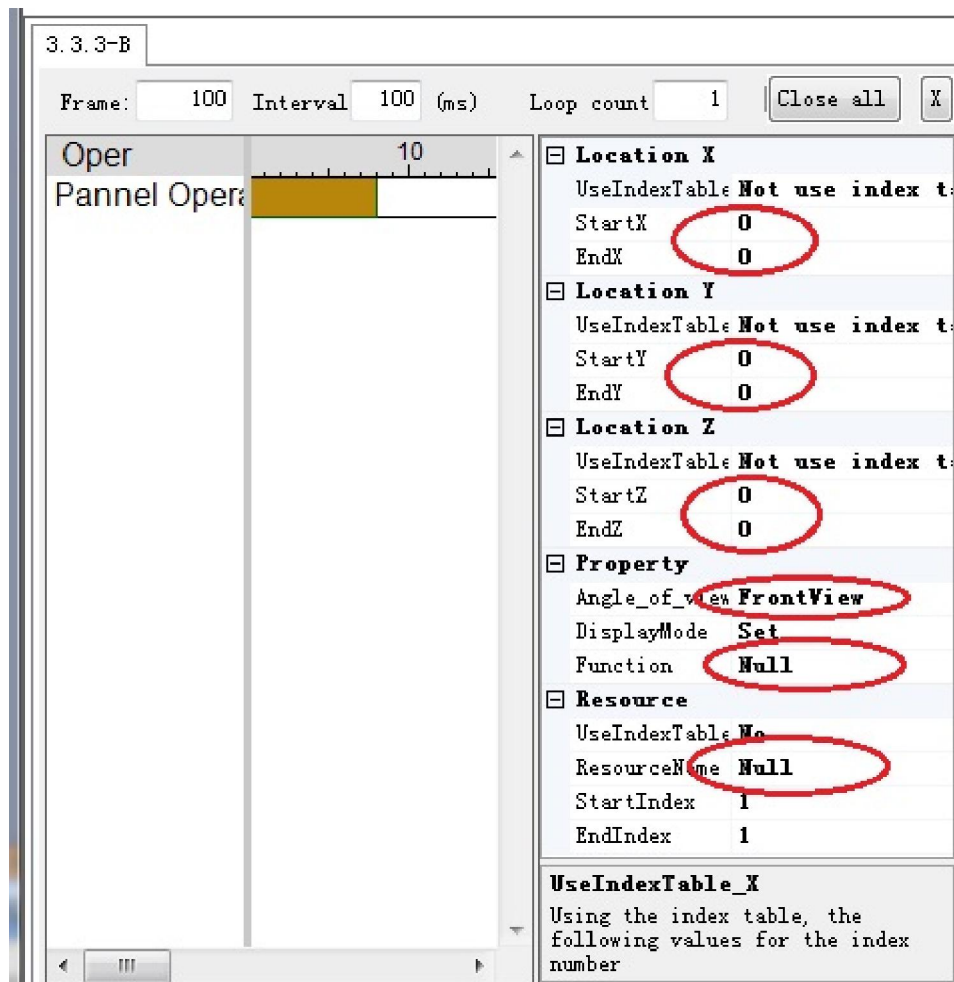


If the frame length is set to 4, then the interval of the point x's corresponding point 0-7 is 2.

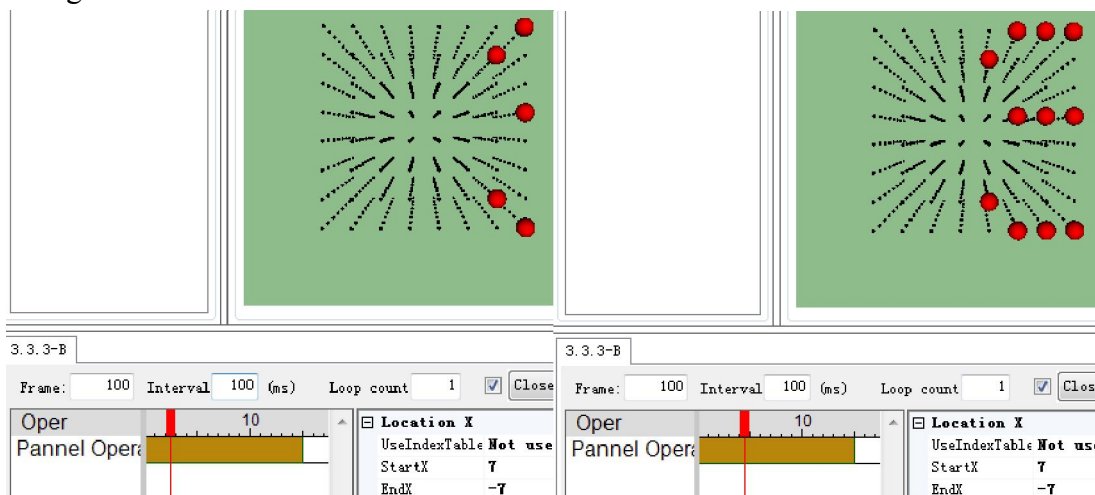
Axis y and z is the same as axis x, you can get different animation effect by setting different value.

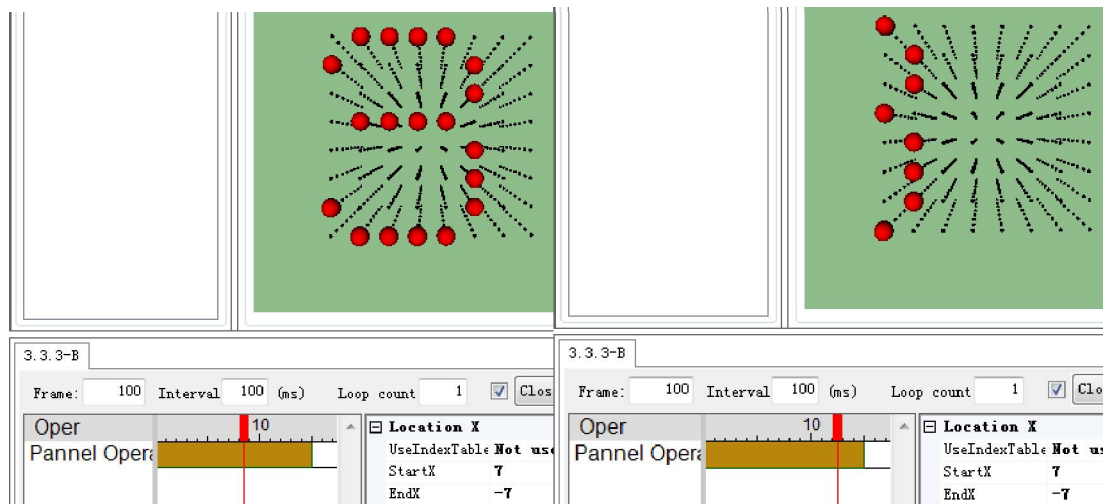
B: Plane operation

Plane operation is similar to the point operation that the plane will move with xyz coordinate which is corresponding to the value set. The difference is the plane operation can choose different plane resources, and it also supports different angles, rotation, mirror, etc.

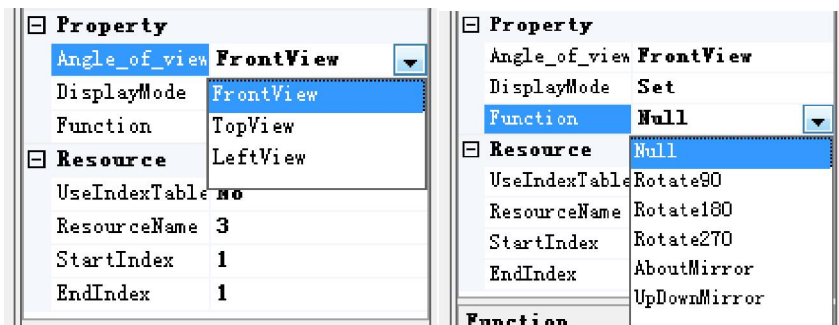


As follows, we set the plane character **【3D】** moving through the right ahead. First, we can imagine that when the plane picture appears in the far left, the coordinates of its first point is 7, the far left of the x axis; while when the picture leave this plane, for the reason that its first point has gone 7 grids from the 0 point of the x axis, the coordinates of its first point turn -7, and the length of the trajectory it went through is 16 frames. The effects are as follow:

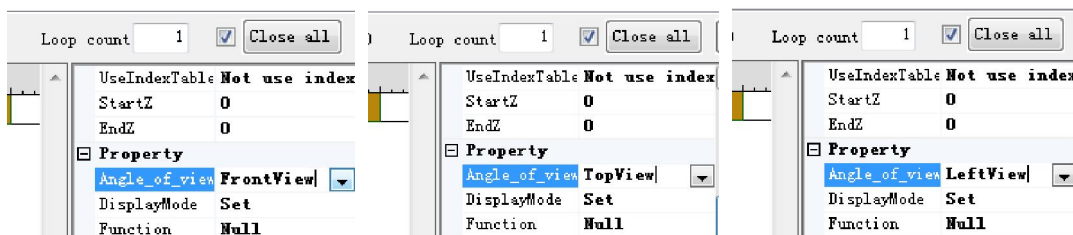
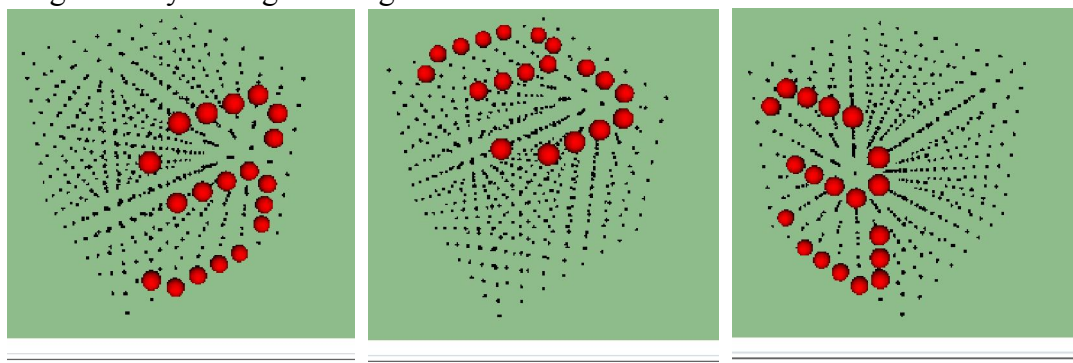




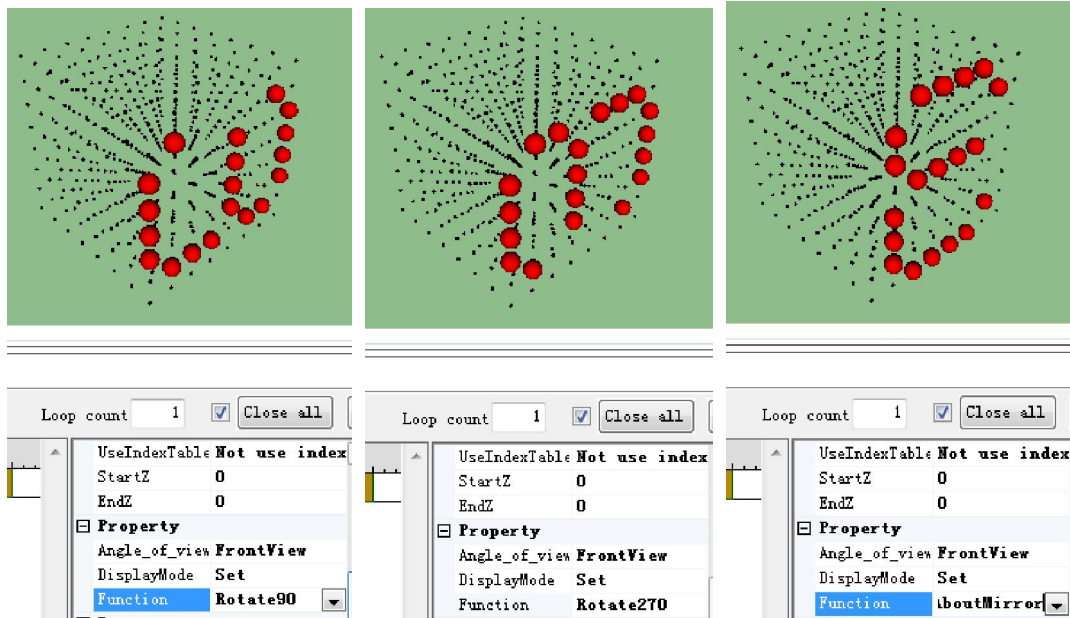
Choose different picture, and you will see different moving animation effects.
Next, we'll show the function of different angles, rotation, mirror, etc.



The followings are the different effects of the same picture in different angles.
What you should pay attention to is that the corresponding xyz coordinates will changes with your angle settings.



Choose different ways of rotating or mirroring, and you can get effects of different angles. As follows:



C: 3d operation

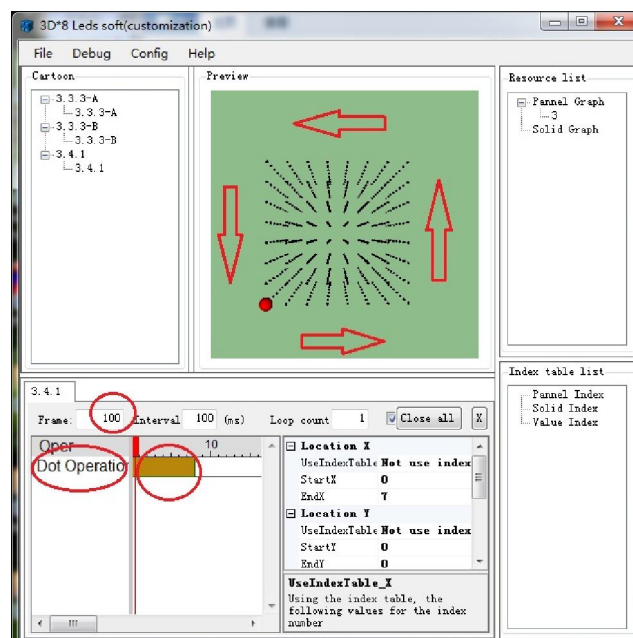
3d operation is nearly the same as the plane operation, so we will not explain it there; you can see the details of it in the page of making animation.

3.4 Instances of making animation

3.4.1 Drawing a line with a point (Point operation)

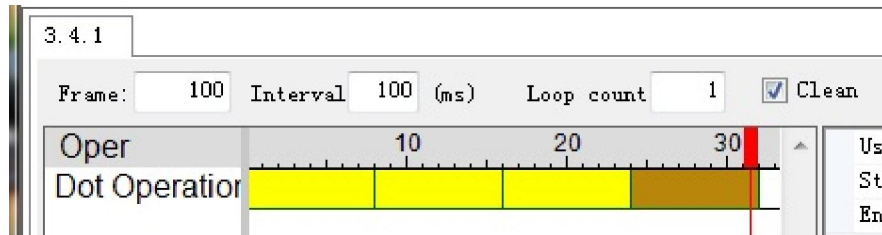
The instances succeed in drawing different pictures by point operation.

First, the preparation can't be omit. Establish an animation group, and then establish a animation unit under it, double-click the animation unit, and there will pop up a operation box. You should set the frames there, and right-click to add point operation, then right-click to insert frames in the time axis, and stretch the length of the frame to the width of a screen, 8frames.

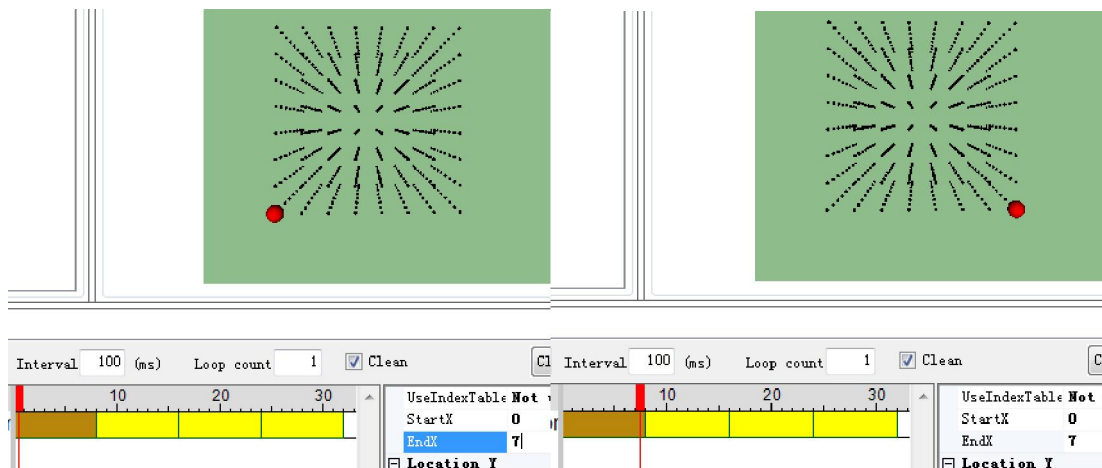


Next, let the point run a circle in the direction of the arrowhead by setting the value of the xyz coordinate.

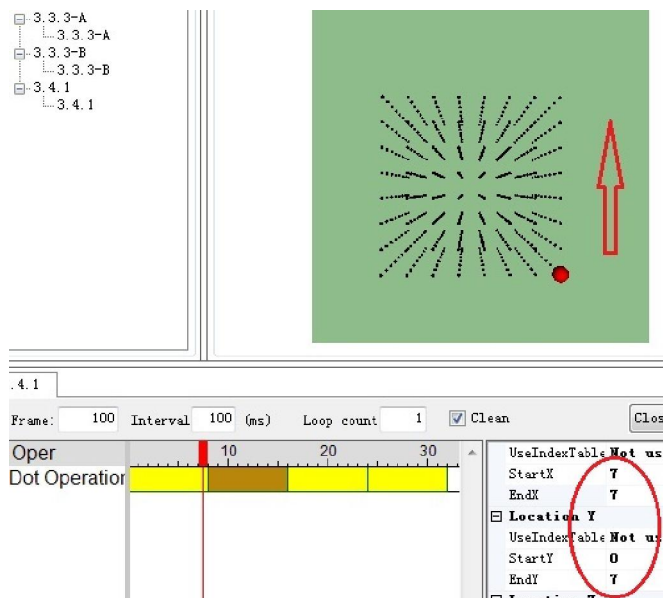
A circle includes 4 sides, so you need to establish 4 independent frame strips. Set different value to different frame strips, and they can perform different operations, and then finally achieve the purpose of drawing a circle.



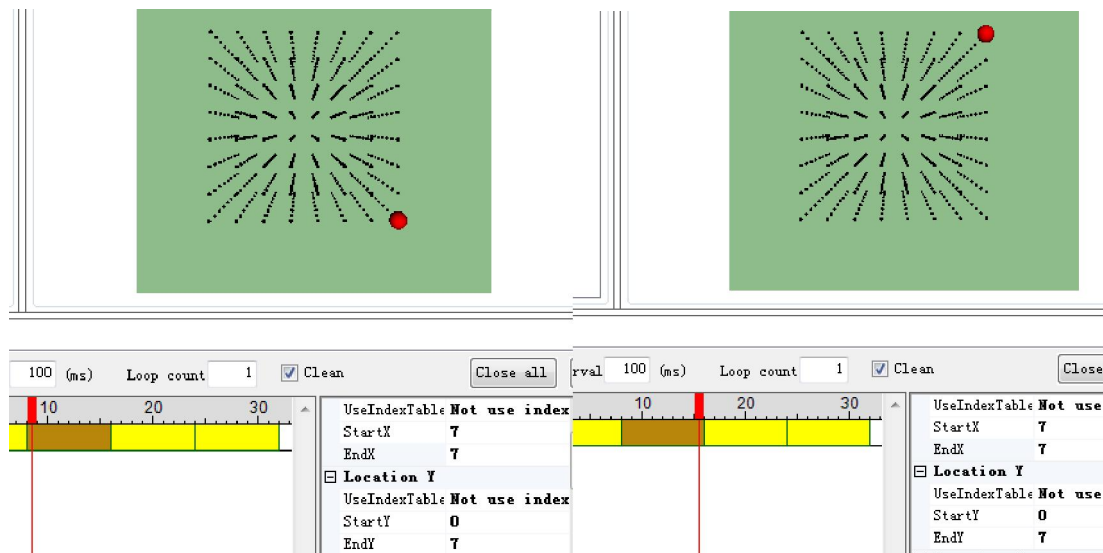
First of all, the first frame strip is from left to right, the X coordinates of its origin is from 0 to 7, and the values of coordinate y and z haven't change. You can make the point run from the left to the right only by changing the end value of X coordinates to 7.



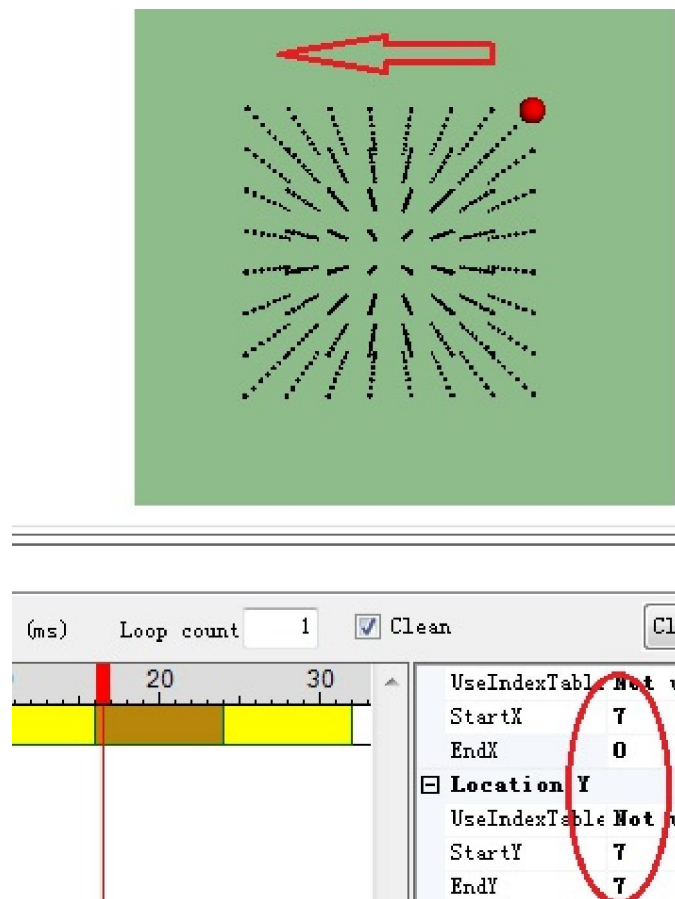
Then the second one. Choose the second frame strip, this one is from the bottom to the top, the X coordinates of its origin is 7, the track of y is from 0 to 7(the top) . You just need to do these two settings, as follows:



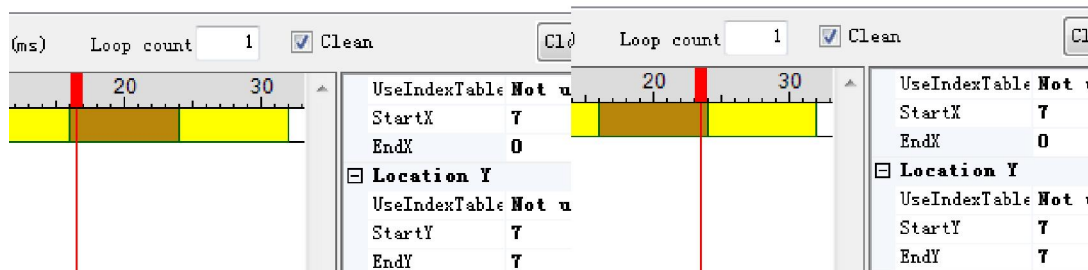
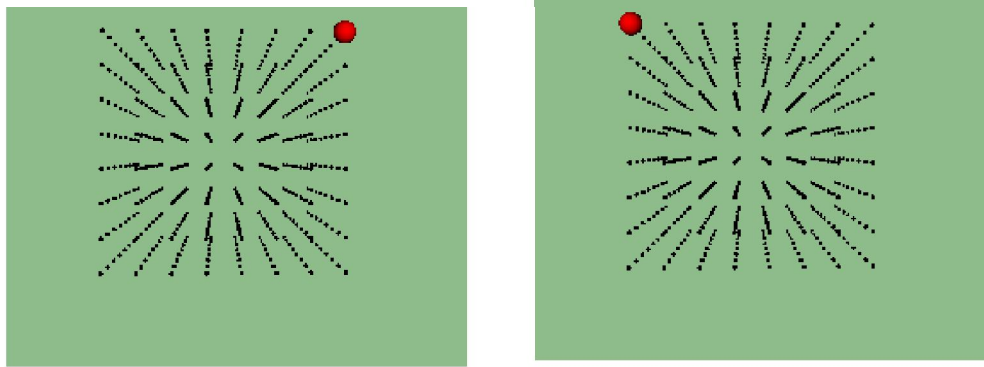
The corresponding view effect of this point is as follows:



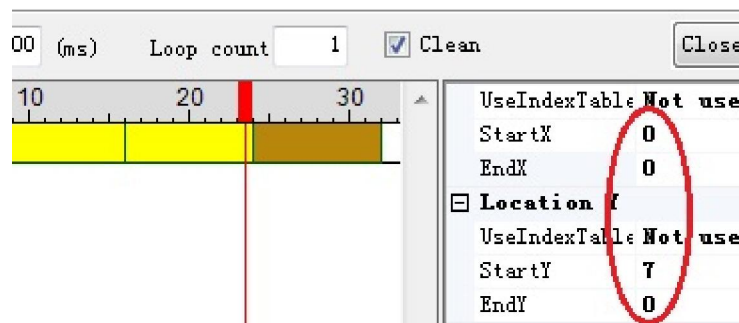
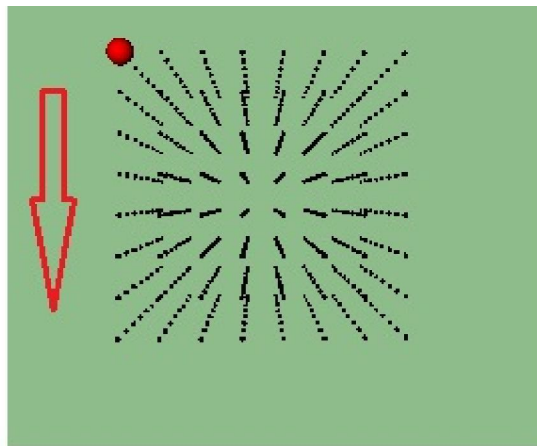
Next is the third one, choose the third frame strip, this one is from the left to the right, the y coordinates of its origin is 7, the track of x is from 7 to 0. You just need to do these two settings, as follows:



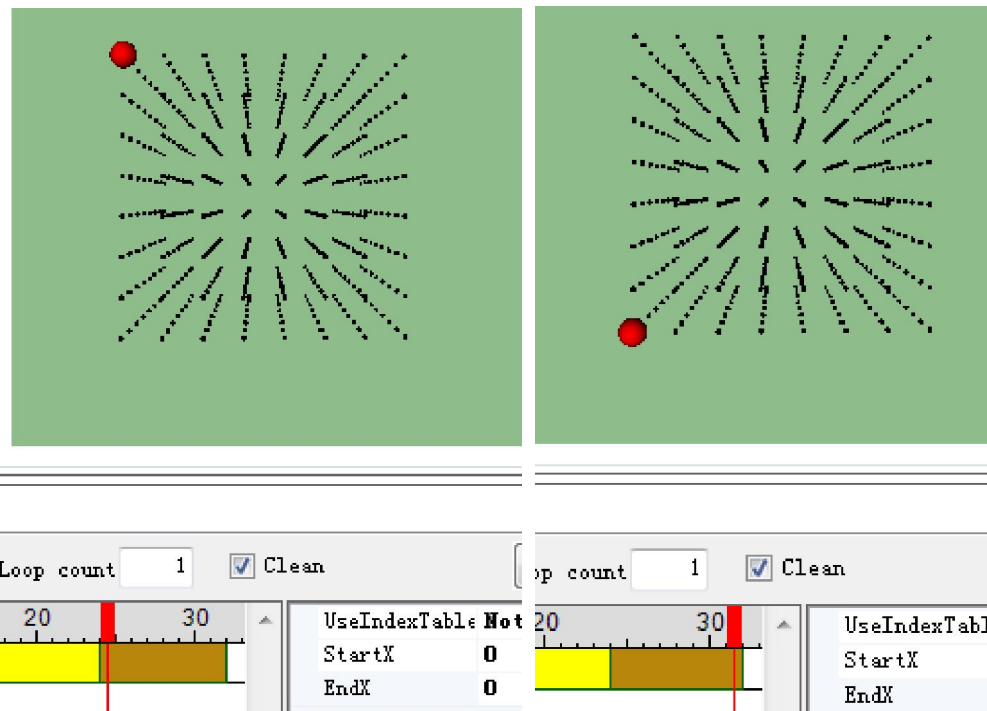
The corresponding view effect of this point is as follows:



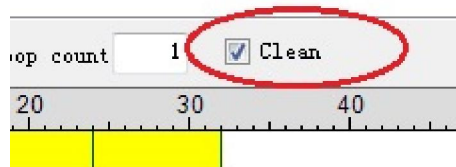
Then is the forth one, choose the forth frame strip, this one is from the top to the bottom, the X coordinates of its origin is 0, the track of y is from 7 to 0. You just need to do these two settings, as follows:



The corresponding view effect of this point is as follows:



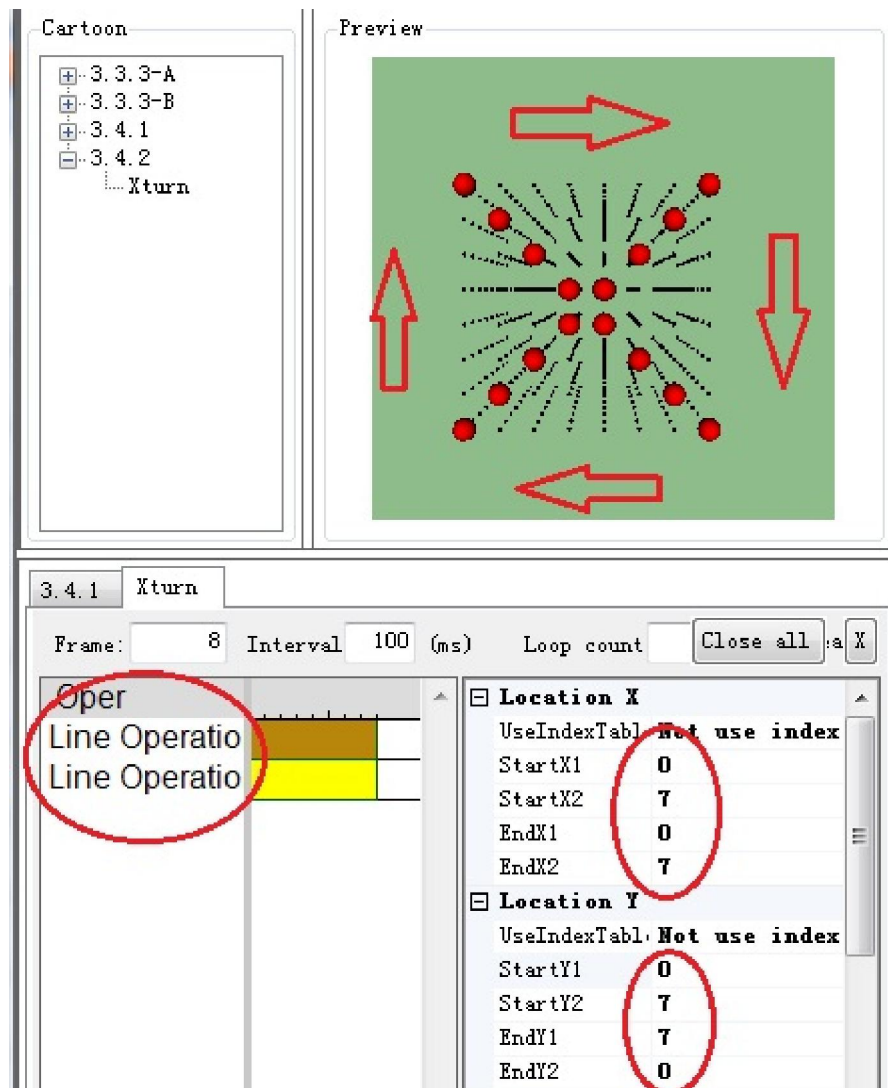
Then you finish drawing a line with a point. When you get rid of the tick of “clear the cache when change frames”, the trajectory of every mobile points will not be cleared, so points’ running track is a solid line, and the function using point operation to draw various graphics is achieved.



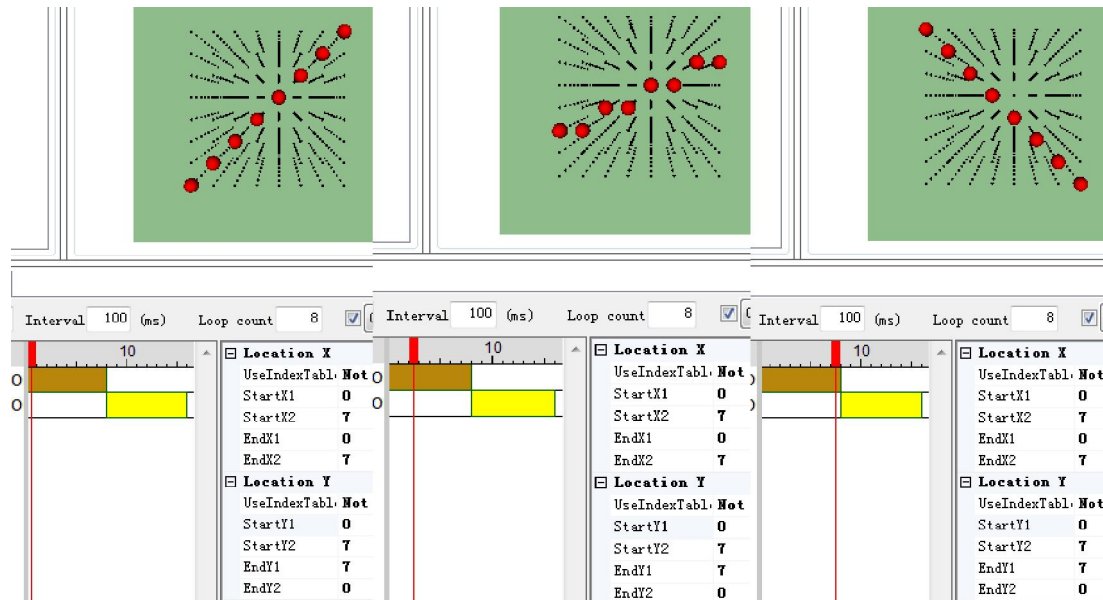
3.4.2 X rotation animation (Line operation)

The instance shows how to use line operation to draw the different graphic animation.

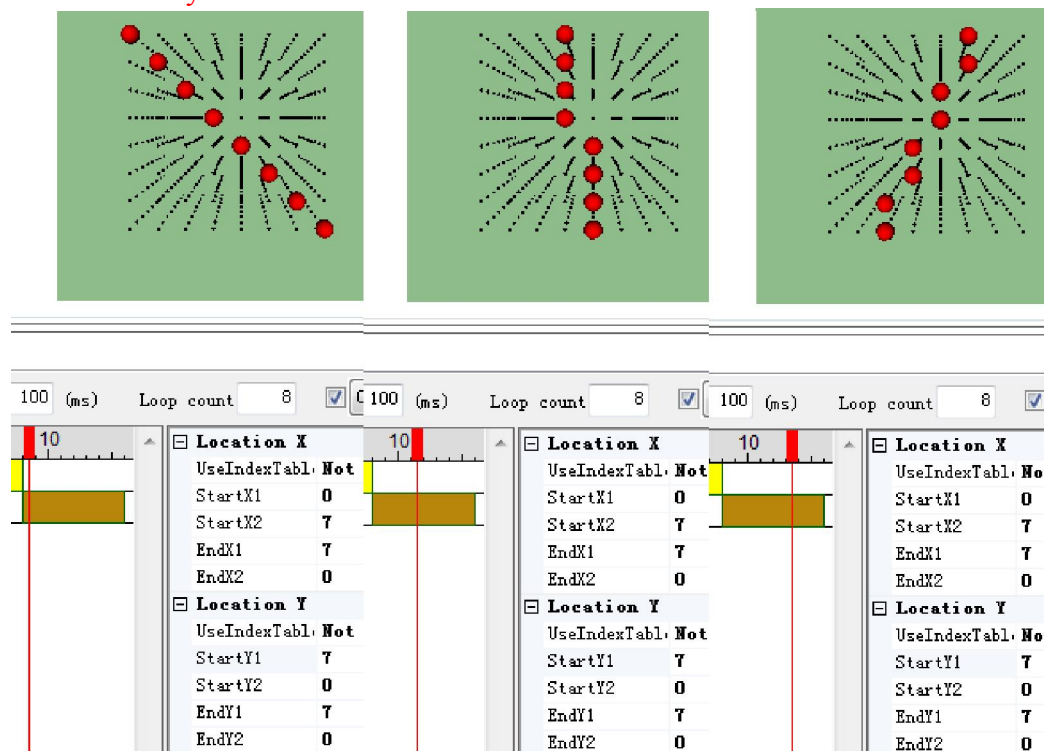
First of all, establish animation group, and then build animation unit, double-click the animation unit, then the animation window will pop up, set the frames there, and right click to add “two lines operation” (in fact, the animation is two lines rotate along the diagonal line), right click on the frames’ time axis to add frames, and stretched the frames to 8, the width of one screen.



The action of the first line is upward movement from the lower left side and downward movement from the upper right side. In this action, the value of the X coordinate corresponding to the upward movement from the lower left side is 0, while the value of the X coordinate is from 0 to 7; the value of the y coordinate corresponding to downward movement from the upper right side is 7, while the value of the y coordinate is from 7 to 0.



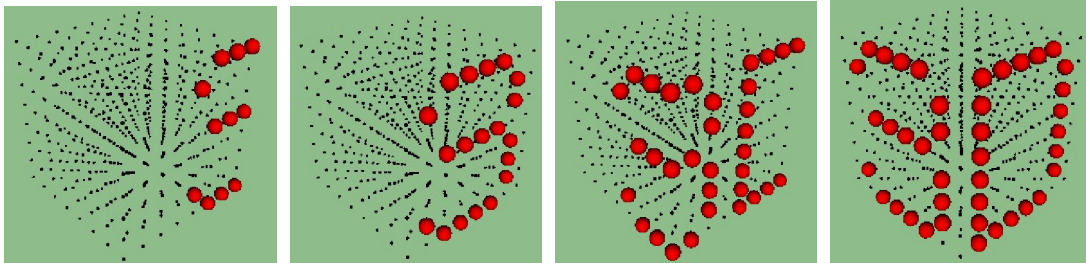
The action of the second line is rightward movement from the upper left side and leftward movement from the lower right side. In this action, the value of the X coordinate corresponding to the rightward movement from the upper left side is 0-7, while the value of the y coordinate is from 7; the value of the X coordinate corresponding to the leftward movement from the lower right side is 7 to 0, while the value of the y coordinate is 0.



After the two lines rotate once, the first line is returned to the initial position of the second line, the second line is returned to the initial position of the first line, and then it rolls up.

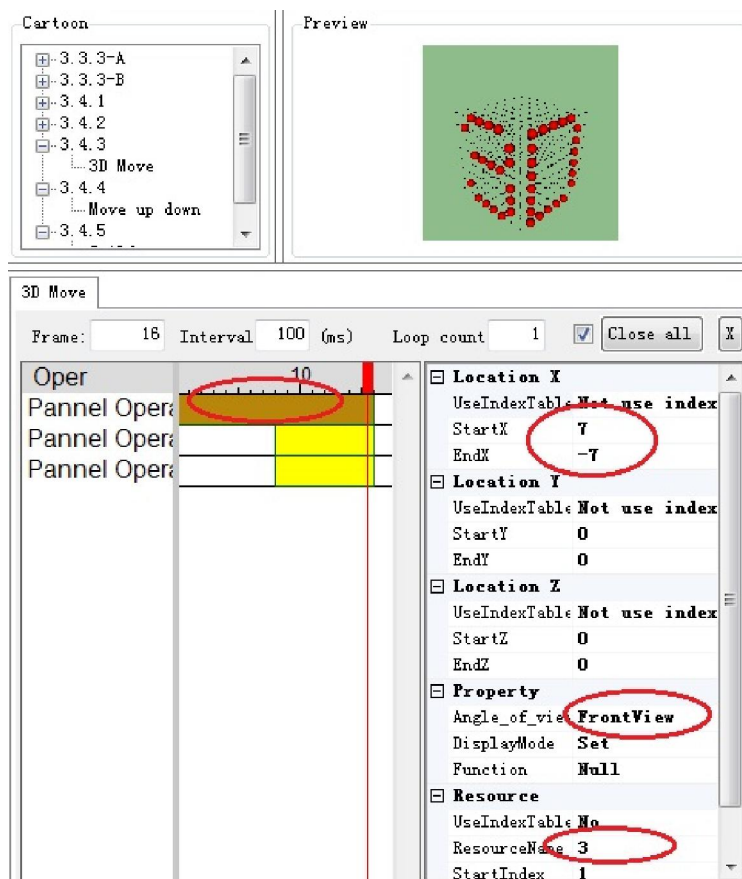
3.4.3 3D8S Movement (Plane operation)

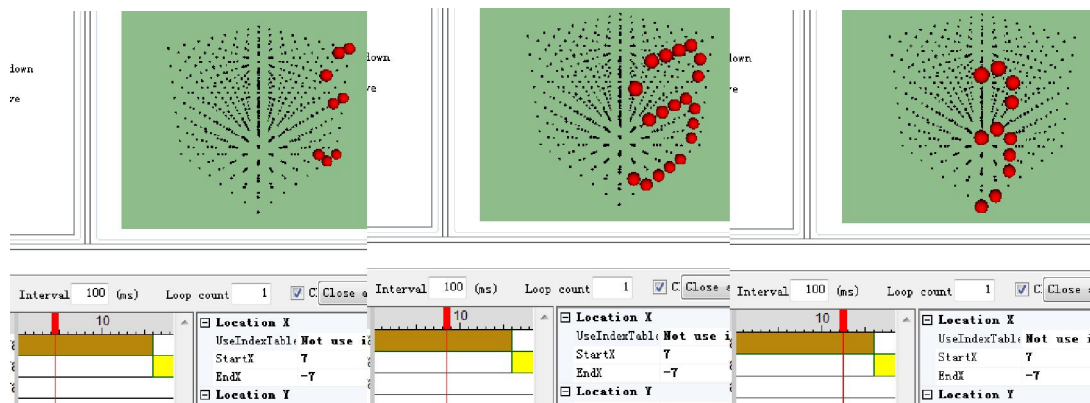
The animation of 3D Movement is mainly plane operation of graphics. In this operation, graphic **【3】** moves from the right of the front to the left, and then from the right of the left to the left. This operation only needs to move the graphic **【3】** from the right to the left of its positive view (Plane operation), and from the right to the left of its left view (Plane operation), and move the graphic **【D】** from the right to the left of its positive view (Plane operation), such three plane operation together.



First, let's look at the mobile operation of **【3】**, its 0 point is from 7 of X coordinates to 0 (**【3】** into the picture), and then from 0 of X coordinates to -7. (**【3】** out of the picture). This operation goes 15 grids altogether. When insert the frames, if you insert 15, then a frame, a grid; if you insert 32, then a frame, 2 grids. We insert 15 frames there.

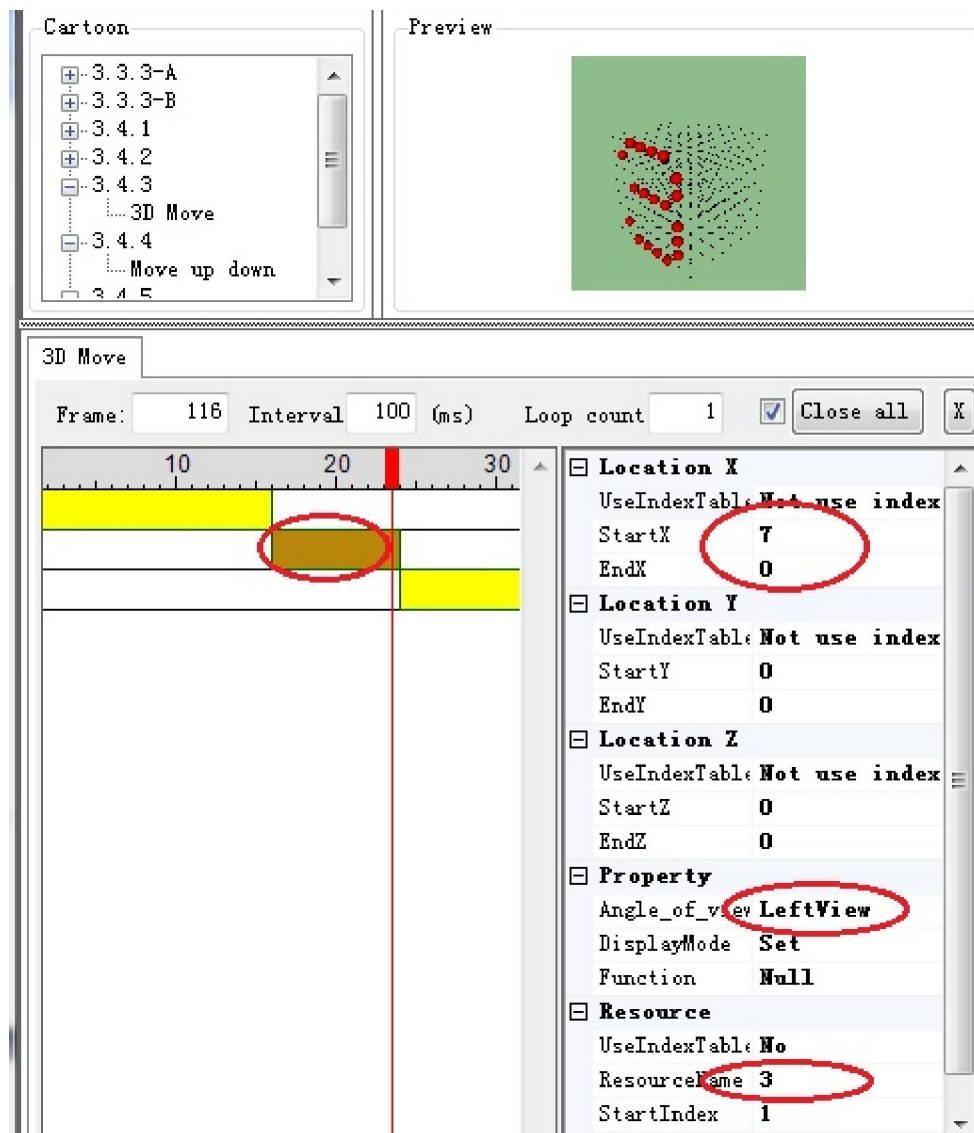
Insert 15 frames, and then select it, choose **【3】** when setting its resource name, a positive view, and then set the coordinate value of graphic moving: according to the X coordinate, moving from 7 to -7, then you complete the **【3】** moving into the picture and then out of the picture.

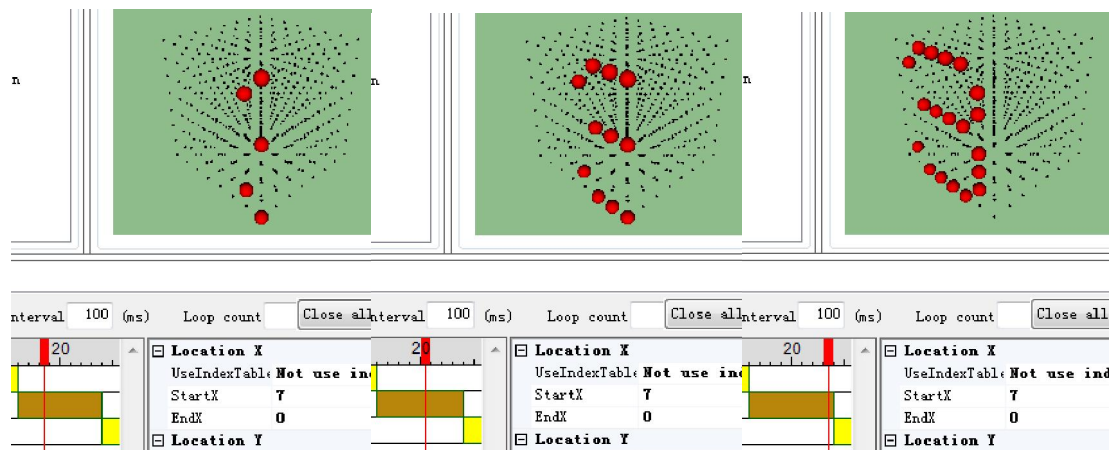




Next is the operation that graphic 【3】 moves from the right of the left to the left. This operation is moving from the right to the left of its view. in this operation, 【3】 is just moving into the picture(from coordinates 7 to 0), then stop, it doesn't move out of the picture, so 8 frames is enough.

We use left view there. In this view, graphic 【3】 is from 7 to 0 along the X coordinate, so this action can be achieved only by set the value of X coordinate.

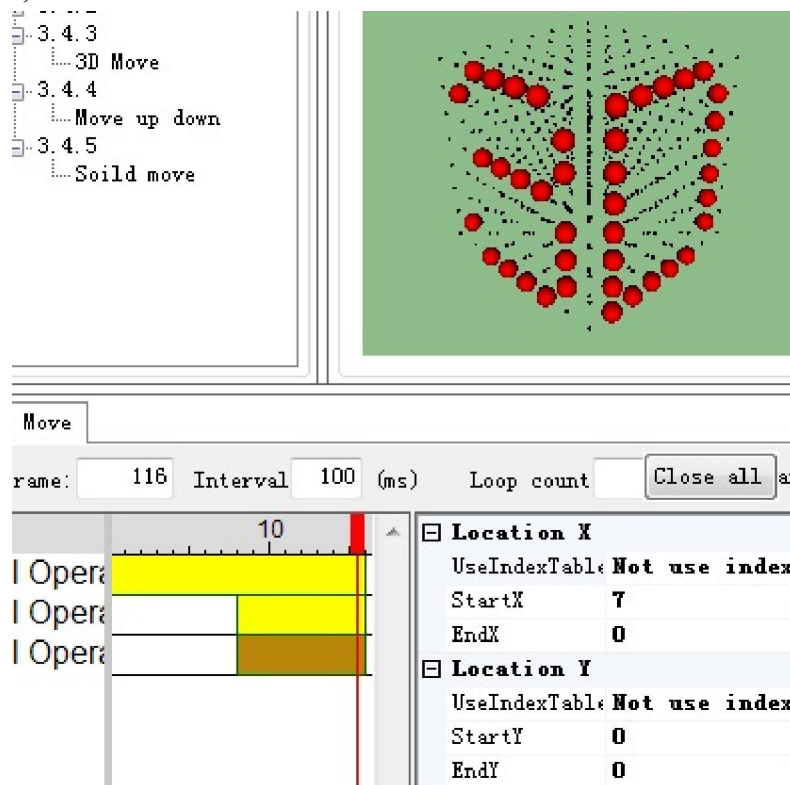




Then put the graphics 【D】 to perform the same action.

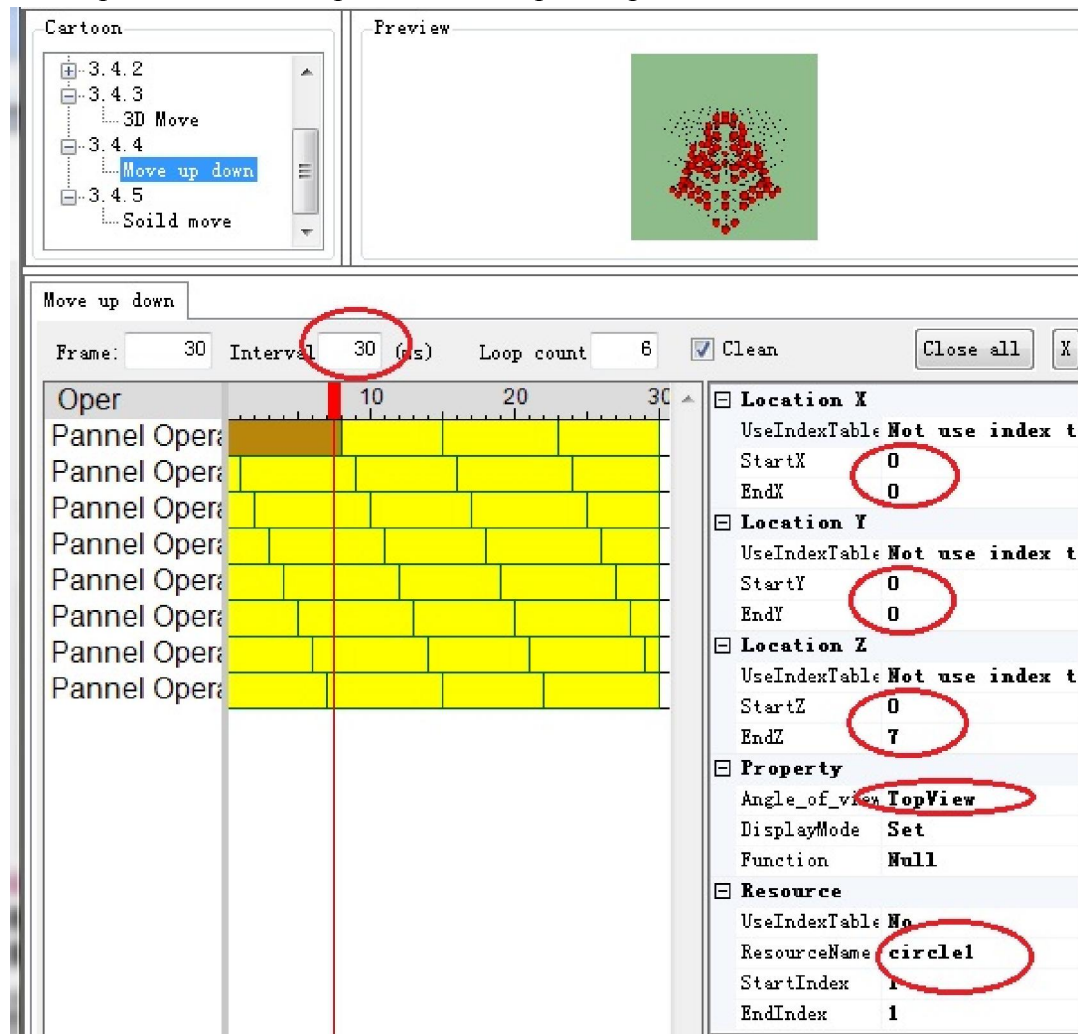
At last, combine the 2 movements and put them to a certain time axis, then the whole animation effect completes.

The animation frames on the time axis are ordered by the sequence the animation coming out. Take this animation for example, when the positive view of 【3】 moves into the positive center doing the action moving out of the picture, the left view of 【3】 need to keep up with it, thus form the effect that 【3】 moves from one plane to another. 【D】 is the same, it moves into the picture when 【3】 moves out of the positive view, the time axis is as follow:

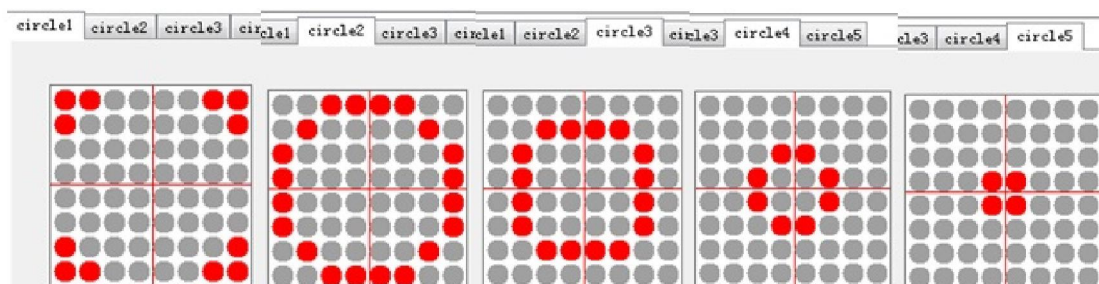


3.4.4 Fluctuating animation (Plane operation)

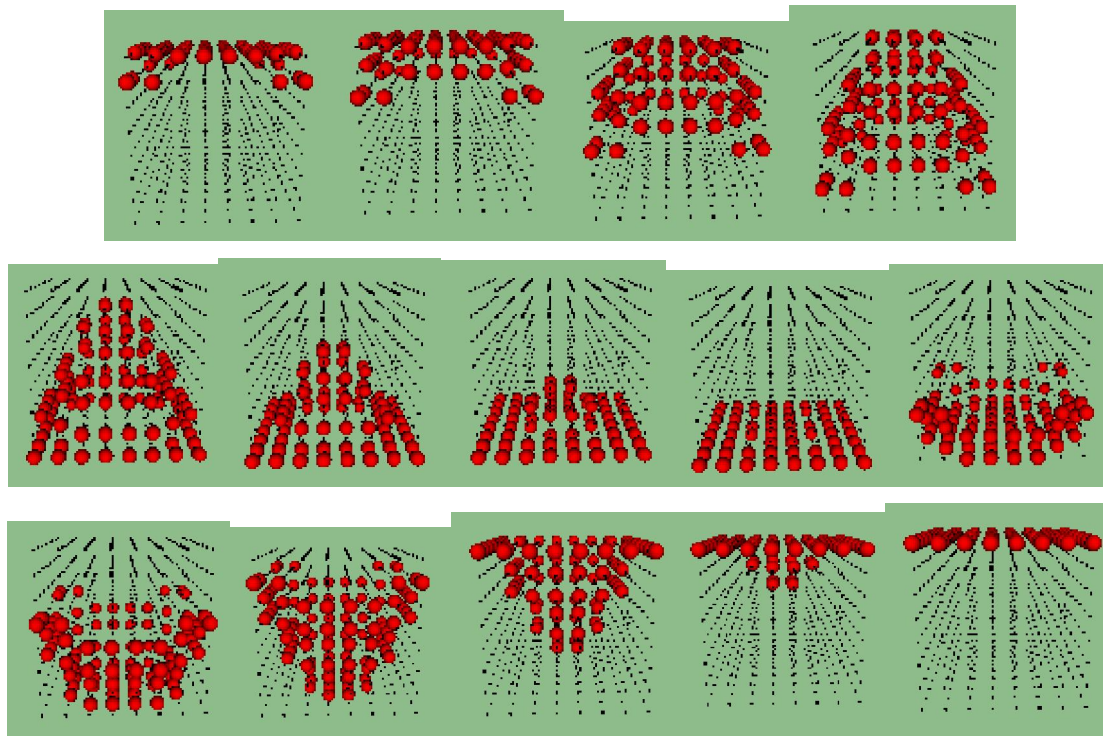
This animation is relatively gorgeous, but its operation is more complicated. The whole operation is made up of 8 different plane operations, the effect is as follows:



This animation is actually made by 5 different size circles moving up and down according to different appearance order, and then they circulate, by doing it the animation is formed. First, you need to have the circle's plane picture made, as follows:



After the plane picture is made, we break down the detailed action process of the animation.



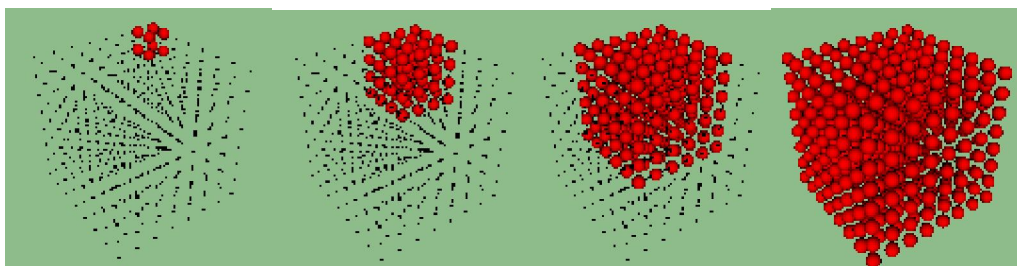
This action is 5 pictures moving respectively from big to small, from top to bottom in sequence. When the circle one moves to the bottom, it stops and waits for others to fall to the bottom layer. They all move respectively from small to big, from bottom to top in sequence to the top layer when 5 circles are all fell to the bottom.

In this way, the operation of every circle is actually the same. As the following picture, 1-5 circles, each occupy two layers, Z coordinates of its top view respectively moves from 0 to 7. The interval of each frame is a grid, then the effect that pictures move down frame after frame formed, and then add a effect that when a frame fall to the bottom it stops (seen in the red circle) , then the effect that circles drop from above to below layer after layer is formed.

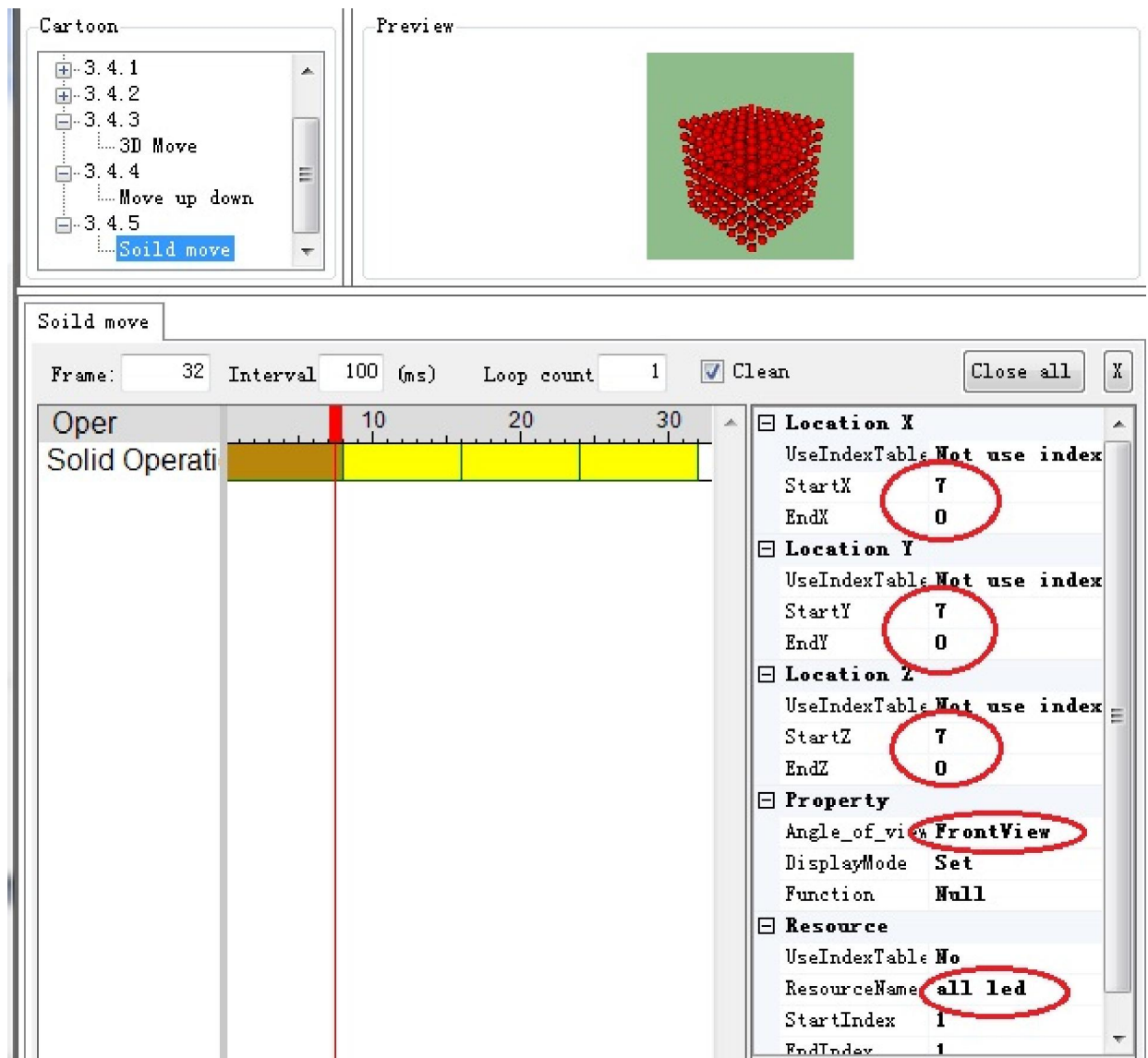
Instead moving up is the same, but all in turn(Z coordinates from 7 to 0).

3.4.5 Cubic mobile animation (3d operation)

Currently, we use 3d animation to achieve the effect of animal flying or running. 3d animation is relatively simpler than others, just play it frame after frame.



As follows, the animation is made by moving a full bright three-dimensional graphic from all angles.

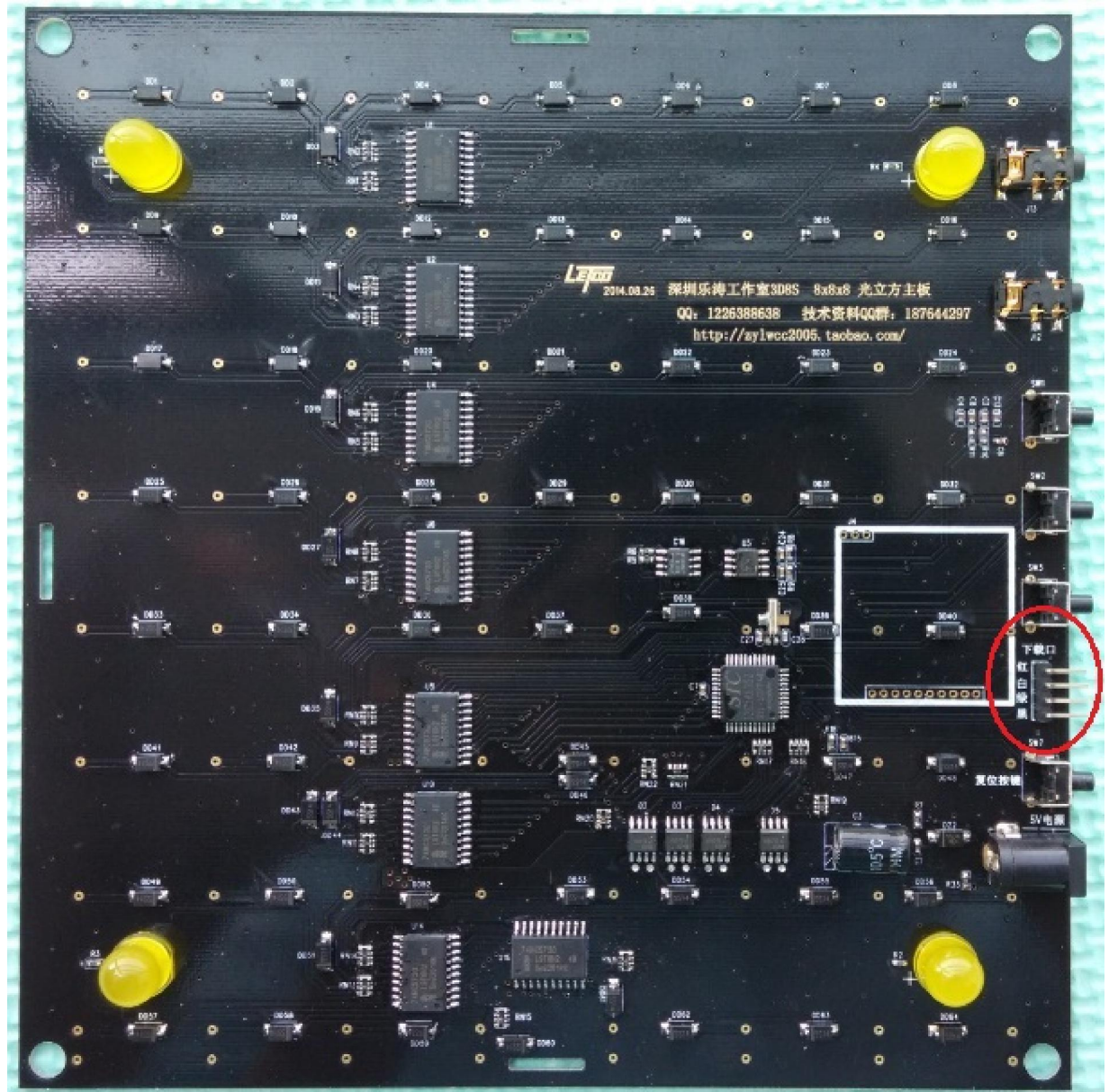


And then change the resources of each frame into three-dimensional, you should pay attention to the order those 3d picture play. If you need to adjust the speed of movement, you can short the interval time of the frame directly.

4 LeTao3D8S light cube tutorial for download and debug

4.1 Picture of 3D8S light cube baseboard

Here is the front view, some of the elements do not need to be soldered, like the photo shows:

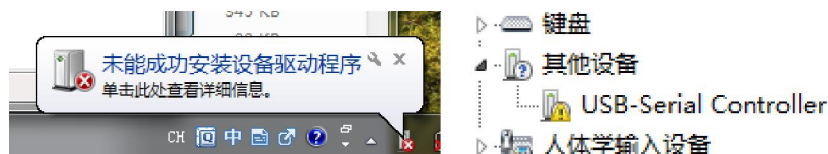


Insert one end of the download wires into the computer USB port. Except the red one, insert the white, green, black wires of the other end into the download port on the baseboard according to the color they have: green to green, white to white, and black to black.



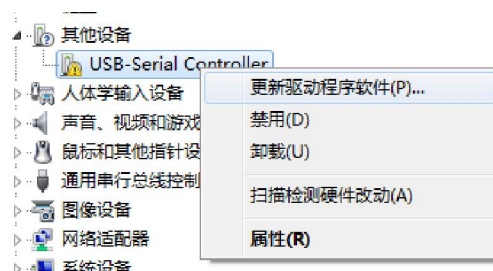
4.2 Install serial driver

Put the download wire into the computer USB interface. 'Not installed device driver' may be prompted for the first time use.

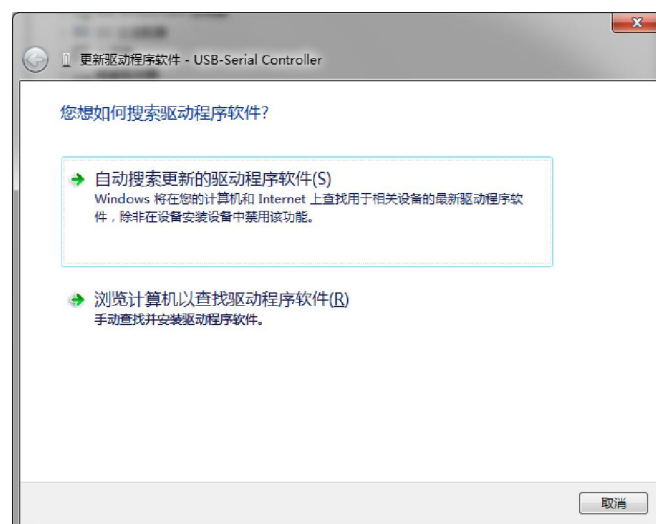


There won't be a prompt if you have installed a driver, and you can see the COM port number directly in the device manager. But if there is, do as the following:

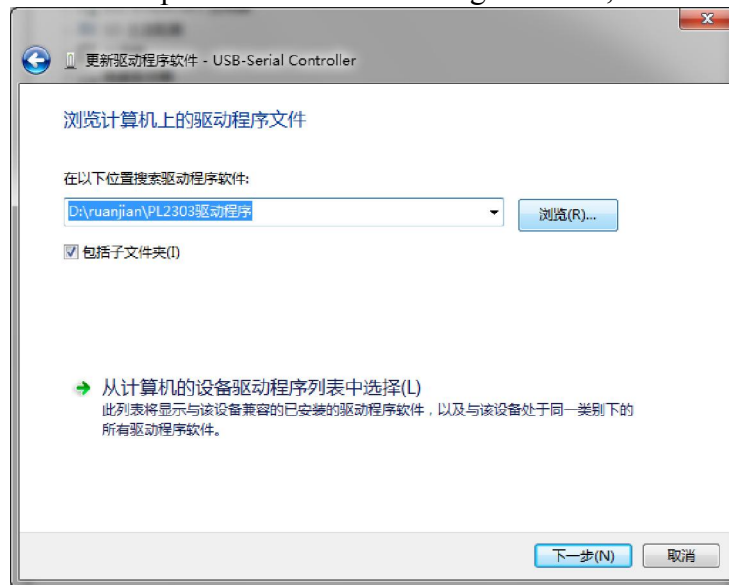
Select 'update driver'...



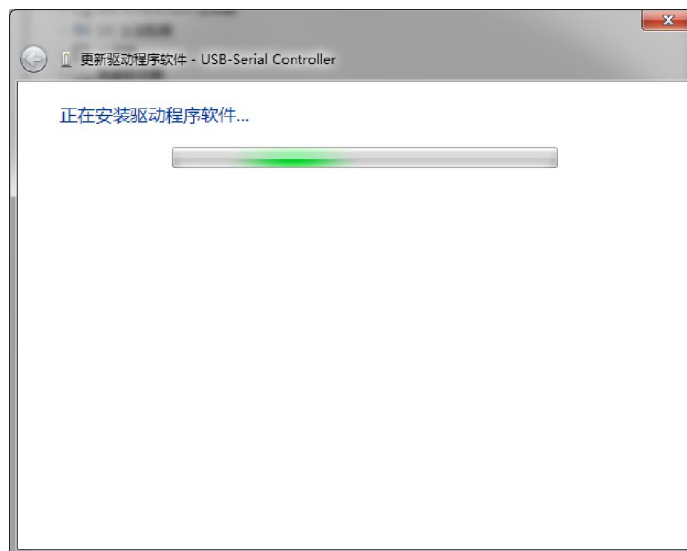
Pop up the box below.



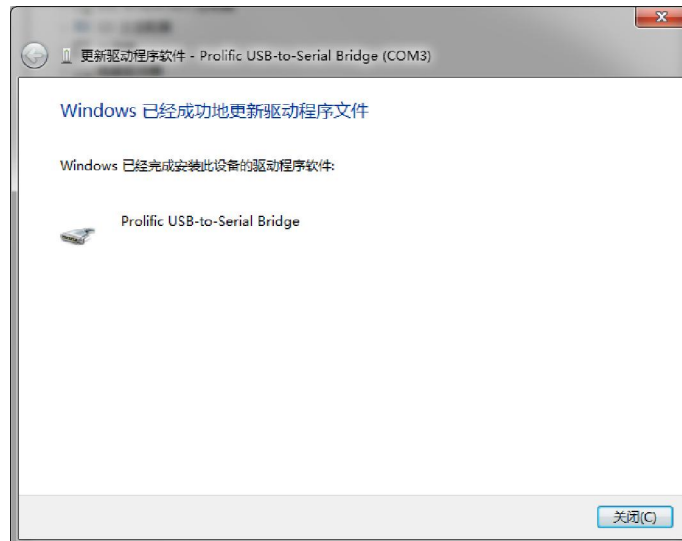
Select 'browse the computer to find the driver'. Then you can find the location of the driver we provided in the following interface, and then click 'next'.



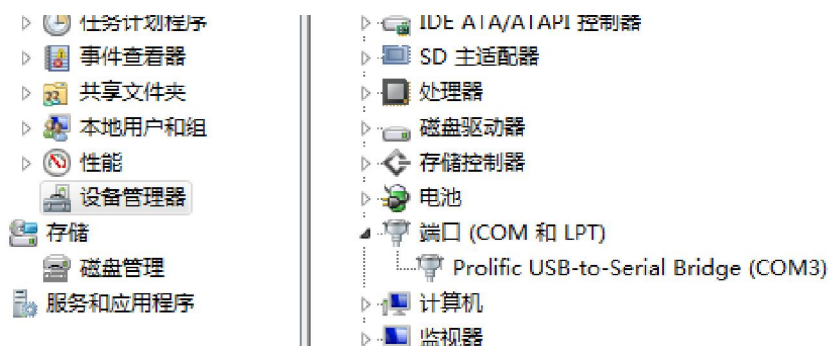
Then you enter the installation interface. If blocked by virus scanner by this time, you choose to trust.



The installation is not completed until the following interface shows up.



Then look at how much the number of the com port is. It is under the computer device manager. As the following picture, the number of the com port of my device is COM3. **The COM values each machine shows may be different, but it doesn't matter.** If you can't see the number of the com port there that means that the com port wire doesn't put well or there is something wrong with the com port wire.

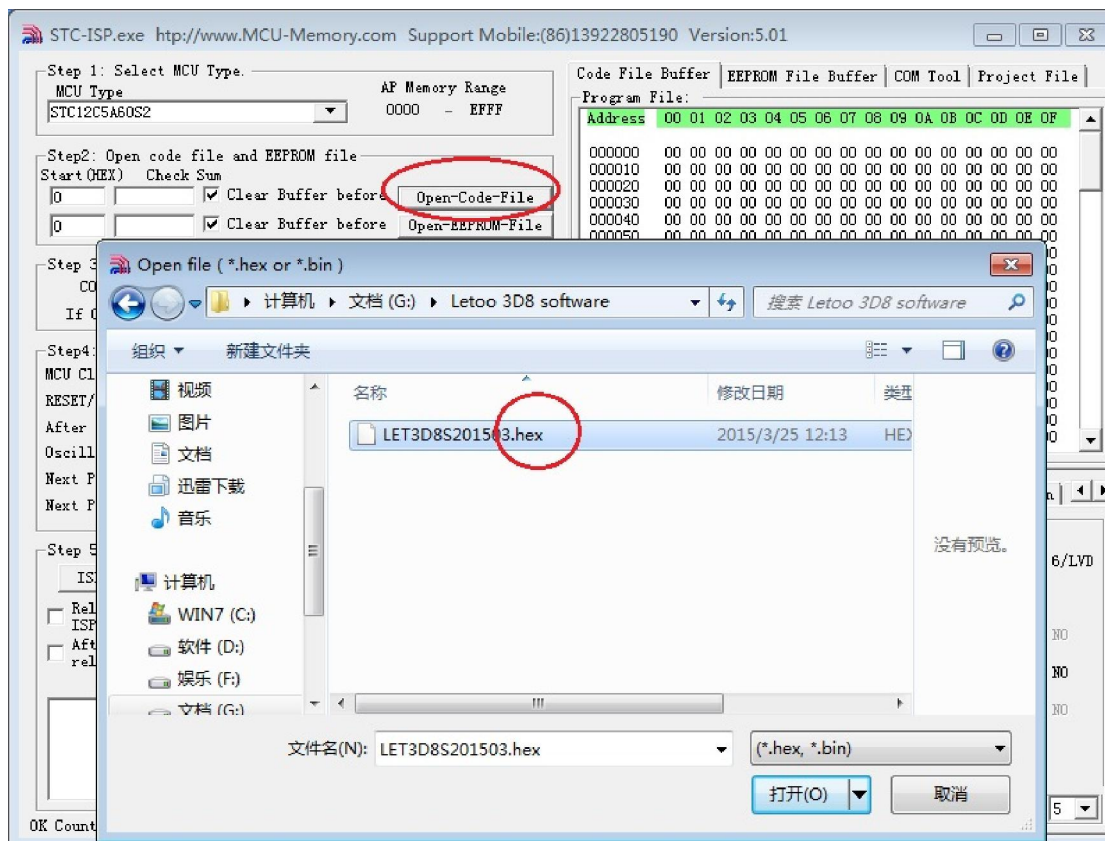
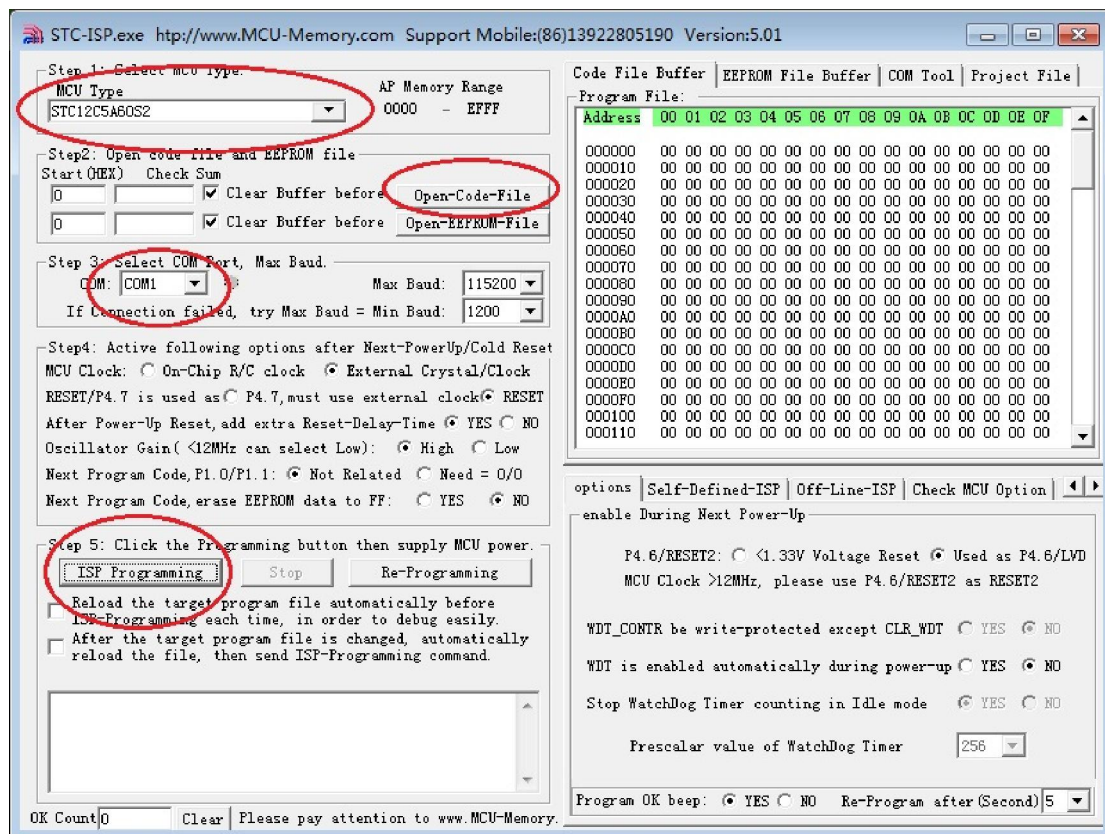


4.3 Download the program to the small board

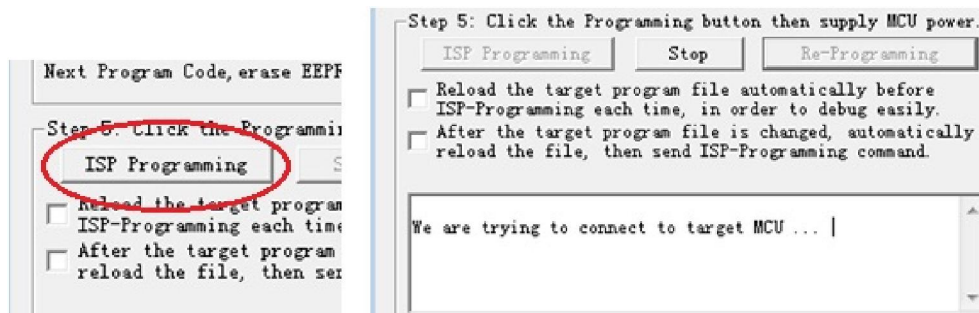
Then open the download software



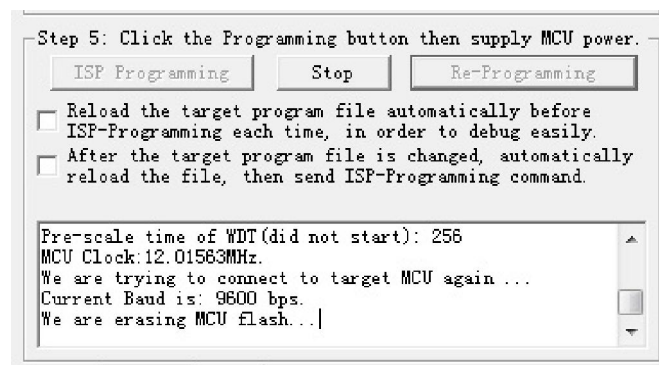
After open the software, there comes the following interface, choose MCU model first, the master value of our baseboard is STC122C5A60S2, then **set the COM value**, the COM value of the download wire can be seen in the device manager, and then **open the program file**.



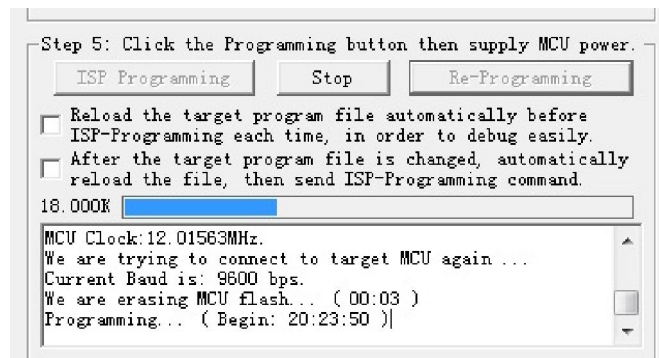
Select the HEX file, click open, and then click download. The download icon will turn grey after click, and meanwhile, the message box shows that “being connected to the MCU...”



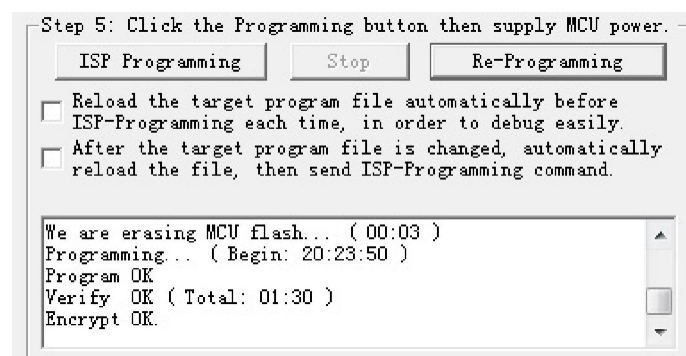
By this time, insert the red one of these 4 download wires into the download port on the baseboard, then the baseboard gets into electricity, the program begins to download.



When begins to download, message box will show the download progress.



When the downloading is finished, message box shows “Program OK, Encrypt OK”.



The animation will run automatically after downloading, and by this time, all the DIY process is finished.