



The Logic Color Shifter has been based on the ideas of the color theory of Robert Delaunay and is a tool for a constant change of the visual color space, an infinite color wheel. A practical application for this Software is the simulation of color changes in Dot Matrix Holograms.

The program Logic Color Shifter is Freeware and can be used free of any charge. The software is the result of a research project conducted by [LogicLink, Marcus Müller](#) in co-operation with the [Holography Laboratory](#) of the Kunsthochschule für Medien in Cologne and was developed as *Red Wine Software*. This software approach has the goal that programming does not take longer than the taste of a bottle of good red wine. Unfortunately the programming usually requires after the red wine version, the white wine version, the Spa version, etc.. Since we are enthusiastic software developers and driven by conviction, we believe that scientific research results should be made available free of charge to everyone and therefore we distribute this software as Freeware. Nevertheless we have costs resulting from the download traffic, license fees for software development tools and used components, and of course from the flowers we have to buy for our neglected wives...

Therefore we are dependent on your support for the programming and further development of our research work and we would appreciate any [donation](#) from your side.

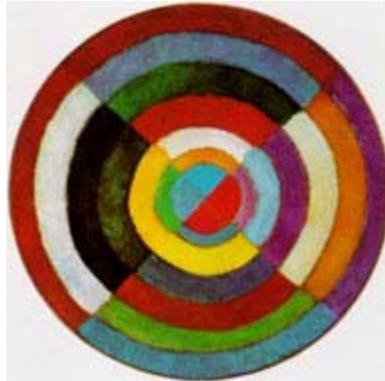
Further information about the circumstances under which you can use this software you can find on the [license](#) page.

Special thanks go to Urs Fries whose ideas and not at least his excellent red wine made this project possible.

## Information

Here you find [background information](#) about the function of the program, a [quickstart tutorial](#) for the impatient ones, [license information](#) and some information about the [financing](#) of the software project.

## Introduction



Robert Delaunay, Disque, première peinture inobjective, ou disque simultane 1912-13

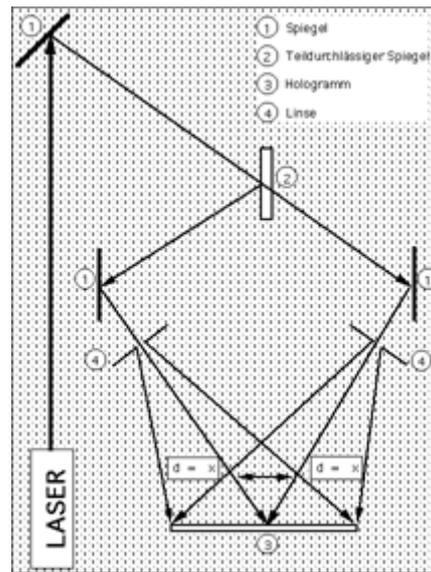
The starting point for the development of the Logic Color Shifter software was the work of Robert Delaunay (1885-1941), who emphasized the movement of colors in his color theory. Delaunay wrote to August Macke in 1912:

*...Only in this way have I found the laws of complementary and simultaneous contrasts of colors which sustain the very rhythm of my vision. In this movement of colors I find the essence, which does not arise from a system, or an a priori theory....*

and further

*...First of all, I always see the sun! The way I want to identify myself and others is with halos here and there halos, movements of color. And that, I believe, is rhythm. Seeing is in itself a movement. Vision is the true creative rhythm. Discerning the quality of rhythms is a movement, and the essential quality of painting is representation the movement of vision which functions in objectivizing itself toward reality. That is the essential of art, and its greatest profoundness....*

In order to experience this movement or the rhythm, how Delaunay calls it, we developed the Logic Color Shifter. It is a tool for the constant change of the visual color space, an infinite color wheel, turning the color space in a given picture. A beautiful implementing of this idea are Dot Matrix Hologprints, which shows a different color or even a different content depending on the viewers point of perception. The Dot Matrix Hologprinter is a development of the [Dutch Holographic Laboratory B.V.](#) and is based on diffraction. The print-out takes place on a holographic silver halogenide emulsion by a laser, which exposes pixels for pixels sequentially.



Diffraction Grating (on axis)

After the development of the emulsion the colors of a pixel result from the diffraction of incident light. By a change in the line spacing between two pixels light is diffracted in a divergent angle which results in a different color of the two pixels.

Moreover, the visible color depends on the angle of incoming light and therefore changes with the vertical viewing angle. On the one hand this leads to marvelous color effects of a print-out but on the other hand this effect has the difficulty to foresee the result of a Dot Matrix Hologram for different points of view. Thus, we developed the Logic Color Shifter, which simulates the result of a Dot Matrix Hologram under different points of view before the actual print-out takes place.

The simulation of the Logic Color Shifters is based on the pixel-wise shifting of the color spectrum within a given picture and gives you an impression, how a Dot Matrix Hologram print-out will be perceived. Beyond that the software can give you an idea about the possibilities of a Dot Matrix Hologram.

However, the unbelievable chroma, dynamics and beauty of a Dot Matrix Hologram can only hardly be shown by the simulation. Therefore you should look at Dot Matrix Holograms physically! You can get a first impression from the [DFG front facade](#) in Bonn by Michael Bleyenbergh, which consists of holographic optical elements in a size of 3cm x 5cm. Examples of Dot Matrix Holograms are the work of [Prof. Andreas Henrich](#) and [Waldemar Mattis-Teutsch](#) on the internet.

Further information on the Dot Matrix Hologram you can find on the web pages of the [Dutch Holographic Laboratory B.V.](#) and the [Holography Laboratory](#) of the Kunsthochschule für Medien in Cologne. Additionally, you can find some examples of a Dot Matrix Hologram simulation on our web site in the [Color Shifter project](#).

## Quickstart

For the completely impatient ones here is the abbreviation through the manual:

### 1. Prerequisites

Because the application is a .Net program the .Net Framework 1.1 must be installed. Further information on prerequisites you find on the page [Installation](#).

### 2. Installation

You do not have to install the Logic Color Shifter at all - simply copy the content of the *LogicColorShifter.zip*-archive in a folder of your will, run it by double-clicking the *LogicColorShifter.exe* and begin. You find more information in [Installation](#).

### 3. Open an image

The starting point for a color shift is always an existing image. An image file can be loaded with the  *Open image* button in the toolbar. Further information you find in the chapter [Image loading](#).

### 4. Chromatic spectrum change

The shift of the chromatic spectrum simulates the vertical movement of an observer in front of a Dot Matrix Hologram. With the track bar at the right the spectrum can be shifted. You find a more detailed description in [Chromatic spectrum shift of the image](#).

Further information on the Logic Color Shifter features you find under *Procedures*. In the chapter *Options* you find information about the adjustments in the Logic Color Shifters software.

## License

The program Logic Color Shifter is the property of the author LogicLink, Marcus Mueller. By downloading and installing you agree the following license conditions:

1. The program is Freeware and you may use it as long as you like.
2. You may distribute single, private copies of the software without any restriction, as long as you do not change the files and the attached license.
3. You can publish Logic Color Shifter on a book or magazine CD, if you give us a short notice about the publication by email to [info@logiclink.de](mailto:info@logiclink.de).
4. For all other publications, e.g. the distribution of the software over internet or a mirror server, a permission of the author is necessary.
5. The program remains always the property of the author even when passed to another person.
6. Reverse engineering is not permitted. If you have doubts about the function of the code we can permit a trustworthy institution, e.g. a university, an insight into the code for a limited time.
7. The free use is limited to entire application. The exclusive use of individual parts of this software is not permitted.
8. This software was developed with greatest care. Nevertheless, the use of this program takes place at your own risk. Therefore, we exclude any liability for damages, which results directly or indirectly from the use of this software. Despite all efforts we cannot guarantee you that

the program is completely free from errors, works without interruption and satisfies your expectations. The program is supplied "as it is" and you use it at your own risk.

## **Donations**

This software is the result of one of our research projects. Our conviction is that scientific research results should be freely available for everyone... and which could be better than a free software which demonstrates these results.

Since this project is based on research without any commercial background, we are dependent on your assistance for further development of this project. Therefore, we ask you for a donation if you like this project and its results. If you are interested to make a donation, send us an email to [info@logiclink.de](mailto:info@logiclink.de) with the subject: [Logic Color Shifter](#).

## Procedures

In this chapter you find you information about the operation of the program. Additionally, here are task described which you can perform with the software and the major control elements are explained. Buttons and menus for a procedure are shown as images in the header line.

## Installation

### 1. Prerequisites

Logic Color Shifter is a .Net based software, which requires the .Net Framework 1.1. You can download the Framework on <http://www.microsoft.com/downloads> as *Microsoft® .NET Framework Version 1.1 Redistributable Package*.

For the recording of color shift videos codecs are used, which should be install if necessary. You can install the DivX codec by the installation of the current [DivX Player](#) and you can get the gets the Microsoft® MPEG-4 Video Codec V2 with the installation of the current [Windows Media Player](#).

The storage requirements of the Logic Color Shifter application are rather moderate with approx. 100 Kbytes. However, depending upon the video codec you use much more space is needed for the recorded videos. Naturally, for the processor and the main memory applies like always: Larger, bigger, better and to much is not enough ; -) ! But on the other hand a Pentium II with 400 MHz and 128MB memory is sufficient for running the program. If you should have dropped those minimal requirements somewhere coincidental, the performance hunger can be drastically reduced by using *bit-map sequences* for recording instead of a video format.

### 2. Installation

Logic Color Shifter does not have to be installed at all - simply copy content of the *LogicColorShifter.zip*-archive somewhere in a folder, run *LogicColorShifter.exe* and begin:

File	Description
LogicColorShifter.exe	The actual program.
LogicColorShifter.chm	Help file of the Logic Color Shifter. If the button "  Help" in the tool bar does not show the online help, this file is probably missing or located in another folder.

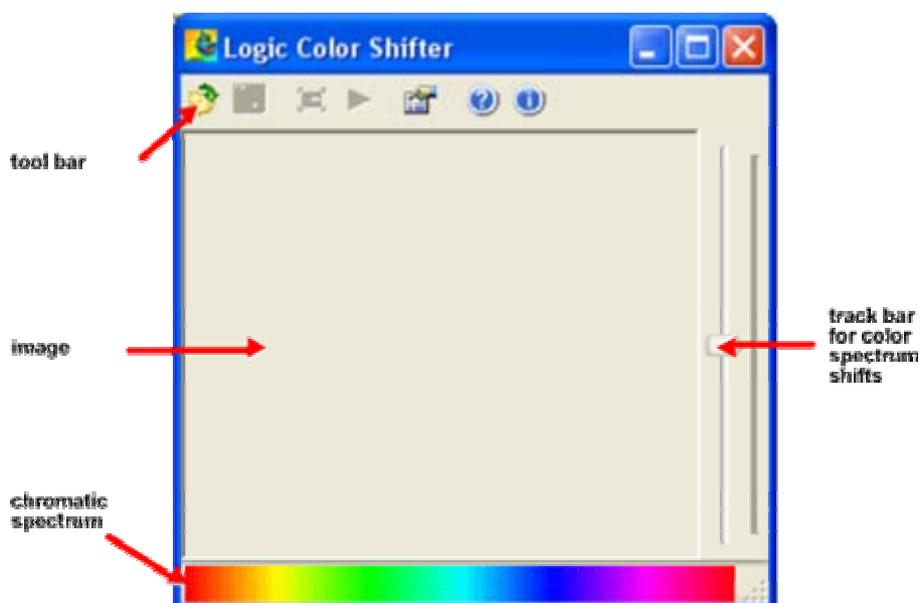
However, if you are one of those who are a little bit more organized then you could copy the content of the *LogicColorShifter.zip*-archive in a folder within the programs directory, like e.g. "Programs\Logic Color Shifter" and create a shortcut to *LogicNetEye.exe* in the start menu. Alternatively, you could also download the setup file and let windows installer do the organized job for you...

### 3. Deinstallation

If you installed the program with Setup.exe or the Microsoft Installer MSI file, you can remove the program under *Control Panel* with the entry *Add/Remove Software*. Otherwise a simple deletion of the file is enough. If you messed up the two different options for removal you may be confronted with the auto repair feature of the Microsoft Installer Service and you should try the first option for removal...

### Start of the application

In most of the cases a double click on the *LogicColorShifter.exe* file or the selection of the *Logic a Color Shifter* shortcut in the start is sufficient for a start of the application. If you are confronted with some error messages now, please examine the prerequisites mentioned under [Installation](#). Still, if the program does not start send to us an [email](#) with your system configuration and the error message. At the latest, if we answered your email, you should see the following main window of the Logic Color Shifter:



Furthermore, you can use the following command line parameters:

Parameter	Description
<i>/i file name</i>	With this parameter you specify an image which is loaded during the start of application. If the path or the file name contains blanks, the file name should be flanked with double quotation marks.
<i>/r resolution</i>	The resolution determines the increment of the chromatic shift. For the parameter "/r" you can use a number between 0 and 2147483648, which is used as a start value. The default value is 360.

Otherwise, there are no further hidden command line parameters, annoying nag screens, obscure registry settings, etc..



## Image loading

The starting point for a color shift is always an existing image. The image can be loaded as Bitmap (\*.bmp), Graphics Interchange Format (\*.gif), JPEG-file (\*.jpg), Portable Network Graphics (\*.png), Icon (\*.ico), Enhanced Metafile (\*.emf) or Windows Metafile (\*.wmf).

After loading the image it is converted into a HSV color space.



## Chromatic spectrum shift of the image

The shift of the chromatic spectrum simulates the vertical movement of an observer in front of a Dot Matrix Hologram. The color of each pixel is shifted for the same amount. To shift the image use the track bar at the right border.

If the color of a pixel reached the end of the chromatic spectrum, it is drawn with a fixed color. The fixed color can be adjusted in the [options](#).

The position in the middle of the track bar corresponds to the original image colors. By moving the track bar down all points of the image are shifted toward the blue portion of the spectrum, while tracking the thumb up all pixels are shifted to the red spectrum.

The increment by which the color is shifted corresponds to the resolution set in the [options](#).



## Animate the chromatic spectrum

The button *Animate* starts the automatic change of the chromatic spectrum. From the current position of the sliding bar the spectrum is shifted from red to blue. If the end of the spectrum is reached, the animation starts at the other end again. Since the shifting includes a larger computation the animation speed depends largely on the processor performance. Additionally, the speed of animation can be adjusted by choosing a smaller or larger resolution.



## Save an animation

An animation of a chromatic spectrum shifts each pixel from the red range of the spectrum up to the blue range. The animation can be saved as a video or bitmap sequence. The following formats can be used:

Format	Description
Video (*.avi)	The animation is stored as a video. In the <a href="#">options</a> the codec can be set, with which the video is created.
Bitmap sequence (*.bmp)	Stores each frame of the animation in the bitmap format. Behind the file name of the sequence the number of the frame is attached to preserve the order of the frames.

During each saving the animation is computed again.



## Image scale

With the button *Scale image the current image is scaled to the size of the window.* Since the complete window area is used, the image can be distorted.

## Options

This chapter explains the application settings in more detail.



### Options for the appearance

In this section the behavior of the appearance of the chromatic spectrum can be adjusted:

Attitude	Worth	Description
Resolution	<i>0 up to quite large</i>	The resolution represents the step-width, in which the spectrum will be leaped through. Meaningful values are between 5 and 1000. Smaller values lead to large jumps, while larger values result in changes between two frames which are hardly visible.
Chromatic spectrum	<i>Complete</i>	Uses the complete HSV color space. This setting does not correspond to the natural solar spectrum, in which the violet range does not occur.
	<i>Solar spectrum with color addition</i>	This setting uses an addition process for the violet range, in which the Hue values from 270 to 360 are calculated by the addition by red and blue. This procedure corresponds to algorithm used by the Dot Matrix Holoprinter, which splits violet color pixels up into a red and a blue Pixel.
	<i>Solar spectrum without color addition</i>	This is a mode, which is suitable for the identification of pixels within the violet range. All pixels with Hue values from 270 to 360 are shown in a uniform violet and are not shifted at all.
Invisible color	<i>White</i>	With this setting all colors outside of the visible chromatic spectrum are shown as white pixels.
	<i>Grey tone</i>	If the color of a pixel moves outside the visible spectrum it is shown by its grey tone. Thus, the image remains as black-and-white picture.



### Options for the video

The here following characteristics of the storage of an animation as a video can be adjusted:

Attitude	Worth	Description
Frame rate	<i>1 up to a lot</i>	Number of frames per second which are stored in the video. The default value is 24

		frames per second. Apart from the resolution this parameter also affects the speed of color shifts within a video.
Codec	<i>Radius Cinepak</i>	Is used by default and should be available on most computers. The compression is only moderate, i.e. large files are generated.
	<i>DivX codec</i>	Very good compression and also heavy cpu load. Creates small video files, which need more time for the production, however.
	<i>Microsoft Mpeg-4 video Codec V2</i>	Likewise very good compression and also heavy cpu load. As in the case of DivX small video files are generated.
	<i>Intel video 5.0</i>	Moderate compression and cpu load.
	<i>Uncompressed</i>	Enormous video file sizes with moderate cpu load.
Quality	<i>Standard, 0% - 100%</i>	Adjusts the quality of the video. This setting is interpreted by the compressor.

## Support

For questions, bugs, suggestions, desires and comments you can send us an email to [info@logiclink.de](mailto:info@logiclink.de) or you can contact us via the [contact form](#) on our website. We appreciate any feedback and we will try to answer your questions as fast as possible.