NLED Matrix
by Northern Lights Electronic Design, LLC
www.NLEDshop.com/nledmatrix
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NLED Matrix is a Java based application used for mixing and controlling video content to output to a custom DIY LED Matrix or matrices, which can be of any shape and size. NLED Matrix supports pixel patching, which allows the user to create the order in which the software outputs the data to the LED Pixels. That means any shape of LED matrix, any layout, any color order, with any type of control scheme can be made to work with the software. It allows two feeds of video data, either from a file such as .MOV, from an image, from a external video feed, or from any of the numerous generated content. The mixed video feed can be sent over Serial(USB Adapter, or RS-485 adapter), TCP, or UDP.

Written in Processing 3.0 (www.Processing.org) to be free, open source, and easy for anyone to modify to suit their needs. It supports all types of RGB(any order) pixels, single color LED pixels, and RGBW pixels.(RGBW may or may not be implemented in current version, check change log)

This is the initial release, and is still pretty rough and documentation isn't completed. Please contact Jnygaard@NLEDshop.com with any questions, bug reports, feature requests, critiques, anything at all, I want to hear about it. All information I receive will be used to make the software and documentation better and more extensive, so please contact me.

The software is optimized to hopefully use as little system resources as possible, all objects should be properly disposed of and GUI refreshes are kept to a bare minimum. If it appears to error, try press the r key to refresh it manually.

Configuration Files and Device Files
config.ini
Holds a file path to the currently selected device configuration file. Each device configuration file holds all the information that describes the LED matrix and directs it to the required patch and thumbnail files.

Device Configuration Files:
File can be any name, ID tags don't matter but must be separated from the value by a single tab, no spaces. Currently any changes in software won't be saved to the device configuration file. So it is best to edit it with a text editor. Open one of the config files in /configs and edit it to suit your project.

COM Port 1: Which COM port data is directed to, system automatically assigns number. Numbers start at 0. Currently only one COM port is supported, but more can be added with some coding.

Transmission Baud: For use with COM ports only, any supported baud rate may be used, but hardware may round to the nearest standard rate, check hardware descriptions.

Matrix H and W: The width and height of the LED matrix used in pixels. For odd shaped matrices, factor it as if it were a square or rectangle.

Pixel Data Type: Identifier for pixel type. RGB(0), RGBW(1), GRB(2), BRG (3), GBR (4), RBG (5), BGR(6), Single Color Using Red(7), Single Color Using Green(8), Single Color Using Blue(9), or if you have a different requirement, an new ID could be used and coded into the software.

Communication Type: 0 is Off, 1 is Serial/COM, 2 is UDP Client, 3 is TCP Client. In both client modes the LED matrix would have to be running before the software is started. Was easiest over server mode.

Server IP: The IP Address used for TCP/UDP communication

Server Port: Port number for TCP/UDP communication

Aurora CMD: Allows a NLED Aurora enabled controller to be utilized in USB Live Control mode. If set to true it will force the command at startup to enter the device into USB live control.

Patch File Name: File path to the matrix patch(map) file that was created using the NLED Matrix Patcher software. A patch file directs the order the data will be sent out to the controllers. Which is required for out-of-order or non-rectangular matrices.

Quick Feed File Name: File path to the QuickFeeds file for that matrix. Each matrix will need its own QuickFeeds file in most cases.

Absolute Footage Path: Where the software should look for movies, images, and other feed files. Last character should be a backslash(\)

Automatic File Name: Automatic control of the software is possible by creating or editing a text document. Described elsewhere. Using Automatic control a QuickFeeds, blending modes, and mixing can done on its own. Example: A QuickFeed is triggered on A -> it runs for X amount of iterations → QuickFeed B is loaded with a new feed -> a blend mode is selected → the two feeds are mixed over X amount of seconds → that QuickFeed runs for X amount of iterations and repeats. So an endless sequence of feeds can be mixed without human interaction.

Frame Rate: Rate of refresh of onscreen previews and rate of data packets. Any number could be attempted but hardware or data transfer rates won't allow much over 30 or 40. Lower rates will have better performance.

GUI Width and Height: Width is overall what is used to scale the window, so keep height and width proportional to 4:3.

MIDI Port and Enable: Identifier numbers for the input MIDI port, may be enabled(true) for MIDI input usage or disabled(false) for better performance.

Serial Control Port and Enable: Used for external DMX or serial control of the software, not fully implemented.

Enable Direct Show Video Feed: Current Windows version uses Dshow input, such as a screen grab or webcam feed and can be assigned to a Quick Feed.

Enable Thumbnails: Enables thumbnails for QuickFeed button backgrounds. Disable for better performance.

Preview Enable: Enables or disables full size previews in the mixed preview window when a QuickFeed is pressed once, so it can be previewed then clicking again will start the QuickFeed.

QuickFeeds File: Standard Text File(.txt)

Numbered in order left to right, with a tab(no spaces) between each value. Each line is a QuickFeed.

1 – User String ID, can be whatever. Displayed on large previews and used as the text for text method.
2 – Method ID, see included spreadsheet with Method ID information.
3 – File Name for video files, leave blank or anything if not used. File name Only, no Path.
4 – Speed, -10.0 to 10.0, it could be more but the speed slider would be messed up.
5 – Color Slider Value for Red, 0 - 255
6 – Color Slider Value for Green, 0 - 255
7 – Color Slider Value for Blue, 0 - 255
8 – Offset X, offsets feed left or right
9 – Offset Y, offsets feed up or down
10 – Color State value, Tint, scale, etc. Values are not easy to follow, so best modified in software.
11 – Control State value, paused/play/stop. Again, not easy to decode, modify in software.
12 – Effect State value, invert, contrast, etc. Again, not easy to decode, modify in software.
13 – Contrast Slider Value, 0 – 255, when enabled, the sets the minimum value to display.
14 – Generation Slider 1, 0 – 255. Value different for each generated content
15 – Generation Slider 2, 0 – 255. Value different for each generated content
16 – Generation Slider 3, 0 – 255. Value different for each generated content
17 – Generation Slider 4, 0 – 255. Value different for each generated content

QuickFeeds Generator Web App:

Runs in a web browser, and creates or edits quickfeed files. It can be used while NLED Matrix is running, so changes can be made on the fly. Open the app and either "Load File" or create a new one using the dropdowns and textfields. When finished, enter a file name and click "Save Quickfeeds File" a file will then be created as if it was a download, so check your downloads file then move it to the NLED Matrix file and make sure your device config file is pointing to it.

You can use the "Load" button to load(or reload) a quickfeed file while the software is running. And press the "Save" button to save the quickfeeds(to the selected location in the device config) file currently loaded by the software.

If editing a QuickFeed File:
- Optionally, press the Save button on the bottom of the NLED Matrix window to save the current QuickFeeds to the designated file.
- In the QuickFeedGenerator App, Click the Browse button to select the QuickFeed file to be edited. Then Press the "Load QuickFeed File" button to load it. All the fields should fill in.
- Go through and edit any of the fields.
- When finished or ready to test it out, enter the file name into the text field.
- Press the "Save QuickFeed File" button and a download will be prompted or start automatically.
- Find the file in your downloads folder or where ever you saved it to and place it in the NLED Matrix folder, overwriting the current one if desired.
- Either start NLED Matrix or if it is running, press the "Load" button on the bottom of the window.

If Creating a New QuickFeed File:
- Start the QuickFeedGenerator App
- Fill in all the information using the dropdown and text fields
- Enter a file name into the Save As box.
- Press the "Save QuickFeed File" button and a download will be prompted or start automatically.
- Find the file in your downloads folder or where ever you saved it to and place it in the NLED Matrix folder, overwriting the current one if desired.
- Either start NLED Matrix or if it is running, press the "Load" button on the bottom of the window.

Starting/Setup Guide:

- Start by updating Java, check the internet.
- Start by designing the layout of your LED Matrix, how the LEDs will be ordered and how it will snake or have to be patched.
- Open up Matrix Patcher software, and follow the instructions included with it for using the software to layout your matrix patch file. Save it and transfer to the NLED Matrix /patches folder.
- Open one of the sample device configuration files from /devices
- Save it with a unique file name to the same folder /devices
- Start at the top and use the descriptions above and fill out all the values. Some may not apply, such as transmission baud if using UDP/TCP connection, so set to 0 or leave them as they are. It is very important that there is a tag, with a single tab character between the value.
- Look it all over make sure its right, especially the file paths to footage and patch file.
- Look for the config.ini file in the program directory. Open it.
- Line 2 should have the file path to the device configuration file that was just made. Should be /configs/your-device-file.txt but an absolute path can be used as well. C:\SomeFolder\........
- With both those files completed and saved. Start the software.
- It should start up and begin working as normal. If not check for any errors, and double check the config file.
- If the output is distorted or messed up, the patch file may be incorrect.

If it doesn't freeze but isn't transmitting, check the transmission indicator on the bottom, it should be blinking. If it is red there was something wrong with communication setup in the device configuration, maybe the COM port is wrong or in use, the server isn't ready, or similar.

If it freezes or stalls during loading, something is substantially wrong. Start with rechecking all the configuration files and ensure your patch has all points placed, as difference between the constants (MatrixHeight * MatrixWidth) and the pixel amount listed in the patch file will cause a complete freeze.

Method Info: (Check Included Spreadsheet for full info)

Automatic Mode:

Automatic mode uses a text file to create an automatic sequence of videos, effects, and blending modes, that plays and mixes on its own. Great for static displays and the like.

A single line is a state. The states variables are divided by a single tab

Fader Position: 0=A …... 100=B
Feed ID: true = Feed A, false = Feed B, selects which feed the automatic state will affect.
QuickFeed ID#: QuickFeed ID number, starting at 0
Draw Counts: Time in frames, the Feed will play before starting the transition.
Blend Mode(0 – 6):
- 0: Blend
- 1: Multiply A to B
- 2: Multiply B to A
- 3: Minimum
- 4: Maximum
- 5: Add A to B
- 6: Add B to A

Blend Speed: Speed the transitions(blend) takes.1000 is instant change, 1 – 999, lowest is slowest speed

Hot Keys:

- **Arrow Keys –** Use the Up/Down/Left/Right Arrows to adjust a slider after it has been selected by clicking on it.
- **r –** Forces a full refresh of the screen.
- **x –** Works with method 123, which is Step Through for testing patches, moves a single pixel through the pixels in the order that they are patched.

Terms:

Feeds: There are 2 Feeds, A and B(left and right). Each feed plays/runs a Quickfeed. Each Feed has color effects, contrast, offset, and invert. The Feeds are mixed together to create the output feed.

QuickFeed: Can be a video(MOV, AVI, etc), image, text mode, generated options(such as star fields, spirals, metaballs, etc), sound reactive(equalizer bars, sine wave, ripple), a Direct Show webcam feed(commonly Winamp Milkdrop with ManyCam to capture, Windows only) There are 60 Quickfeed slots, accessible from either Feed, each one has individual effects(color, invert, contrast), offset, speed, and play/pause/stop. The effects are saved to the slot as they are modified.

Pixel Patching: Allows non-rectangular/non-adjacent/out-of-order pixels to be mapped and controlled properly. Basically it is the order the data will be packed up and sent to the controller. The software uses the patch file coordinates to grab color data to send out in the same order the LED pixels will be in.