

# Projection Decorating

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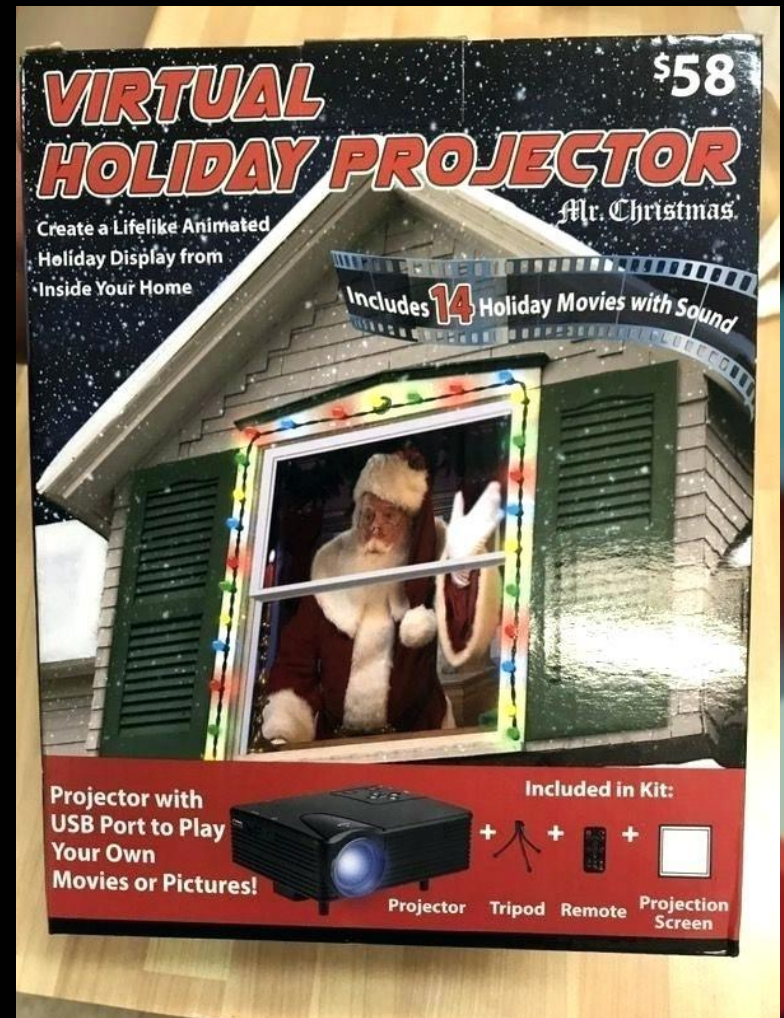
# Topics

- What is it?
- Choosing a projector
- Choosing a screen
- Projector placement
- Video sources & editors
- Integrating with Falcon Player
- Playing videos in Falcon Player
- Projection Mapping
- Virtual Matrices in xLights



# What is it?

- Playback of videos & still images onto windows, glass doors, garage doors or even a house
- Virtual Matrix with xLights



# What Can It Be Used For?

- Any image or video you want
- Could be cartoons/videos
- Custom videos for each sequence/song
- Projection Mapping
- Virtual matrix with xLights



# What Do I Need?

- Projector with serial port
- Serial cable
- USB to serial adapter
- Raspberry Pi running Falcon Player
- Videos in MP4 format
- Surface to project onto
- Projection screen material



# Choosing a Projector

# Brightness

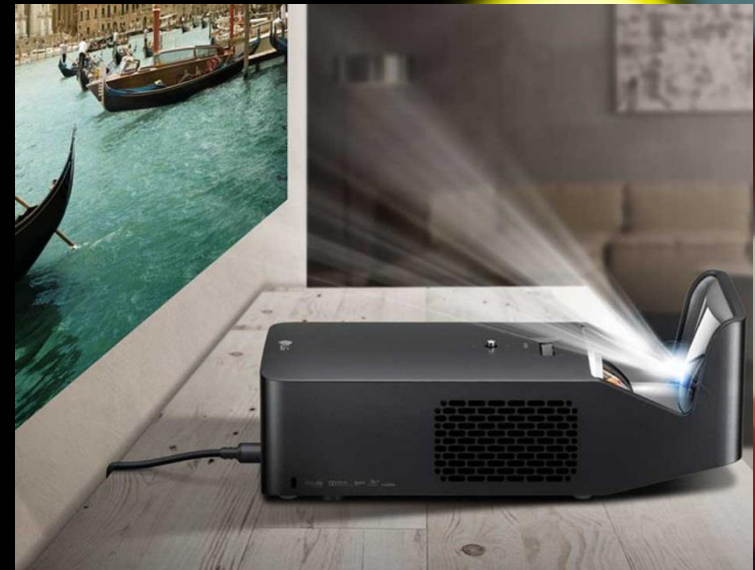
- Lumens is important
  - 1,700 - 2,000 good for windows
    - 4,000 Plus if used outside
  - Cheap brands lie about lumens!
- Resolution not as important
  - Visitors will see house from the road
  - 800x600 is sufficient
  - WXGA (1,280 x 800) is best for wide windows
  - HD 1920 x 1080 is recommended for Projection mapping
  - Cheap brands lie about resolution!
    - HD “compatible”



A Million Lumens  
Something  
Looks Fishy

# Throw Distance and Brands

- Throw distance
  - How far from window to project a large image
  - Short-throw projectors are best
  - Good website: [www.projectorcentral.com](http://www.projectorcentral.com)
- Good brands
  - Sony, Optoma, Viewsonic, Eiki, Pro FX, Hitachi, Boxlight, Epson, BenQ





# New or Used?

- New projectors can be \$500 - \$1,500 & up
- Used is the way to go!
  - Good projectors for \$70-\$200
  - Ebay (ipl-reno is an excellent seller)
  - Schools sell used projectors on eBay
  - Make sure remaining lamp remaining life is low
  - Used projector can last 5-8 years with a fairly new lamp



# Video Inputs and Control

- Video inputs
  - HDMI, DVI\*, and DisplayPort\* best for Falcon Player
    - \* *with proper adapter*
- Automatic on/off control
  - Serial port (RS232) best
  - USB port on projector not good
  - Ethernet/RJ45 port not as good
  - Do not use a timer! (will damage lamp)



# Choosing a Screen

# Choosing a Screen

- Material ideas (commercial)
  - Atmosfx premium projection material  
([www.foxandgrapes.com](http://www.foxandgrapes.com))
  - Trapeze
    - 10% spandex / 90% polyester
    - Best picture quality for rear projection
  - Spandex
    - Four-way stretch, not two-way



# Choosing a Screen

- Material ideas (DIY)
  - Shower curtain!
    - Frosted, thin, not white?
    - Remove wrinkles with hair dryer, add grommets
  - Plastic tablecloth
  - Translucent industrial plastic
  - Window privacy film
  - Plastic garbage bag
  - Durable white polyvinyl
  - Vellum (from art stores)
  - Rubber bed sheet



# Projector Placement

# Projector Placement

- Sit projector near window bottom
  - Avoids “hotspot” from lens causing a bright area in the video
- Locations
  - Window
  - Storm door
  - Garage door
  - Lawn

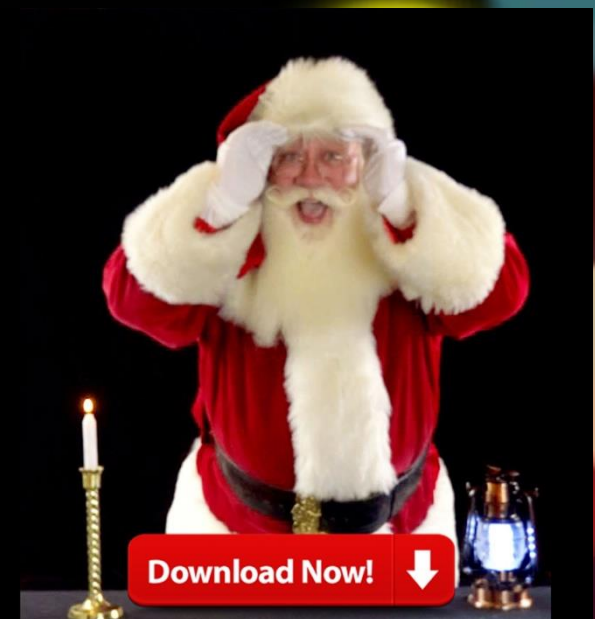


# Video Sources & Editors



# Video Sources & Editors

- [www.totalhomefx.com](http://www.totalhomefx.com)
- [www.atmosfx.com](http://www.atmosfx.com)
- [www.holidayprojectors.com](http://www.holidayprojectors.com)
- [www.thechristmaslightemporium.com](http://www.thechristmaslightemporium.com)
- Anything by Jon Hyers
  - [www.virtualfxvideo.com/shop-c1yk](http://www.virtualfxvideo.com/shop-c1yk)
- Good, free video editor
  - Davinci Resolve (free version)
- Good, paid video editor
  - Adobe After Effects/ Premier Pro



# Integrating with Falcon Player

Detailed instructions at:  
[www.itwinkle.org](http://www.itwinkle.org) > Build It > Projector Control

# How It Works

- Free projector plugin
- Serial cable between Raspberry Pi and projector
- Load MP4 video files into Falcon Player
- Create events in playlist to turn on/off projector, change video source, etc.
- Play videos in playlist



# Connections

- Connections

- HDMI out on Raspberry Pi to HDMI / DVI input on projector
- USB (RPI) to serial (projector) adapter
- Null modem or straight-through serial cable



# Projector Control Codes

- What are they?
- Hex codes for your projector model
- Good source for projector manuals & hex codes:
  - Google “(brand) (model) projector Clary Business Machines”

-Command List

TYPE1 Command (HEX+CR)	Function
P65	
C00(43 30 30 0D)	POWER ON
C01(43 30 31 0D)	POWER OFF

0892D0

8

146

208

# Projector Control Plugin

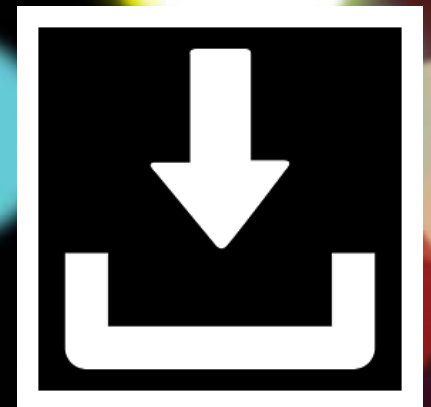
- Install via Content Setup > Plugins
  - List of supported projectors in Input/Output Setup > Projector Control menu
  - Choosing a similar brand/model may work

Connection type: SERIAL ▼

SERIAL DEVICE: ttyUSB0 ▼

Projector: BOXLIGHT-WX25NU ▼

Get help at [www.falconchristmas.com/  
forum/index.php/topic,2182.html](http://www.falconchristmas.com/forum/index.php/topic,2182.html)



# Projector Not Listed? Add Your Own!

- Help > SSH Shell
- `sudo nano media/plugins/FPP-Plugin-Projector-Control/projectorCommands.inc`
- Remove comments, add hex codes for ON, OFF, VIDEO, and baud rate settings.
- Ctrl-O to save, Ctrl-X to exit editor

```
// To add another projector fill out the below and remove the //  
Array("NAME" => "BOXLIGHT-WX25NU",  
  
      "ON" => "\x43\x30\x30\x0D",  
      "OFF" => "\x43\x30\x31\x0D",  
      "VIDEO" => "\x43\x30\x35\x0D",  
      "BLANK" => "\x43\x39\x37\x0D",  
      "AUTO" => "\x43\x39\x32\x0D",  
  
      "BAUD_RATE" => "9600",  
      "CHAR_BITS" => "8",  
      "STOP_BITS" => "1",  
      "PARITY" => "none"  
),
```



# Playing Videos in Falcon Player



# Playing a Video

- Upload MP4 video via Content Setup > File Manager
- Create playlist with these entries:

#	Type	Media File / Script / Event / Pause
1.	Event	01_01 - PROJECTOR-ON
2.	Pause	PAUSE - 45
3.	Event	01_03 - PROJECTOR-VIDEO
4.	Media	Brave - Trailer.mp4
5.	Event	01_02 - PROJECTOR-OFF



- Connect FM transmitter to Pi audio jack

# Projection Mapping

- Create a map of your house
  - Connect a laptop to the projector, set it up outside where the projector covers the entire face of the house



# Projection Mapping

- Create a map of your house
  - Start tracing the outlines, windows doors, etc



# Create Your Video

- Use the map you created to create masks in your software of choice
  - Drop video effects into masked areas and adjust size accordingly
  - You can add unique effects by adjusting key frames
    - A key frame will automatically calculate the difference in two values
  - Once the video is created, you can upload it to FPP using Manager

# Creating a Hybrid Show

Combining pixels with projection mapping can be difficult

- xLights does not natively support projection mapping
- You can add your video into xLights as a Virtual Matrix, or you can keep the projection file separate
- In order to get the files to play at the same time with FPP, the audio, FSEQ, and MP4 must have the EXACT same name (minus the extension)

# Combining Pixels and Projection

The screenshot displays a Windows desktop environment with several overlapping windows:

- VLC media player:** The main window is titled "Bostick House Love is an Open Door v6.mp4 - VLC media player". It features a menu bar with "Media", "Playback", "Audio", "Video", "Subtitle", "Tools", "View", and "Help". The video content is mostly black, with a small scene visible at the bottom showing characters in a blue-lit environment. The playback progress bar shows "00:05" and a volume level of "80%".
- Music Player:** A smaller window on the left shows a music player interface with the title "Love is an Open Door V2 and". It includes a progress bar at "0:01:28" and volume/mute controls.
- Player:** A window in the top right corner shows a person wearing a "DETROIT" baseball cap.
- File Explorer:** A window on the right side displays a "Date modified" list with the following entries:

Date modified
2/25/2022 10:19 AM
1/26/2022 8:38 PM
2/8/2022 7:39 PM
2/8/2022 7:42 PM
2/10/2022 6:51 PM
2/11/2022 5:18 PM
2/5/2022 1:27 AM
2/4/2022 8:19 PM
1/30/2022 10:16 AM
1/30/2022 10:16 AM
1/30/2022 10:17 AM
2/7/2022 10:31 PM
1/30/2022 10:42 AM
1/30/2022 10:32 AM
1/26/2022 8:48 PM
1/26/2022 8:48 PM



# Final Result

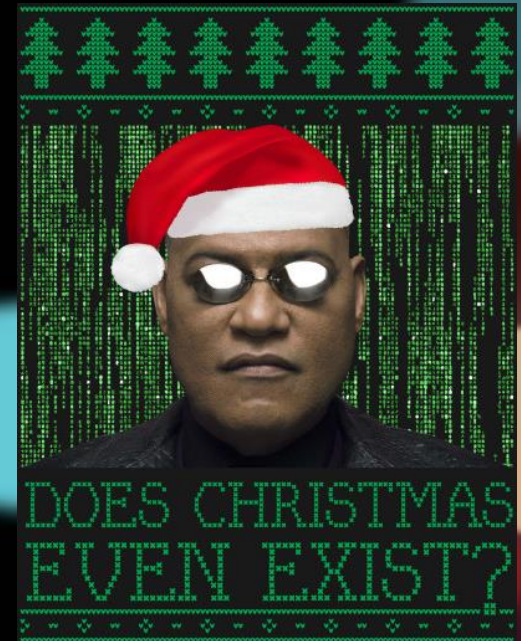


# Virtual Matrix in xLights



# Use Your Projector as a Matrix!

- Virtual Matrix feature
  - Create sequences on xLights matrix model
  - Can display text and any effects in xLights
  - Falcon player outputs sequence to HDMI port
  - Matrix FP plugins: Matrix Tools, BetaBrite Sign Control, Twitter-Tweet Download, Message Queue to Matrix Overlay, RDS Data to Message Queue/Matrix, Sports Ticker, Mail Control, Stock Ticker, Score Board, Event Date, Weather Information to Message Queue



# Setting up Matrix in xLights

- Resolution
  - Lower is better! Even 176x96 is 50K channels, large FSEQ files, longer rendering time
- Create xLights controller universes
  - IP address of Falcon Player
  - 100 universes
- Create xLights matrix model
  - 96 strings, 176 nodes/string, top-left Starting Location

Name	VirtualMatrix
Matrix	
Direction	Horizontal
# Strings	96
Nodes/String	176
Strands/String	1
Starting Location	Top Left
Indiv Start Chans	<input type="checkbox"/>
Start Channel	13621

# Setting up Matrix in Falcon Player

- Input/Output Setup > Channel Outputs > Other
  - Virtual Matrix “type”, start channel from xLights model, 176 width, 96 height
- FPP Settings > Force HDMI display
  - Bug with “Blank screen on startup”
- Need help?
  - [https://falcon-player.gitbooks.io/falcon-player-manual/content/chapter\\_nine\\_miscellaneous\\_items/virtual\\_matrix.html](https://falcon-player.gitbooks.io/falcon-player-manual/content/chapter_nine_miscellaneous_items/virtual_matrix.html)



**Questions?**

# Projection Decorating

Thank you!

