

**Internet  
Controlled**

**Christmas  
Lights**

[www.itwinkle.org](http://www.itwinkle.org)

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For complete instructions, visit [www.itwinkle.org](http://www.itwinkle.org) (“Build It” menu)

## Topics

- How does it work?
- xLights Animations
- Falcon Player
- Network / IP Camera
- Streaming Video and Audio
- Internet Control Website
- Falcon Player and Internet Control







## Overview

- What's it all about?
  - Was it worth it?
- How does it work?

## What's It All About?

- Do not live on a busy street, wanted more people to enjoy the lights
- Did not want to sacrifice enjoyment by roadside visitors
- Internet users choose brief sequences from a website, all lights play that sequence
- Streaming webcam allows Internet users to view lights and hear music



## Was It Worth It?

- Started with one article in local newspaper
- Has grown to 3 live television interviews (including Good Morning America), 2 live radio interviews, and 64 newspaper, television, radio, and website articles
- Internet users from all over the world
- Control requests every five seconds, overloaded camera, updated website to allow users to vote





# How Does It Work?



## How does it work?

- Anti-bot feature to prevent fake votes
- One vote per round, resets each round
- Voting / Non-voting hours
- Log of past votes
- Cool-down to avoid repeat sequence choices



# xLights Sequences



“



## xLights Sequences

- Lights only and with music sequences
- Short sequences (1-2 minutes long) allow voting action to be seen without waiting.
- Unlimited sequences supported, defined in sequences.txt file on website



## Falcon Player

- Installing FP onto Raspberry Pi
- Uploading sequences & playlists

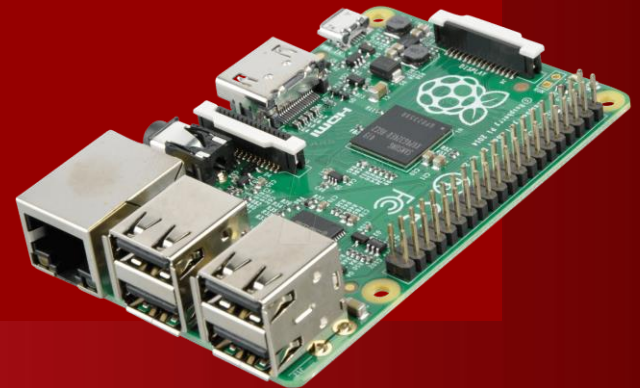


# Installing FP Onto Raspberry Pi

- Need
  - Raspberry Pi 2 or 3
  - 8-16G memory card (or larger for large shows with music)
- Image that installs Raspberry Pi OS and Falcon Player in one step:

<https://github.com/FalconChristmas/fpp/releasesFalcon>

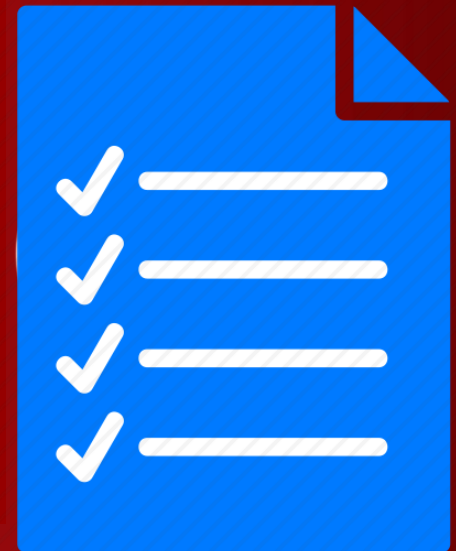
- Player configuration tips on iTwinkle.org website (under “Build It > Internet Control v2” menu)





## Uploading Sequences

1. Use Falcon Player's "Content Setup > File Manager > Sequences" menu to upload sequences (.fseq files)
  - These are found in xLights' "show" directory (pressing [F9] reveals this folder)
2. Create playlist for each sequence





## Network / IP Camera

- The hardware
- The software

# The Hardware

- Need
  - Raspberry Pi 2 or 3
  - RPi camera module (do not buy “No IR” version)
  - Male USB connector, long two-wire and Ethernet cables
  - 5.25V USB power adapter
  - Dummy security camera enclosure
- Assembly
  - 3D printed camera adapter and body extender
  - Power RPi through power and ground pins
  - Mount RPi onto plate, attach to battery compartment upside down





# The Software

- MotionEyeOS
  - Free streaming and security camera software
  - from <https://github.com/ccrisan/motioneyeos/releases>
  - Save image to microSD with “Win32 Disk Imager”
- Software configuration
  - Set static IP address (not DHCP from router)
  - Set resolution & frame rate (1280x720, 20 FPS) works well for 4-5 Mbps upload speed

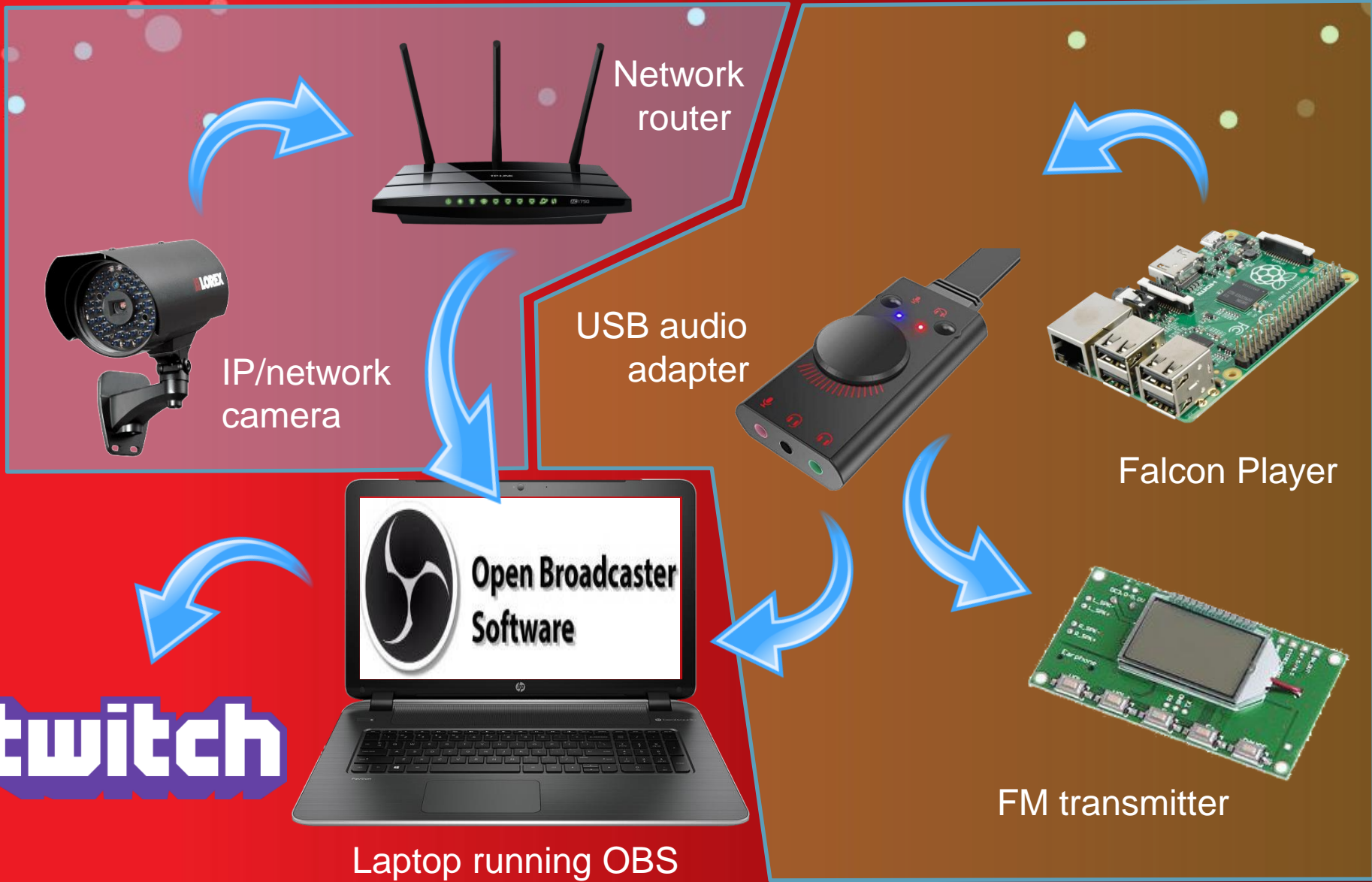


## Streaming Video and Audio

- Hardware  
(audio splitter, FM transmitter)
- Software  
(Twitch, OBS Studio)



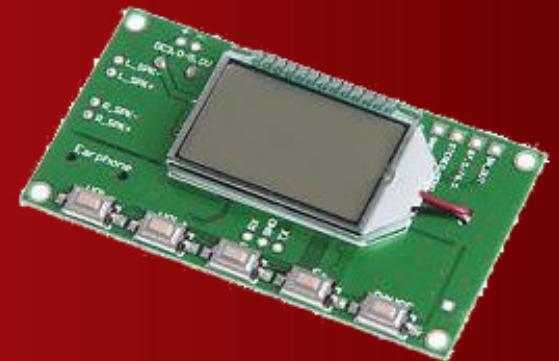
# How does it work?





## The Hardware

- USB sound adapter for Raspberry Pi
  - Allows two sound outputs (to computer and FM transmitter)
  - Natively supported by Falcon Player
- FM Transmitter
  - PLL Digital FM Radio Receiver
  - 100-foot range
  - 3D printed enclosure on Thingiverse



## The Software (Twitch)

- Videogame streaming service
- Free accounts, Christmas lights “approved”
- Video embedded into your webpage
- Single video feed to twitch, unlimited viewers using Twitch’s bandwidth (not yours)



## The Software (Twitch)

- How to setup Twitch
  - Create free account and create a name for your “channel”
  - Obtain a streaming key
  - Add this to your webpage:



```
src="http://player.twitch.tv/?channel=tominohio"
```



## The Software (OBS Studio)

- Free video streaming software
- Combines video & audio from multiple sources into a single output
- Text and graphics overlay
- Scheduled streaming



**Open Broadcaster  
Software**

## The Software (OBS Studio)

- Create **BrowserSource** to receive video from IP/network camera's IP address
- Create **Audio Input Capture** source to receive audio from computer's "line jack" jack
- Enter Twitch streaming key
- Set desired output resolution based on your ISP's "upload" speed.



## The Software (OBS Studio)

- Use Windows Task Scheduler to start OBS at a certain time each day
- Use OBS Studio's **Output Timer** feature to stream a set number of hours
- Configure computer BIOS to turn on computer at a set time each day







## Internet Control Website

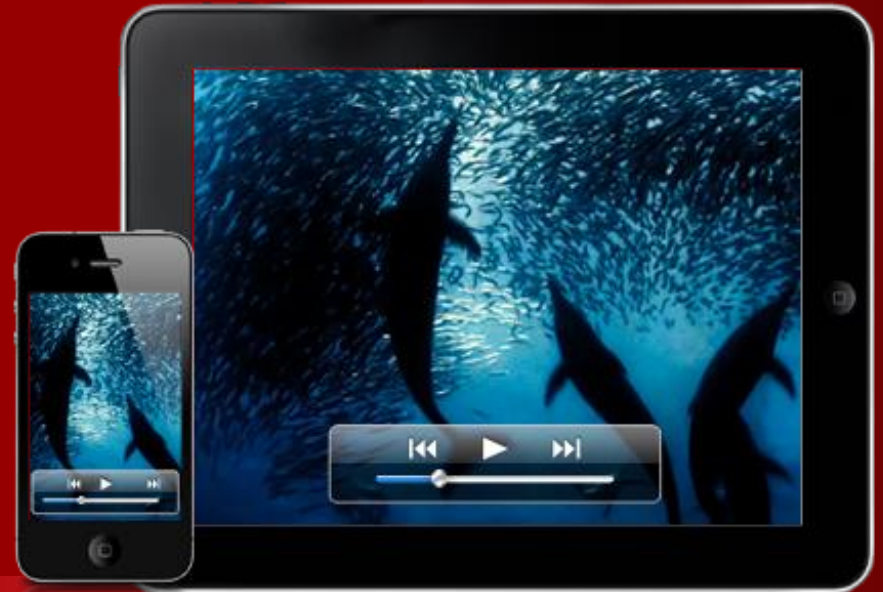
- Hosting a website
- Installing Internet control webpage and video feed



*iTwinkle.org*  
CHRISTMAS IS IN THE AIR

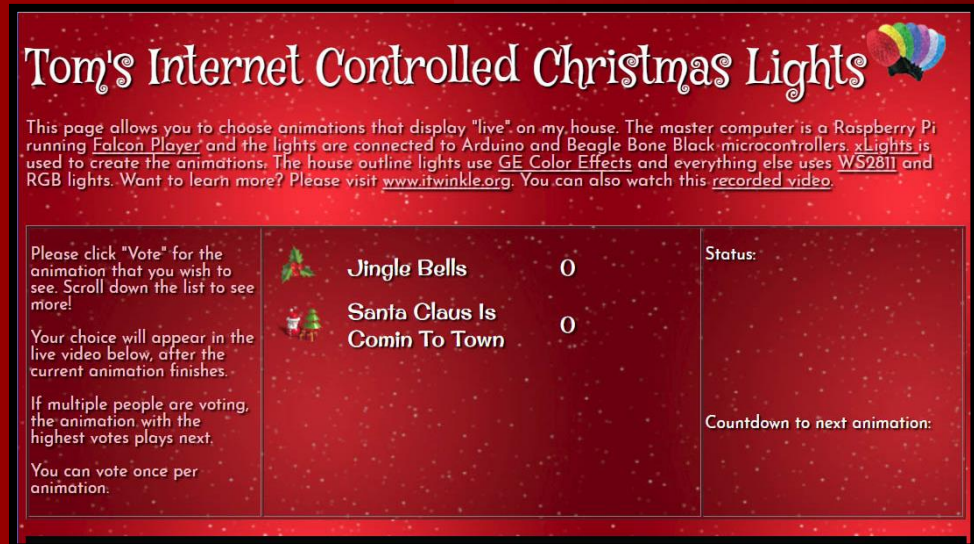
## Hosting a Website

- Basic hosting package is fine
- Must support PHP (not Microsoft / IIS)
- Voting system uses PHP and JavaScript
- Webpage is scalable for big/small screens
- HostGator (my favorite), many other hosting companies





# Install Internet Control System Webpage

- Add list of sequences to sequences.txt
- Add Twitch video feed URL to index.php
- Set voting control availability days/times in hidden.php
- Set anti-bot passphrase in voteaction.php
- Copy webpage files to website folder via FTP
- Set MP3/MP4 audio in prePlayActions.php (bug)



Tom's Internet Controlled Christmas Lights

This page allows you to choose animations that display "live" on my house. The master computer is a Raspberry Pi running Falcon Player and the lights are connected to Arduino and Beagle Bone Black microcontrollers. xLights is used to create the animations. The house outline lights use GE Color Effects and everything else uses WS2811 and RGB lights. Want to learn more? Please visit [www.itwinkle.org](http://www.itwinkle.org). You can also watch this [recorded video](#).

Please click "Vote" for the animation that you wish to see. Scroll down the list to see more!	 Jingle Bells	0	Status:
Your choice will appear in the live video below, after the current animation finishes.	 Santa Claus Is Comin To Town	0	

If multiple people are voting, the animation with the highest votes plays next.

You can vote once per animation.

Countdown to next animation:



## Falcon Player and Internet Control

- Dynamic playlist
- Falcon Player Scheduler



## Dynamic Playlist

- Built into Falcon Player
- `prePlayActions.php` puts highest voted sequence or random sequence (if no votes) into `dynamic.json` file on website
- Falcon Player queries website for sequence to play
- `postPlayActions.php` performs minor cleanup actions after sequence finishes



## Dynamic Playlist

- URL: Execute a file from a website
- Dynamic: Read a `.json` file from a website to determine sequence to play

#	Type	Media File / Script / Event / Pause
1.	URL	URL - GET - <a href="http://itwinkle.org/control-lights/prePlayActions.php">http://itwinkle.org/control-lights/prePlayActions.php</a>
2.	Dynamic	DYNAMIC - url <a href="http://itwinkle.org/control-lights/dynamic.json">http://itwinkle.org/control-lights/dynamic.json</a>
3.	URL	URL - GET - <a href="http://itwinkle.org/control-lights/postPlayActions.php">http://itwinkle.org/control-lights/postPlayActions.php</a>
4.	Pause	PAUSE - 3



## Falcon Player Scheduler

- Have Falcon Player start dynamic playlist when the Raspberry Pi when powered on.
- Via Content > Scheduler from the menu
- Start/End date: 2019-01-01 / 2099-12-31
- Playlist: Dynamic
- Start/End Time: 00:00:00 / 24:00:00
- Repeat: Checked (bug in FP v2.7.2!)
  - Dynamic playlist is looped continuously



## Summary



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**Questions?**

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A festive Christmas-themed graphic. At the top center is a white Christmas tree decorated with red stars and a gold star on top. Below the tree is a large, colorful arrangement of 3D stars in shades of green, yellow, orange, red, and purple. The text "THANK YOU!" is written in large, white, bold, sans-serif capital letters across the middle of the stars. The background is a vibrant red with a bokeh effect of white and red circles of varying sizes. At the bottom, there are horizontal white lines.

**THANK YOU!**