



THE G-FX LAB

Projection Rig Build Guide

A complete DIY weatherproof outdoor projection mapping rig —
from parts list to first show.

By Geno | FacadeThemes LLC | facadethemes.com

Amazon Influencer: amzn.to/4v2Wwyj



Introduction

I spent 30 years as a software developer, but one of my most satisfying projects was building a weatherproof outdoor projection mapping rig for my own front yard. What started as a personal hobby quickly expanded — my neighbor wanted one too, and soon we were running synchronized two-house projection shows for holidays, graduations, and neighborhood events.

The hardware side was only half the battle. The real bottleneck was content — every new theme meant starting from a blank canvas. That frustration led me to build FacadeThemes.com, an AI-powered platform that generates complete ready-to-map theme packages from a single photo of your house. Together, this rig and that platform form the complete G-FX Lab system.

This guide documents exactly how I built the rig — every part, every modification, every real-world deployment trick. Nothing is theoretical here. This is what I actually use.

Why Build Your Own?

Pre-built outdoor projection rigs exist, but they come with a significant premium — you are paying for someone else's enclosure and projector choices with little flexibility. By building this rig yourself, you choose exactly the enclosure and projector that fit your needs and budget. More importantly, when you are ready to upgrade individual components — a brighter projector, a faster mini PC — you can do so at a significantly lower cost than purchasing an upgraded solution from a turnkey supplier.



Two-house synchronized show — JMU graduation celebration

What You Will Build

- A fully weatherproof outdoor projector enclosure rated for all-season use

- Autonomous mini PC inside the enclosure — no laptop required at the show
- FM audio broadcast so neighbors tune in on their car radios
- Weatherproof panel-mount ports: Ethernet, USB-A, USB-C, and FM antenna feedthrough
- Secure carry handle and theft-deterrent cable lock system
- Repeatable field deployment using surveyor stake position markers
- Wind-resistant ground anchoring for the tripod legs

Bill of Materials

Affiliate Disclosure: Some links in this guide are Amazon affiliate links. As an Amazon Associate I earn from qualifying purchases. You pay nothing extra — the price is identical whether you use my link or not. Using these links is a simple way to support the G-FX Lab at no cost to you.

#	Item	Price	Link
1	Optoma GT2100HDR Short Throw Laser Projector 4200 lumens, 1080p, 30,000hr laser, IPX6 dust resistance	\$1,499.99	amazon.com/dp/B0C4KWSFBW?tag=thegfxlab-20
2	DeerTV Small Outdoor Projector Enclosure PRO Weatherproof, thermostat-controlled cooling, 3yr warranty	\$469.00	deertv.com/products/small-outdoor-projector-enclosure
3	GMKtec Mini PC M2 — Intel i7-1185G7 16GB DDR4, 1TB SSD, 2.5G ethernet, USB4.0, WiFi 6 Must enable Auto Power-On in BIOS settings	\$459.98	amazon.com/dp/B0C96FR8YC?tag=thegfxlab-20
4	AZWang 1000FT Long Range FM Transmitter Antenna included, stereo, 1000ft range Replaces Reteless TR508 + separate antenna	\$159.99	amazon.com/dp/B0FK4YQCHH?tag=thegfxlab-20
6	Vascer Heavy Duty Security Cable 15ft (3/8") Braided galvanized steel with vinyl coating	\$24.99	amazon.com/dp/B0898VH869?tag=thegfxlab-20
7	Master Lock Magnum Heavy Duty Padlock Weather resistant, cut-safe shackle	\$14.99	amazon.com/dp/B000RFLNG8?tag=thegfxlab-20
8	PYLE-PRO Universal Laptop Projector Tripod Stand 22-35" height, 41 lb capacity Flat plate design essential for VESA connection	\$39.99	amazon.com/dp/B003GEJ5PI?tag=thegfxlab-20
9	MysRuida IP68 Waterproof USB 3.0 Extension M20 panel mount, 5Gbps, -40 to +150C	\$12.99	amazon.com/dp/B0F8GZSBYR?tag=thegfxlab-20
10	USB 3.1 Type C Flush Mount Panel Extension 1ft male to female dashboard adapter	\$12.99	amazon.com/dp/B0C3C9QPJM?tag=thegfxlab-20
11	Lonlonty IP68 CAT6 RJ45 Panel Mount Coupler Gold-plated, 1Gbps/10Gbps, 2-pack	\$11.99	amazon.com/dp/B0BJ6NXWYN?tag=thegfxlab-20
12	Dikiwodark RV Cable Passthrough for FM Antenna PETG, weatherproof, 2-pack	\$18.50	amazon.com/dp/B0DS1XTD7P?tag=thegfxlab-20
13	BESIGN Ground Loop Noise Isolator (OPTIONAL) Only needed if FM audio hum/interference present 3.5mm audio cable, no power required	\$9.99	amazon.com/dp/B06XQYN77L?tag=thegfxlab-20

#	Item	Price	Link
14	ZRuiYFFS Stainless Steel Door Handle (10") 304 stainless — MUST be 100mm center-to-center Matches VESA pattern on enclosure lid	\$13.39	amazon.com/dp/B0DWXTSG78?tag=thegfxlab-20
15	Fayeploo M4 Button Torx Screws 100-pack Tamper-resistant, 18-8 stainless, includes T20 bit	\$9.99	amazon.com/dp/B0FHT3KTTX?tag=thegfxlab-20
16	ICEELEC Mountable Power Strip 4-outlet Flat plug, 10ft cord, mountable design Ideal for securing inside enclosure	\$17.99	amazon.com/dp/B0BXSC2L2JB?tag=thegfxlab-20
17	HYDROSORBENT Silica Gel Desiccant 40g Prevents moisture buildup inside enclosure Renew by heating at 250°F for 1-2 hours	\$9.99	amazon.com/dp/B0037Z8K3E?tag=thegfxlab-20
18	Linelucool Deburring Tool + 10 HSS Blades For cleaning drilled port holes	\$7.99	amazon.com/dp/B09376DFYP?tag=thegfxlab-20
19	Rust-Oleum Clear Coat Spray (12oz) Weather/corrosion protection on drilled edges	\$6.47	amazon.com/dp/B0010NY95S?tag=thegfxlab-20
20	WD-40 White Lithium Grease Spray Lubricant for mounting hardware threads	\$7.18	amazon.com/dp/B00L35DAWQ?tag=thegfxlab-20
21	RIY Trampoline Stakes 12" (8-pack) One stake per tripod leg foot — 8-pack covers two full rig deployments Drive through each leg foot into ground for wind resistance	\$17.99	amazon.com/dp/B0D5D2XLK8?tag=thegfxlab-20
22	indiedouker Property Line Markers (20-pack) Orange surveyor spikes for repeatable positioning	\$15.99	amazon.com/dp/B0FDVZ1SJQ?tag=thegfxlab-20
*23	SPACERR Outlet Box Extender Kit (22-pack) OPTIONAL: rubber tubes used as weatherproof gaskets	\$12.99	amazon.com/dp/B07Q3Y3P7D?tag=thegfxlab-20
24	Command 20lb X-Large Picture Hanging Strips 16 Pairs For mounting power strip and FM transmitter inside enclosure No drilling required — fully removable	\$9.75	amazon.com/dp/B0B3SR5M71?tag=thegfxlab-20
25	GUARDLEAD 18" Collapsible Traffic Cones with Reflective Collars One per tripod leg perimeter — collapses flat for storage Reflective collars visible to drivers at night	\$12.99	amazon.com/dp/B09SWQ5J82?tag=thegfxlab-20
26	100PCS 304 Stainless Steel Fender Washer Assortment Kit M3-M12 sizes — used behind VESA mount screws 304 stainless matches handle and Torx screws for corrosion resistance	\$8.99	amazon.com/dp/B0CL4HBP7Y?tag=thegfxlab-20
TOTAL (approx. with tax)		~\$2,862	

* Optional item. See Step 1 notes.

NOTE: DeerTV enclosure will be replaced in a future BOM update with a Made in America version currently in development by Process Integration Inc. Stay tuned to @GenosWorldOfTech for updates.

Build Steps

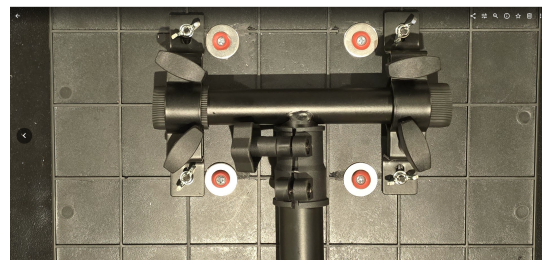
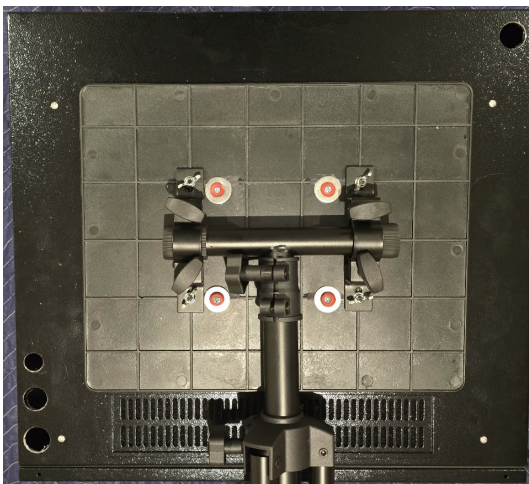
STEP 1 — Mount the Tripod Plate to the Enclosure

The DeerTV enclosure has a VESA 100x100mm hole pattern on the back panel. Use this to attach the head plate from the Pyle tripod stand.

IMPORTANT — WHY THE PYLE-PRO STAND: The Pyle-Pro PLPTS2 is specifically chosen because it features a flat tray plate that can be easily modified to connect directly to the VESA mount on the DeerTV enclosure. Not all tripod stands have this flat plate design — standard camera tripods use a small screw mount that is incompatible with this build. Do not substitute.

PRO TIP — DRILLING TEMPLATE: Before drilling any holes in the Pyle-Pro tripod tray plate, create a perfect transfer template using a standard 8.5 x 11 sheet of paper. Place the paper flat over the VESA holes on the back of the DeerTV enclosure and hold it completely still. Using a pencil or sharp object, poke through the paper into each of the four VESA holes to mark their exact positions. Remove the paper carefully, then tape it onto the Pyle-Pro tray plate as a drilling guide. This guarantees perfect hole alignment on the first attempt with no measuring required — a simple trick that saves you from misaligning holes on an expensive part.

- Identify the four VESA 100x100mm holes on the back panel of the enclosure
- Using a multi-tool, carefully flatten the plastic ribbing around each hole so washers sit flush against the surface
- Position the tripod head plate over the four holes
- Insert standard Phillips head screws through the plate and VESA holes
- OPTIONAL: Cut rubber tubes from the SPACERR outlet spacer kit to length and place as gaskets behind each washer for added moisture protection at the contact points
- Place stainless steel fender washers (from the 304 SS Washer Assortment Kit) behind each VESA mount screw to distribute load across the enclosure back panel and create a flush, secure connection
- Apply WD-40 White Lithium Grease to screw threads before final tightening
- Tighten wing nuts on the tripod bracket clamps by hand — enough to hold firm but allowing angle adjustment in the field



Left: Back panel with tripod plate mounted via VESA holes. Right: Close-up showing washer placement and wing nut hardware.

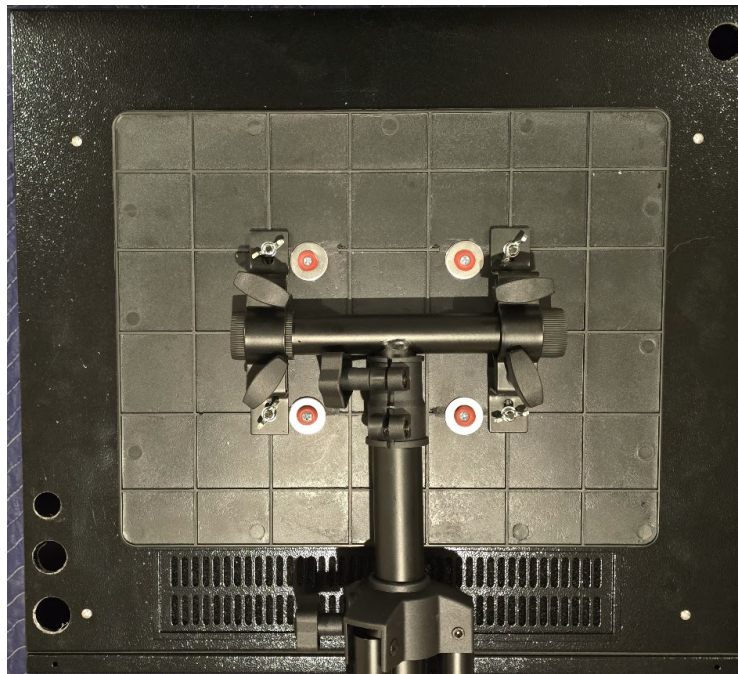
PRO TIP — Washers: Use the 304 stainless steel fender washers (BOM #26) behind each VESA mount screw to distribute load across the enclosure back panel and create a flush, secure connection. The assortment kit covers M3 through M12 so you have the right size regardless of your specific screw selection. 304 stainless matches the handle and Torx screws for consistent corrosion resistance.

PRO TIP: The stainless steel door handle (BOM #14) also mounts using the 100x100mm VESA pattern on the enclosure LID using the tamper-resistant Torx screws. This handle serves three purposes: carry handle for transport, security cable anchor point, and tamper deterrent in the field.

STEP 2 — Drill the Weatherproof Port Holes

Four weatherproof port connectors need to be mounted through the enclosure walls. Plan your layout before drilling — port placement determines cable routing inside.

- Mark hole positions: three ports on the BOTTOM EDGE (Ethernet, USB-A, USB-C) and one on the RIGHT SIDE PANEL (FM antenna feedthrough)
- Bottom edge placement is intentional — gravity minimizes water ingress and cables route downward naturally
- FM antenna is isolated on its own panel to reduce RF interference with data ports
- Use a step drill bit (stepper tool) to drill each hole — step bits give clean, sized holes without cracking the enclosure material
- Match drill size to your specific panel mount connector diameter
- After drilling, use the Linelucool deburring tool to remove all burrs and sharp edges from each hole
- Spray Rust-Oleum clear coat on all exposed metal edges to prevent corrosion
- Allow clear coat to fully cure before proceeding

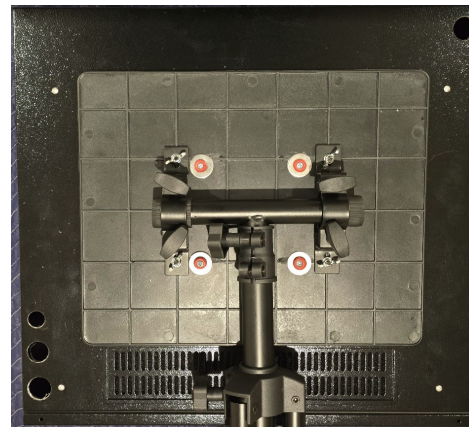


Back panel showing drilled port holes on the left side edge. Three data ports on bottom edge, FM antenna feedthrough on right panel (not shown).

STEP 3 — Install the Weatherproof Port Connectors

Install each panel mount connector from inside the enclosure, threading through the drilled holes and securing with locking nuts from the outside.

Port	Connector	Location	Identifier
Ethernet	Lonlonty IP68 CAT6 RJ45 Panel Mount	Bottom edge	BLUE ring
USB-A	MysRuida IP68 USB 3.0 M20 Panel Mount	Bottom edge	GREEN ring
USB-C	USB 3.1 Type C Flush Mount Adapter	Bottom edge	—
FM Antenna	Dikiwodark RV Cable Passthrough	Right side panel	—



Left: Bottom edge showing installed Ethernet (blue), USB-A (green), and USB-C connectors. Right: Right side panel with FM antenna feedthrough installed solo.

PRO TIP: The colored indicator rings (blue/green) make port identification fast in the dark during field setup. Consider adding labels with a label maker for USB-C and FM if you want full port identification at a glance.

IMPORTANT — FM ANTENNA HOLE PLACEMENT: The hole position shown in the Step 2 photo reflects the original build. If you are using the Dikiwodark RV Cable Passthrough connector from the BOM, drill the hole **FURTHER INWARD** from the panel edge than shown in the photo. The Dikiwodark connector has a wider profile than the original and requires additional clearance for the locking nut to seat properly against the inside of the enclosure wall. Measure your connector's nut diameter before drilling and confirm you have enough clearance from the edge before committing to the hole position.

STEP 4 — Interior Component Installation

With ports installed, load the interior components. The enclosure has a shelf/tray area above the projector space for housing electronics.

- Use Command 20lb Heavy Duty Picture Hanging Strips to mount the ICEELEC power strip to the back wall of the upper compartment — no drilling required, fully removable if needed
- Use Command strips to mount the AZWang FM Transmitter on the left interior wall — LCD display faces inward for frequency adjustment when the door is open
- **OPTIONAL:** Connect the BESIGN Ground Loop Noise Isolator inline between the mini PC audio output and FM transmitter input only if you experience audio hum or interference

- Place the GMKtec Mini PC M2 in the upper compartment — enable Auto Power-On in BIOS (Power Management settings) so the unit boots automatically when AC power is applied
- Route all power cables to the power strip
- Connect the FM antenna cable from the transmitter through the Dikiwodark RV passthrough on the right side panel
- Place the HYDROSORBENT silica gel desiccant packet inside the enclosure to control moisture
- Slide the Optoma GT2100HDR projector into the main bay — lens facing forward through the enclosure opening
- Connect HDMI from mini PC to projector, and USB/Ethernet as needed
- CRITICAL: Enable Direct Power On in the Optoma projector settings menu so it powers up automatically when AC power is applied — both the mini PC and projector must auto-start for a truly autonomous rig
- Run the external power cable out through the DeerTV built-in cable management



Left: Interior overview showing FM transmitter (left), DeerTV cooling fan (center), and power strip (right). Right: Close-up of 4-outlet power strip and internal cooling fan.



Fully loaded interior: Optoma GT2100HDR projector seated in main bay with all electronics installed above.

STEP 5 — Security Hardware Installation

Before deploying outdoors, install the security hardware. This rig represents a significant investment — treat it accordingly.

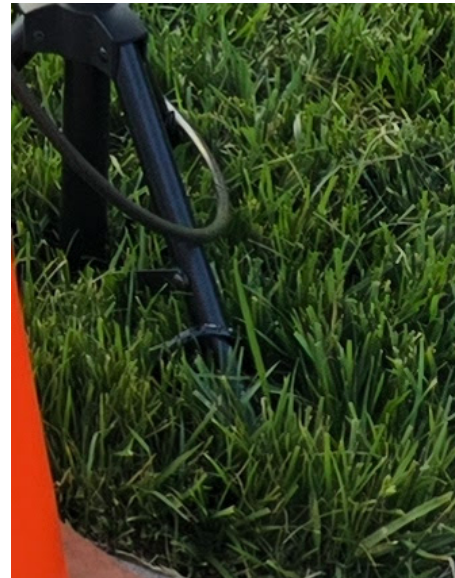
- Mount the ZRuiYFFS stainless steel handle on the TOP LID of the enclosure using the 100x100mm VESA hole pattern
- Use the Torx tamper-resistant screws (BOM #15) — this prevents opportunistic removal in the field
- Apply WD-40 White Lithium Grease to all screw threads
- Test the handle load capacity — it should support the full weight of the assembled unit
- Thread the Vascor 15ft security cable through the handle
- In the field: loop the cable around a fixed object (tree, post, railing) and secure with the Master Lock padlock

PRO TIP: The Torx security screws require a T20 Torx bit to remove. Most casual thieves will not have one on hand. Combined with the cable lock, this creates two layers of deterrence.

STEP 6 — Field Deployment & Positioning

Consistent show-to-show positioning is critical for projection mapping — your mapped zones must align perfectly with the physical facade every time. Here is the system that makes repeatable deployment fast and reliable.

- On your first deployment, find the optimal projector position for your facade and note the exact spot
- Push indiedouker orange surveyor spikes into the ground at each tripod leg foot position
- These stakes stay in the ground permanently — they mark your exact position for every future show
- Set up: place tripod legs on the stake markers and you are immediately in the correct position
- Drive one RIY trampoline anchor stake through each tripod leg foot into the ground — three stakes total per deployment, one per leg. This prevents the rig from shifting or tipping in wind
- Extend and aim the FM antenna vertically for maximum broadcast range
- Connect external power via the enclosure cable management
- Loop the security cable from the top handle around your anchor point and lock with the Master Lock
- Place GUARDLEAD collapsible traffic cones around the rig perimeter — the reflective collars make the setup visible to drivers at night and keep foot traffic away from cables. Cones collapse flat for easy storage between shows



Left: Fully deployed rig on front lawn with FM antenna extended and security cone placed. Right: Trampoline anchor stake driven through tripod leg foot for wind resistance.

Projection Mapping Software

The rig is the hardware — but to actually map and run your shows you will need projection mapping software. Here are the most popular options used by home enthusiasts and professionals alike. FacadeThemes.com generates content packages in standard file formats (PNG, MP4, PDF) compatible with all of the platforms below — no proprietary format lock-in.

Software	Best For	Pricing	Website
HeavyM ★ Popular for Home Users	Beginners — home enthusiasts, easy to learn	Free trial, paid plans from \$19/mo	heavym.net
MadMapper	Intermediate to professional users	From \$9.99/mo	madmapper.com
Resolume	Professional and live performance	From \$25/mo	resolume.com
TouchDesigner	Advanced users, real-time generative visuals	Free non-commercial	derivative.ca
Lightform	Plug and play, beginner friendly	Hardware + software bundle	lightform.com

FacadeThemes Compatibility: FacadeThemes.com generates complete theme packages including transparent PNG props, MP4 video loops, and a human-readable production guide — standard formats that drop directly into any of the platforms above. Upload a photo of your house, choose your theme, and your assets are ready to map. No prompt engineering required.

Real World Shows — Watch the Rig in Action

All four shows below were produced using this exact rig and content generated by FacadeThemes.com. Scan the QR-style links below or search on YouTube @GenosWorldOfTech.

Show	YouTube URL
■ Military Tribute — Honor, Service & Legacy	youtu.be/9siGcW5fWfM
■ JMU Graduation Celebration	youtu.be/s8sNO23Q4hk
■ Easter Into the Bunny-Verse	youtu.be/nl3u_li_OXc
■ Easter Ocean Bunnies	youtu.be/iha7KUWyE5A

Subscribe to @GenosWorldOfTech on YouTube for new show productions, rig build tutorials, and FacadeThemes walkthroughs: youtube.com/@GenosWorldOfTech

Show Gallery — Two Rigs, Built From This Guide

Both of these rigs — mine and my neighbor's — were built using the exact parts list and steps in this guide. Every show below was produced using HeavyM with content generated by FacadeThemes.com. This is what your rig can do.



Easter — "Into the Bunny-Verse" theme Spider-Man inspired bunny heroes across both stories



Easter — Ocean/Coral Reef theme Neighbor's house with synchronized LED accent lighting



Christmas — Grinch theme (two houses synchronized) FM audio ticker visible: "Tune to FM 96.5 For Sound"



Military/Memorial tribute — "Honor, Service, Legacy" Fighter jets, Navy insignia, "Some Gave Some, Others Gave All"



Graduation Celebration — JMU theme Two-house synchronized show — this is what projection mapping looks like at its best

From Rig to Show — Content Creation

Now that your rig is built and deployed, you need content — and that is where most people get stuck. Creating projection mapping themes from scratch means hours of work in motion graphics software for every occasion. That is the problem FacadeThemes.com was built to solve.

Upload a photo of your house, enter your projector model, choose your occasion and visual style, and the platform generates a complete ready-to-map package: AI-generated theme previews, transparent PNG props and architectural textures, Runway video loops, and a human-readable production guide. Everything drops straight into HeavyM, MadMapper, or your mapping tool of choice.

Try FacadeThemes.com

Preview Spin: \$8 Manifest Only: \$24 Full Package: \$79

facadethemes.com

Shop All Rig Parts on Amazon

Find the complete G-FX Lab storefront with all BOM items at:

amzn.to/4v2Wwyj

Projector Selection Guide

Why Laser? Laser projectors are the preferred choice for this enclosure build for three key reasons: longer lifespan (30,000+ hours vs 2,000-5,000 hours for lamp-based projectors), better color and contrast quality, and significantly less heat generation. Heat management is especially important when your projector is housed inside a sealed enclosure — a lamp-based projector running hot will stress the thermostat-controlled cooling system and shorten the life of all components inside.

Facade Color Matters: The color of your home exterior is a significant factor in lumens required. Light colored surfaces (white, beige, light gray) reflect more light and produce brighter results with fewer lumens. Dark surfaces (dark gray, brown, brick red, navy) absorb light and require significantly more lumens. General guidance: Light/white facade — 3,000 lumens minimum. Medium tone facade — 4,000+ lumens recommended. Dark facade — 5,000+ lumens or consider two projectors. Geno's house features a medium-tone exterior — the Optoma GT2100HDR at 4,200 lumens is the sweet spot.

Enclosure Compatibility: Always verify your projector dimensions against the DeerTV PRO maximum specs of 17.1 x 15.7 x 6.1 inches before purchasing.

Compatible Projectors for Home Facade Mapping

The Optoma GT2100HDR is Geno's personal choice, but these projectors are also well-suited for home facade projection mapping. All are compatible with the DeerTV PRO enclosure — verify dimensions before purchasing (max 17.1 x 15.7 x 6.1 inches). Remember: darker facades require more lumens.

Projector	Lumens	Res	Type	Price	Affiliate Link
Optoma GT2100HDR ■ Geno's Choice	4,200	1080p	Short Throw Laser	\$1,499.99	amazon.com/dp/B0C4KWSFBW?tag=thegfxlab-20
BenQ TH671ST	3,000	1080p	Short Throw DLP	\$949.00	amazon.com/dp/B076MHKTFH?tag=thegfxlab-20
BenQ TK710STi	3,200	4K	Short Throw Laser	\$1,899.00	amazon.com/dp/B0D486MJN9?tag=thegfxlab-20
BenQ HT2060	2,800	1080p	Short Throw DLP	\$1,450.09	amazon.com/dp/B0BWGXHVRV?tag=thegfxlab-20
ViewSonic PX701-4K	3,200	4K	Standard Throw	\$829.99	amazon.com/dp/B08L9SM2DK?tag=thegfxlab-20
Epson Home Cinema 2350	2,800	1080p	Standard Throw	\$999.99	amazon.com/dp/B0BDR8THMJ?tag=thegfxlab-20

Prices shown are approximate and subject to change. Laser projectors are strongly recommended over lamp-based for enclosure use due to lower heat generation and longer lifespan. All affiliate links include tag thegfxlab-20.

Follow the Build on YouTube

Watch the full rig build video, HeavyM tutorials, FacadeThemes walkthroughs, and live show footage:

youtube.com/@GenosWorldOfTech

The G-FX Lab Projection Rig Build Guide | FacadeThemes LLC | Virginia, USA | 2026 Content subject to update. Made in America enclosure version coming soon.