

Jumping Spider Enclosure Project

Intro

Today, April 30th 2026, was what finally pushed me across the edge. I've seen many videos, reels, etc about jumping spiders and they've always peaked my interest. They have an inherent disconnect from normal spiders that makes them more approachable for my tastes and their large eyes greatly appeal to their cuteness. But behind that unassuming, fragile frame, lies an excellent hunter that excels at maneuvering within their environment, stalking their prey until a successful catch is all but confirmed. This is all to say that jumping spiders are active, interesting, and cool, enough to inspire me to begin a project related to them. Their behavior, environment, and needs conveniently make for a fun project, where I'll need to design, build, and monitor an enclosure that best accommodate for my soon to be 8-legged jumpy friend.

Quick info on salticidae (fancy name for "Jumping spiders")

Salticidae are the largest family of spiders, accounting for 13% of spider species or ~7000 species in total.

Enclosure Conditions

Materials

https://www.amazon.com/Acrylic-Plexiglass-Transparent-Projects-Replacement/dp/B0D481SF1B/ref=sr_1_3?crid=WLDADOXRAPR7&dib=eyJ2IjoiMSJ9.LwGzfuHd9Yjuu-EHP0BfwL34DeN0JFi2svMEdO-jgt2Cnh9-LMVDjl18guI5pwyejiq94UH_U8JjXKVRrAQUel5w1RpiMfoKXakv_y_aFQeho5Dhs5iIkyH4he8BIRXKrNBiGN7J9AH-zg2y7ALvCd6QF1lo5j99OD8c4lk5sn80iLK7zafSUXu3--g2-c36rFvkS-ooWMx4ZmqDAeEtzi7Vop_QqRacE7yLIsEFuEK0.95NgNttKnAa4SqwL9w2Ec4PZXCssXsI2girvvyPuV5w&dib_tag=se&keywords=acrylic%2Bsheet%2B9%22&qid=1777609103&prefix=acrylic%2Bsheet%2B9%2B%2Caps%2C561&sr=8-3&th=1

https://www.amazon.com/DIYMAG-Different-Neodymium-Refrigerator-Building/dp/B09TVXL3DZ/ref=sr_1_10?crid=1JU2DHT3TZ1KR&dib=eyJ2IjoiMSJ9.MIA-Fcj1_5ohfg2Ve8eM4xg9vFm5El9i_QZj1oYjYieVER-5A6Lvmg-ru0yxZCra95YGsox1_3gjlh1j9izPLUbx8vPnVfiAB4cfKyqMd_Fe7_Sste7Be1dzJ_rS4tcD4gx8mIP12mLV_Wt8qEnuT_NwxU6GKNgYGEpIF9SR9Ohww5S83I65DX6xS0Fheu_DTxlBZ93ioSyXY-

[g45aJa28-MP_Ar-wDizVskE_ONIQ.4Ue8JnpkiAxXouPurwcsK8YTGjUZr4r5_vgi-cVp5AE&dib_tag=se&keywords=craft%2Bmagnets&qid=1777614752&sprefix=craft%2Bmagnets%2Caps%2C593&sr=8-10&th=1](https://www.mcmaster.com/products/door-hinges/mounting-location~surface/mount-type~adhesive/)

<https://www.mcmaster.com/products/door-hinges/mounting-location~surface/mount-type~adhesive/>

<https://www.ledsupply.com/led-strips/cob-led-strip-lights>

<https://www.ledsupply.com/accessories/ip68-sauna-led-strip-connectors>

<https://www.ledsupply.com/led-channels/lo-track-1m>

<https://www.ledsupply.com/accessories/end-caps-led-strip-track>

<https://www.mcmaster.com/products/gaskets/for-use-with~wire/grommets-1~/>

<https://www.mcmaster.com/products/gaskets/grommets-2~/>

<https://www.mcmaster.com/products/sealants/sealants-3~/environment~submersible/environment~food-and-beverage/>

<https://www.noctua.at/en/products/nf-a4x20-5v-pwm>

Custom PCB capacitive probe for soil in google

<https://www.mcmaster.com/85385T97/>

Spiders

https://www.morphmarket.com/us/c/invertebrates/true-spiders/jumping-spiders?location_state=ca&maturity_in=juvenile&maturity_in=subadult

<https://bugsinyberspace.com/product-category/live-pet-bugs/buy-pet-jumping-spiders/>

<https://spoodville.com/shop>

ideal spider: salticus scenicus

Updated Implementation Plan v3

Micro-Bioactive Jumping Spider Enclosure

1. Current project baseline

Enclosure type:

- Micro-bioactive jumping spider enclosure
- Likely for regal jumping spider or bold jumping spider
- Front-access primary door
- Approx. 6" × 6" × 9"
- Recessed passive drainage/substrate base
- Dry isolated top electronics module

- Dedicated isolated fan duct
- No automated misting for now
- Monitoring-first environmental control

Core systems:

1. Living chamber

- spider
- plants
- springtails
- substrate
- cork / branches / web anchors

2. Passive drainage base

- LECA or pebbles
- mesh barrier
- bioactive substrate
- passive water collection tray/reservoir

3. Dry top electronics module

- LED wiring
- PCB
- controller
- buck converter
- connectors

4. Isolated airflow duct

- top exhaust path
- Noctua NF-A4x20 5V PWM fan
- humid air does not pass through main electronics cavity

Phase 1: Mechanical enclosure design

1.1 Enclosure body

Design for:

- **6" × 6" footprint**

- **9" height**
- **front access door**
- **recessed base for drainage/substrate**
- **top module for lighting, vents, fan duct, and electronics**
- **smooth interior surfaces**
- **no spider-accessible electronics**
- **no sharp edges**
- **no top-only maintenance access as the main door**

The front door is important because jumping spiders often build web hammocks near the top. A front-access door reduces the chance of destroying the hammock during feeding or maintenance.

1.2 Passive drainage base

There is **no pump**. Use a passive drainage tray/reservoir.

Recommended layer stack:

Top

- Leaf litter / cork chips / moss patches
- Bioactive substrate, about 1-1.5"
- Mesh barrier
- LECA or pebble drainage layer, about 0.5-1"
- Passive water tray/reservoir

Bottom

Design requirements:

- Include an inspection/removal path for excess water.
- Keep substrate out of the drainage tray with mesh.
- Avoid stagnant water.
- Avoid permanently saturated substrate.
- Design so water can drain down, but humidity does not depend on standing water.

Goal:

Damp substrate zones + dry retreats + no swamp conditions

Phase 2: Ventilation design

2.1 Mesh choice

Use:

80 × 80 stainless steel woven mesh

Approx. 0.007" / 0.18 mm opening

304 stainless steel is fine

316 stainless steel is optional but not necessary

Why this size:

- Good containment for fruit flies and small feeders
- Reduces springtail escape
- Safe for spider legs/body
- Still allows airflow if vent area is large enough

Avoid using mosquito netting as the primary vent material if stainless mesh is practical. Stainless mesh is more rigid, cleaner, more durable, and easier to frame.

2.2 Lower intake vents

Use lower mesh-covered intake vents.

Recommended total lower intake area:

0.75–1.5 in² total gross opening

Example layouts:

Option A:

One lower vent window:

0.5" × 2"

Option B:

Two lower vent windows:

0.4" × 1.5" each

Placement:

- Lower front or lower side
- Around **0.5–1" above substrate line**
- Opposite the upper/top exhaust path

- Covered with framed 80×80 stainless mesh
-

2.3 Top exhaust

Yes, the rear/top exhaust can simply be a **top exhaust**, as long as it creates a cross-flow path from lower intake to upper exhaust.

Preferred airflow path:

lower mesh intake

↓

living chamber

↓

top exhaust duct

↓

outside

The top exhaust should be part of an **isolated duct**, not the main electronics box.

Good design:

Living chamber air → dedicated exhaust duct → fan/outlet → room

Bad design:

Living chamber air → main electronics box → fan/outlet → room

The fan duct can include both:

- passive exhaust openings
- fan-assisted exhaust

Ideally, the duct still allows some passive airflow when the fan is off.

Phase 3: Lighting system

3.1 Lighting choice

Use:

Two 5" LEDSupply 6000 K COB LED strips

Recessed aluminum channels

Frosted diffusers

Dimming control

Timer / controller-based photoperiod

Target lighting range:

Characteristic	Target
Color temperature	5000–6500 K
Normal brightness	150–350 lumens total
Max useful brightness	250–600 lumens total
CRI	80+, ideally 90+
Photoperiod	10–12 hours/day
Night	Fully dark

Because two 5" COB strips may be bright over a 6" cube, dimming is required.

Start around:

40–60% LED brightness

Then tune based on:

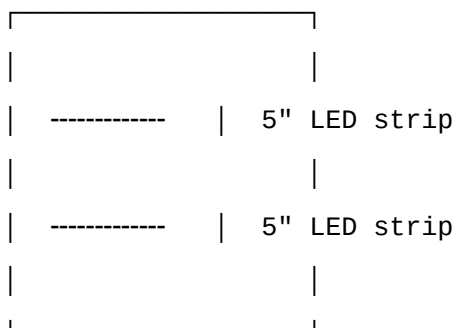
- spider hiding/avoidance
- plant stretching
- heat rise
- condensation behavior
- viewing quality

3.2 LED channel layout

Top view:

6" × 6" top

Back



Front

Recommended spacing:

- Two parallel 5" strips

- About **2–3" center-to-center**
- About **0.5" clearance from strip ends to side walls**
- Preserve shaded corners
- Do not fill the entire top with light

The **1 mm exposed aluminum channel/lens lip** below the top is acceptable if:

- smooth
 - deburred
 - gap-free
 - impossible for the spider to pry into
 - diffuser cannot be removed from inside the enclosure
-

3.3 Lighting isolation

The spider-facing side should expose only:

- smooth frosted diffuser
- smooth aluminum or printed frame
- no wires
- no solder pads
- no connectors
- no adhesive strip

The dry top side may contain:

- LED strip
- IP68 LED strip connectors
- wiring
- strain relief
- PCB connections

Use:

- recessed aluminum channels
- frosted diffuser lenses
- IP68 LED strip connectors
- cable glands or grommets
- mechanical retention

- gasketed service covers

Avoid making the LEDs impossible to replace. Seal the chamber boundaries, not the LEDs permanently.

Phase 4: Top isolation, sealants, and adhesives

4.1 Top module goal

The top should function as separate zones:

Top module zones:

1. Dry electronics cavity

- PCB
- controller
- buck converter
- connectors
- LED/fan wiring

2. Isolated fan/exhaust duct

- humid air path
- fan
- mesh/guard
- outlet

3. LED channel pockets

- recessed channels
- diffuser facing chamber
- wiring exits sealed into dry area

Do not allow humid enclosure air to move through the main electronics cavity.

4.2 Sealant and adhesive approach

Prioritize mechanical sealing:

- screws
- retaining frames

- heat-set inserts
- gaskets
- compression-fit panels
- O-rings where useful
- cable glands
- replaceable mesh frames

Use sealants as secondary protection.

Suggested materials:

Use	Recommended material
Acrylic-to-acrylic structural joints	Acrylic solvent cement
Channel-to-top perimeter	Thin aquarium-safe silicone bead or gasket
Mesh frame perimeter	Gasket or thin sealant bead
Service lid	Silicone, EPDM, or neoprene gasket
Wire pass-throughs	Cable gland + optional sealant
PCB protection	Conformal coating after full testing
LED connector protection	IP68 connectors + strain relief
Fan duct seams	Gasket/sealant, but keep fan replaceable

Avoid:

- hot glue as a primary waterproofing method
- super glue as a humidity seal
- permanent potting of serviceable LEDs/fans
- acetic silicone directly on exposed copper/electronics
- adding the spider before all sealants are fully cured and odor-free

Phase 5: Fan and airflow control

5.1 Fan choice

Use:

Noctua NF-A4x20 5V PWM

40 × 40 × 20 mm

5 V

4-pin PWM

tach/RPM feedback

This is a better fit than the earlier 20 mm fan because it provides:

- real PWM speed control
- tach feedback
- lower noise
- better low-speed behavior
- replaceable standard fan format

Mount it as:

living chamber → isolated exhaust duct → Noctua fan → room

Do not blow directly into the enclosure. Use it as an **exhaust fan**.

5.2 Fan mounting

Fan requirements:

- mounted in isolated duct
- both sides guarded or screened
- inaccessible to spider
- inaccessible to feeder insects
- not directly misted
- not exposed to standing condensation
- removable for replacement
- vibration-isolated if possible

The fan should assist airflow, not act as life support. Passive ventilation should still work when the fan is off.

5.3 Fan RPM control ranges

Use actual RPM if reading tach feedback.

Suggested control table:

Mode	PWM target	Approx. RPM	Use
Off	0%	0 RPM	Normal/default
Very low	20–25%	~1100–1600 RPM	Gentle background exhaust
Low	25–35%	~1600–2300 RPM	Humidity settling
Medium	40–55%	~2500–3500 RPM	Persistent high humidity

Mode	PWM target	Approx. RPM	Use
High	60–75%	~3500–4500 RPM	Short corrective drying
Full	100%	~5000 RPM	Testing only

Normal operating range should probably be:

0–35% PWM most of the time

Full speed is excessive for normal use in a 6" cube.

Phase 6: Electronics and PCB

6.1 Controller choice

Recommended:

ESP32

Use ESP32 if you want:

- Wi-Fi logging
- dashboard
- alerts
- OTA updates
- future automation
- web interface
- data export

Arduino Nano is fine for simple local control, but ESP32 is better for this project.

6.2 Power architecture

Use an external DC supply and onboard regulation.

Example if LEDs are 24 V:

External 24 V DC supply

↓

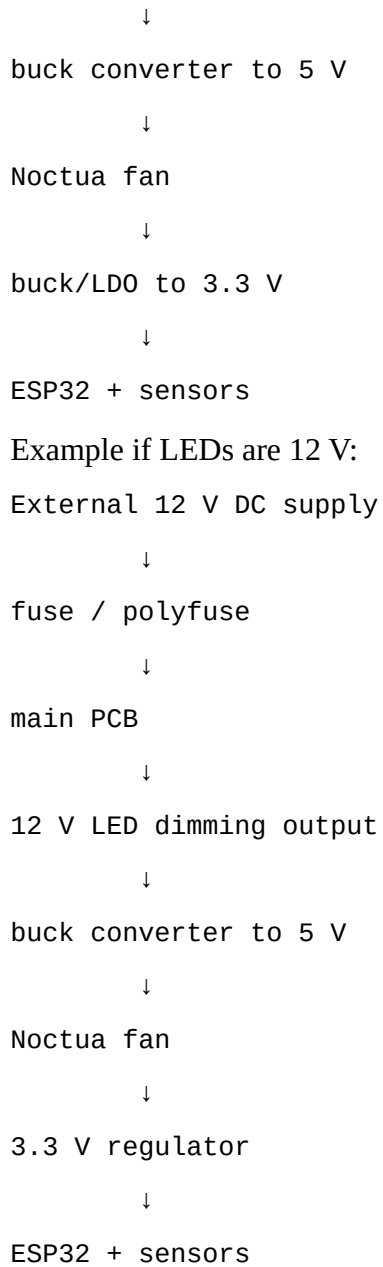
fuse / polyfuse

↓

main PCB

↓

24 V LED dimming output



Design notes:

- No AC mains inside the enclosure.
- External power brick only.
- Add reverse-polarity protection.
- Add fuse or resettable polyfuse.
- Add TVS diode if you want extra input protection.
- Use MOSFETs for LED dimming if needed.
- Use proper 4-pin fan header.

- Add tach input to an interrupt-capable pin.
 - Add I²C sensor headers.
 - Add test pads.
 - Add manual fan override.
 - Add manual LED override or dim control.
 - Keep USB/programming access away from humid ducting.
-

6.3 PCB mounting

Mount PCB in the dry isolated top electronics cavity.

Use:

- standoffs
- screws
- conformal coating after testing
- serviceable connectors
- labels/silkscreen
- strain relief for wires
- gasketed top cover

Do not permanently bury the PCB where it cannot be inspected.

Phase 7: Sensors

7.1 Air temp/RH sensors

Use two sensors:

Top air sensor

Bottom air sensor

Recommended sensor:

SHT31-D with PTFE filter

Higher-end option:

SHT35 or SHT45 with protective membrane/filter

Use two identical sensors if possible.

Placement:

Sensor**Placement**

Top temp/RH Upper-middle chamber, shaded from LEDs, not in direct exhaust stream

Bottom temp/RH Lower plant zone, above substrate, protected from mist and splash

Do not place sensors:

- directly under the LEDs
- directly in fan airflow
- directly in mist path
- touching wet substrate
- inside the main electronics box if they are meant to measure enclosure air

If both sensors share an I²C address, use:

I²C multiplexer

or

separate buses

7.2 Substrate moisture sensor

Recommended:

Waterproof capacitive substrate moisture sensor

Good options:

DFRobot waterproof capacitive soil moisture sensor

or

custom short capacitive probe designed for the shallow substrate depth

Avoid:

resistive two-prong soil moisture sensors

because they corrode and can drift badly in moist substrate.

Placement:

- mid-depth in substrate
- horizontal or diagonal
- near plant root zone
- not in drainage layer
- not against acrylic/glass wall
- not directly under the main misting target
- not in the wettest corner

Use the substrate sensor for trends, not exact thresholds.

Useful readings:

- drying curve after misting
- substrate staying too wet
- substrate staying too dry
- drainage failure
- plant-zone moisture stability

Phase 8: Environmental control logic

8.1 Monitoring-first approach

No automated misting initially.

The system should:

- read top RH/temp
- read bottom RH/temp
- read substrate moisture trend
- log values
- control fan
- control or schedule LEDs
- alert you when manual misting or maintenance is needed

8.2 Humidity targets

Suggested environmental ranges:

Condition	Target
Normal baseline RH	50–70%
Post-misting spike	75–85%
High RH concern	>80% for too long
Very high RH	>90%
Condensation concern	Persistent visible condensation
Low RH alert	<45% for 2+ hours

The key is not one perfect number. The key is a cycle:

mist → humidity spike → gradual dry-down → stable baseline

8.3 Temperature targets

Suggested range:

Condition	Target
Normal	72–80°F
Warm	>82°F
Alert	>85°F

If temperature rises too much:

1. increase exhaust fan
 2. dim LEDs
 3. alert user
 4. check room temperature / direct sun / electronics heat
-

8.4 Fan control logic

Use RPM-based logic if tach is working.

Every 30–60 seconds:

Read top RH/temp

Read bottom RH/temp

Compare with previous trend

Decide fan mode

Suggested logic:

If temp > 85°F:

fan = high, 3500–4500 RPM

alert = true

Else if temp > 82°F:

fan = medium, 2500–3500 RPM

consider dimming LEDs

Else if RH > 95% or condensation flag persists:

fan = high, 3500–4500 RPM

alert = true

Else if RH > 90% for 10–20 minutes:

fan = medium, 2500–3500 RPM

Else if RH > 80% for 30–60 minutes:

fan = low, 1600–2300 RPM

Else:

fan = off

Night behavior:

At night:

fan remains off unless:

RH >90% for extended period

or condensation persists

or temperature is high

Low humidity behavior:

If RH <45% for 2+ hours:

alert user to mist manually

do not automatically mist

Phase 9: Bioactive setup

9.1 Bioactive style

Use a **micro-bioactive** setup, not a large wet vivarium.

Core bioactive elements:

- live plants
- springtails
- leaf litter
- cork bark
- cork chips
- branches/twigs
- drainage layer
- substrate
- moss patches, optional

- moisture gradient

Do not make the enclosure uniformly wet.

9.2 Cleanup crew

Start with:

Springtails only

Springtails should not harm the spider while molting. They are tiny detritivores and generally stay around moist substrate, leaf litter, mold, and decaying matter.

The spider may occasionally eat a springtail, but they are not meaningful prey. Most likely, the spider ignores them.

If springtails get out of control, it usually means:

- too much moisture
- too much decaying plant matter
- uneaten feeder remains
- too much mold/fungal food
- insufficient dry-down

Control methods:

1. reduce misting slightly
2. improve ventilation
3. remove decaying matter
4. remove uneaten prey
5. let top substrate dry slightly between misting
6. bait with tiny vegetable/mushroom piece, then remove bait

Consider dwarf white isopods later only if the system is stable. Do not start with larger isopods.

9.3 Plants

Best choices:

- Fittonia / nerve plant
- Peperomia caperata
- Pilea depressa / baby tears
- Selaginella
- tiny Cryptanthus / earth star

- heart fern, with caution

Use cautiously:

- small Philodendron cutting
- Philodendron Brasil
- pothos
- dwarf Syngonium
- miniature bird's nest fern
- Macodes petola / jewel orchid
- Ficus pumila / creeping fig

Avoid or deprioritize:

- large ferns
- Sansevieria
- Haworthia
- Gasteria
- Rhipsalis
- Hatiora
- aggressive vines

Planting layout:

Bottom/back corner:

Fittonia or Peperomia

Groundcover patch:

Pilea depressa or Selaginella

Accent:

tiny Cryptanthus or heart fern

Vertical zone:

cork / branches / anchor points

Top:

dry retreat and web hammock area

Preserve open visual hunting space.

Phase 10: Feeding and watering

10.1 Feeding plate

Use a shallow removable feeding plate.

Recommended characteristics:

Feature	Target
Diameter	20–30 mm
Lip height	1–3 mm
Depth	Flat/shallow
Material	Ceramic, glass, resin, or textured plastic
Placement	Front/lower area
Accessibility	Easy to remove and clean

Purpose:

- keep prey visible
- reduce feeder hiding
- simplify cleaning
- create predictable feeding zone

Remove uneaten prey.

Especially remove:

- crickets
- roaches
- large prey
- anything that can bother a molting spider

10.2 Watering

Primary water source:

light misting on wall, plant, or cork

Optional backup micro water dish:

Feature	Target
Diameter	10–15 mm max
Open water depth	≤1 mm
Safety fill	pebbles, LECA, or textured insert

Feature	Target
Placement	lower/front area
Maintenance	refresh/clean often
Avoid:	
deep open water	
large dishes	
smooth steep-sided cups	
standing water near hammock	
Best hydration approach:	
Misting droplets + optional pebble-filled micro dish	

Phase 11: Build and commissioning sequence

11.1 Dry build

1. CAD enclosure body
2. CAD front door
3. CAD recessed base
4. CAD top module
5. CAD LED channel pockets
6. CAD isolated exhaust duct
7. CAD mesh vent frames
8. CAD electronics cavity

Verify:

- front door clearance
 - service access
 - channel clearance
 - mesh retention
 - fan removal
 - PCB removal
 - wiring paths
 - sealing surfaces
-

11.2 Electronics test

Before installing into the final enclosure:

1. Test external DC supply
2. Test buck converter
3. Test ESP32 or Arduino Nano
4. Test both temp/RH sensors
5. Test substrate sensor
6. Test LED dimming
7. Test fan PWM
8. Test fan tach/RPM reading
9. Test alerts/logging
10. Test failsafe behavior

Failsafe defaults:

LEDs off or low if controller fails

Fan off or safe default if controller fails

No automatic misting

No heater

No pump

11.3 Wet/humidity test without spider

Run the enclosure empty before adding substrate.

Test:

- mist exposure
- condensation paths
- vent function
- top duct isolation
- electrical cavity dryness
- fan operation
- sensor stability
- sealant behavior
- water drainage into passive tray

Then add substrate and plants.

11.4 Bioactive commissioning

1. Add drainage layer
2. Add barrier mesh
3. Add substrate
4. Add hardscape
5. Add plants
6. Add springtails
7. Run empty for 2–4 weeks
8. Log temp/RH and substrate trends
9. Tune fan logic
10. Tune LED brightness
11. Check mold and plant health

Do not add the spider until the enclosure shows stable dry-down after misting.

11.5 Spider introduction

Before adding spider:

- no exposed electronics
- no sharp edges
- no accessible fan
- no escape gaps
- no constant condensation
- no standing water risk
- substrate not swampy
- springtails stable
- plants stable
- top hammock area available
- lighting not too intense

After adding spider:

- avoid major rearrangements

- observe hammock location
- feed carefully
- remove uneaten prey
- continue logging environment
- adjust slowly, not aggressively

Project Context Summary for Future GPT Use

I'm designing a custom micro-bioactive jumping spider enclosure, likely for a regal jumping spider or bold jumping spider. The enclosure is about 6" × 6" × 9" with a front-access primary door. The base is recessed and will contain a passive drainage/substrate system, not a pump. I want the enclosure to be planted, safe, serviceable, and semi-smart, but not dependent on automation for life support.

The habitat should include live low-light plants, springtails, leaf litter, cork bark, branches, top web-hammock anchor points, and open visual hunting space. It should be micro-bioactive, not a wet vivarium. Springtails are the starting cleanup crew; dwarf white isopods might be considered later but are not part of the initial plan.

Lighting plan:

Use two 5" LEDSupply 6000 K COB LED strips mounted overhead in recessed aluminum channels with frosted diffusers. The LEDs should be dimmable. Target total brightness is roughly 150-350 lumens in normal use, with 250-600 lumens as the upper useful design range. Photoperiod should be 10-12 hours/day with dark nights. The spider-facing side should expose only the smooth diffuser/channel surface, with no accessible wires, solder pads, connectors, adhesive strip, or electronics.

Top/electronics plan:

The top should be isolated into separate areas: a dry electronics cavity, LED channel pockets, and a dedicated fan/exhaust duct. Humid enclosure air should not pass through the main electronics cavity. The system should use an external DC supply, not AC mains inside the enclosure. The electronics will likely use either an ESP32 or Arduino Nano, but ESP32 is preferred for logging, alerts, and future expansion. I plan to design a custom PCB with buck conversion, fan control, LED dimming, sensor inputs, and serviceable connectors.

Ventilation plan:

Use lower intake vents and top exhaust vents to create cross-ventilation. The lower intake should be around 0.75-1.5 in² total gross opening, placed about 0.5-1" above the substrate line. Use framed 80×80 stainless steel woven mesh, around 0.007" /

0.18 mm opening, preferably 304 stainless. The top exhaust can be the main upper exhaust. Air should flow from lower intake through the living chamber and out through a dedicated top duct.

Fan plan:

Use a Noctua NF-A4x20 5V PWM fan as an exhaust fan in the dedicated isolated duct. It is a 40×40×20 mm 5 V PWM fan with tach feedback. The fan should be guarded, inaccessible to the spider, protected from direct mist, and replaceable. Use it as a gentle exhaust assist, not a constant breeze. Normal operation should usually be off or low speed.

Fan control ranges:

- Off: 0 RPM
- Very low: about 1100–1600 RPM
- Low: about 1600–2300 RPM
- Medium: about 2500–3500 RPM
- High: about 3500–4500 RPM
- Full speed only for testing

Environmental targets:

- Normal humidity baseline: about 50–70%
- Post-misting spike: about 75–85%, then gradual dry-down
- Alert if RH is below 45% for 2+ hours
- Fan low if RH is above 80% for 30–60 minutes
- Fan medium if RH is above 90% for 10–20 minutes
- Fan high briefly and alert if RH is above 95% or condensation persists
- Normal temperature: about 72–80°F
- If temp exceeds 82°F, run fan medium and consider dimming LEDs
- If temp exceeds 85°F, alert

Sensor plan:

Use two air temp/RH sensors, preferably SHT31-D with PTFE filters, or higher-end SHT35/SHT45 with protective membranes. One sensor should be placed upper-middle, shaded from LEDs and outside the direct fan stream. The other should be placed lower-middle near the plant/substrate zone, protected from direct mist and splash. Use an I²C multiplexer if needed. Add one waterproof capacitive substrate moisture sensor, preferably a DFRobot waterproof capacitive sensor or a custom short capacitive probe. Place it mid-depth in the substrate, horizontal or diagonal, near

plant roots, not touching the drainage layer, wall, or wettest corner. Use substrate moisture for trend monitoring only, not automated misting.

Drainage/substrate plan:

The base is passive, not pumped. Use a shallow drainage tray/reservoir, LECA or pebble drainage layer, mesh barrier, and bioactive substrate. Substrate can be ABG-style or a blend of coco fiber, orchid bark, sphagnum moss, leaf litter, and cork chips. Goal is damp-but-not-swampy with a moisture gradient.

Plants discussed:

Best choices include *Fittonia*, *Peperomia caperata*, *Pilea depressa*, *Selaginella*, tiny *Cryptanthus*, and possibly heart fern with caution. Usable but prune carefully: small *Philodendron* cuttings, *Philodendron Brasil*, pothos, dwarf *Syngonium*, miniature bird's nest fern, *Macodes petola*, and *Ficus pumila*. Avoid large ferns, aggressive vines, *Haworthia*, *Gasteria*, *Sansevieria*, *Rhipsalis*, and *Hatiora*.

Feeding/watering:

Use a shallow removable feeding plate about 20–30 mm diameter with a 1–3 mm lip, placed front/lower and easy to clean. Remove uneaten prey, especially crickets or anything that could bother the spider during molting. Primary hydration should be light misting on wall/plant/cork. Optional backup water dish should be tiny: 10–15 mm diameter max, ≤ 1 mm open water depth, filled with pebbles/LECA/textured insert to prevent drowning. Avoid deep open water.

Important cautions:

No direct sun, no heat lamps, no UV lighting, no exposed electronics on the humid side, no humid air through the main electronics box, no accessible fan blades, no sharp aluminum edges, no gaps around the diffuser/channel, no over-automated misting, no deep open water, and do not let plants fill all hunting space.

Commissioning:

Build and test the enclosure empty first. Test the electronics, fan, LEDs, sensors, seals, drainage, and condensation behavior. Then add substrate, plants, and springtails. Run the planted enclosure empty for 2–4 weeks, logging temp/RH and substrate trends. Tune light brightness and fan logic. Add the spider only once humidity, condensation, mold, plants, and springtails are stable.