# Virgil

# Web forensic with Lookyloo, capturing websites with Lacus, integration with Pandora



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CIRCL Virtual Summer School 2025



## What is Yoyodyne IT

- Based in Bordeaux
  - Full remote \o/
- Building tools to help people make informed decisions
  - Actual intelligence is still our best bet
  - Opensource or GTFO
- Infosec trainings
  - Mostly to at-risk communities, journalists
- The tools are co-developped with (or invented by) Quinn Norton



### (some of the) Tools maintained by CIRCL



Computer Incident Response Center LUXEMBOURG



### The tools we're going to cover

- Lookyloo
  - https://lookyloo.circl.lu/capture
  - <u>https://lookyloo-demo.yoyodyne-it.eu/index</u>
  - https://github.com/Lookyloo
- Monitoring with Lookyloo
  - <u>https://monitoring-demo.yoyodyne-it.eu/</u>
  - https://monitor.circl.lu/
- Lacus
  - <u>https://lacus-demo.yoyodyne-it.eu/</u>
  - <u>https://github.com/ail-project/lacus</u>
- Pandora
  - <u>https://pandora-demo.yoyodyne-it.eu/submit</u>
  - <u>https://github.com/pandora-analysis</u>



## Virgil

- The *complete* tool suite
- One stop shop for all the configuration
  - VT, URL Scan, MISP(s), malware bazaar
  - Setup proxies for Lookyloo
- Easy install, update, start, stop
- Install on one or more machines
  - Uses Letsencrypt for TLS
  - Connect all the tools
- Properly installed in the filesystem
  - Easy to debug (not docker)
- Ansible playbooks
  - <u>https://github.com/Yoyodyne-IT/Virgil</u>



. ook 1/00

- Easy capture page to pass all the settings for the capture
  - <u>https://lookyloo-demo.yoyodyne-it.eu/capture</u>
- Can take an HTML file, or a list of URLs
- Pull or import from another instance
  - <u>https://lookyloo-demo.yoyodyne-it.eu/submit\_capture</u>
- Simple examples:
  - <u>https://lookyloo-demo.yoyodyne-it.eu/tree/754ab511-886c-42c5-826d-2456bd408c68</u>
  - https://lookyloo-demo.yoyodyne-it.eu/tree/132f142f-cf85-4164-8b20-8da4188d5072
  - <u>https://lookyloo-demo.yoyodyne-it.eu/tree/95df8d80-7582-40c4-81d8-1d00a25ba50c</u>
- File sample
  - <u>https://lookyloo-demo.yoyodyne-it.eu/tree/b068a584-8da3-4677-9a2f-8852b25e90d3</u>

## Lookyloo

- What is the tree
- Statistics
- Storage state
  - Cookies
  - Local storage
  - Indexed DB
- Screenshot & favicon(s)
- Downloads
  - o <u>https://lookyloo.circl.lu/tree/6e6a034a-a1bf-4991-b8e1-8c20cb096b4d</u>
- What are the hostnodes popups

## Lookyloo

- Menus for pivoting to captures
  - Indexes on ressources, IPs, Hostnames, Favicons
  - Fuzzy hash on the content of the page (DomHash)
  - Passive DNS
  - Hash lookup
- Subsequent captures
  - Keep state (storage)
- Push to another Lookyloo instance
- Categorization
- [Admin] 3rd party services (VT, Urlscan)
- [Admin] MISP integration (search, push)

### Lookyloo

- Incidence response and reporting
- Uses whois to get contacts for IP, ASN, and domain
- Get Security TXT file if any
- Contact for IPFS URLs
- Submit to a ticketing system (RTIR)

- Example:
  - https://lookyloo.circl.lu/tree/8246b282-19f1-4e2f-a529-c02fde957d03

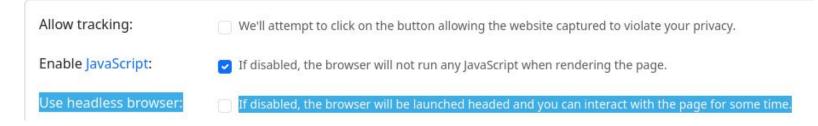
### Capture instrumentation

- 1. Capture headless by default
- 2. Tries to act like a normal user (in this order)
  - 2.1. [On Demand] tries to bypass GDPR overlay
  - 2.2. Moves mouse on the page
  - 2.3. Hit keyboard
  - 2.4. Jump to fragment on page is any (#<id>)
  - 2.5. Attempts to move time forward to trigger JS on a timer
  - 2.6. Random waits
  - 2.7. Waits for network idle (500ms without traffic)
- 3. Instrumentation
  - 3.1. <u>https://github.com/Lookyloo/PlaywrightCapture/blob/main/playwrightcapture/capture.py#L805</u>

### Headfull capture

- Sometimes want/need to interact with a page
  - o <u>https://lookyloo.circl.lu/tree/d580503d-deba-4707-be92-79c14321fe71</u>
- Only possible on a machine with a graphical interface
  - <u>http://127.0.0.1:5100/</u>
  - http://127.0.0.1:5100/tree/db389f5b-6d78-4b59-8fda-1e319be93dd8
- Once captured, push to remote instance
  - <u>https://lookyloo.circl.lu//tree/db389f5b-6d78-4b59-8fda-1e319be93dd8</u>

#### Capture Configuration 💿



# URL Monitoring (WiP)

- Unexpected changes on a legitimate site
  - Defacement
- New domain renders something
  - New domain used for phishing months after registration
- Email notification
- Comparing captures is difficult
  - Network (IPs) & redirects to a landing page
  - Changes on landing page
  - Big websites with ads networks are extremely problematic
- https://lookyloo-demo.yoyodyne-it.eu/tree/754ab511-886c-42c5-826d-2456bd408c68



- Standalone capturing interface
- In memory, no long term storage
- API only, only website is the documentation
  - https://lacus-demo.yoyodyne-it.eu/
- Usage
  - Submit capture with settings
  - Check regularly if it's done (~30s)
  - Get the result

#### Lacus

#### • Result of a capture

- Screenshot
- Rendered HTML (!= the response of the GET request)
- Storage (cookies, local storage, indexed DB)
- $\circ$  URL in the browser bar
- Favicon(s)
- Runtime
- Downloaded file(s)
- HTTP Archive (HAR)

#### Sample script with PyLacus

from pylacus import PyLacus

```
client = PyLacus(root_url="https://lacus-demo.yoyodyne-it.eu/")
```

```
uuid = client.enqueue(url="https://google.fr")
```

```
status = client.get_capture_status(uuid)
```

```
# -1: unknown
```

```
# 0: queued (not started)
```

# 1: done

```
# 2: capture started
```

```
_
```

```
# When status == 1
```

```
r = client.get_capture(uuid)
```

### **Captures & Proxies**

- Support for wireguard proxies via wireproxy
  - <u>https://github.com/whyvl/wireproxy</u>
- Can use ProtonVPN to exit from anywhere
  - They offer wireguard configs
  - The proxies must be pre-configured in Lacus
- Automatic update of the IP addresses in the HAR
  - Only for Socks5 proxies
- Example:
  - o uuid = client.enqueue(url="<u>https://google.fr</u>", proxy="US")
  - o r = client.get\_capture(uuid)
  - o r['last\_redirected\_url']
    - https://www.google.com/?zx=1751807845231&no\_sw\_cr=1



- Initial goal
  - People receive attachments via email
  - Stop submitting people's passports on Virus Total
  - Do not require the help desk to check manually every attachment
- View the content of a file
- Let people do their work
- Share link to analysis
- Submit to help desk
  - <u>https://pandora-demo.yoyodyne-it.eu/submit</u>
- Lots of false positives and negatives

#### Pandora

- Can listen on an IMAP mailbox for forwarded emails
- Extracts archives
- Can create new modules for specific usecases
- Supports custom Yara rules
- Extract observables (email, hashes, URLs)
  - URLs can be submitted to lookyloo
- HTML doc -> Submit to Lookyloo
- Downloaded files in Lookyloo -> Submit to Pandora

### Virgil

- Deploys Lacus, Lookyloo, Pandora
- On one or more machine
  - The relevant config files are setup as they should be
  - Requires domains so we can use letsencrypt
- Lets you configure the modules with the right API keys if needed
  - VT, malware bazaar, urlscan, urlhaus, hybridanalysis, joesandbox, mwdb
  - Setup the proxies for Lookyloo / Lacus
- Easy update for all the tools at once
  - One command to rule them all

### Integrations

- AIL (Lacus)
  - Workshop on Thursday the 17th
- Assembly line (Lacus & lookyloo) Work in progress
  - <u>https://github.com/Government-of-Yukon-IT-Security/assemblyline-service-lookyloo</u>
  - <u>https://github.com/Government-of-Yukon-IT-Security/assemblyline-service-lacus</u>
- OpenRelik (Lacus, Lookyloo?)
  - Not started yet, hopefully by the end of the year
  - <u>https://github.com/openrelik</u>

#### Python modules for integration

- PyLacus
  - <u>https://pypi.org/project/pylacus/</u>
- PyLookyloo
  - <u>https://pypi.org/project/pylookyloo/</u>
- PyLookylooMonitoring
  - <u>https://pypi.org/project/pylookyloomonitoring/</u>
- PyPandora
  - <u>https://pypi.org/project/pypandora/</u>
- PySecurityTXT
  - <u>https://pypi.org/project/pysecuritytxt/</u>

# Usecases and examples

#### Phishing and scams

- The leanest websites you'll see today
- Use interesting techniques to block the analysts
  - Or just use Cloudflare, they're the phishers best friends.
- Sometimes hard to reproduce a capture

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Welcome to Digital Banking
A Sign In Username Passed Sum Sum Diagon
Not a Navy Federal member? Join now and enjoy the support and great service of a credit union that puts your needs first. Izcome a Nomber Izcome a Nomber
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Navy Federal Credit Union https://lookyloo.circl.lu/tree/260406eb-1219-4379-a80d-3f3bad2bd683



Secure Area En español

#### Log In to Online Banking

User ID	Stay connected with our app	Login help
Save this User ID 💡	241	Forgot ID/Password?
	Secure, convenient	Problem logging in?
Password	banking anytime	Not using Online Banking?
Forgot your Password?	BANK OF AMERICA Get the app	Enroll now
		Learn more about Online Banking
🋍 Log In		Service Agreement



Bank of America https://lookyloo.circl.lu/tree/b500a676-ac38-4737-93bd-b03c83e5a89e



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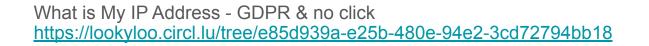


Credit Agricole https://lookyloo.circl.lu/tree/91015905-fdc9-456f-a4d4-6fc5d5e7ff61

### Tracking on legitimate websites

- GDPR is actually doing good things
- Everything is so much worse outside Europe
- It is still very bad
- Use an adblocker.









Frequently Asked Questions

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w does my public IP address affect me?

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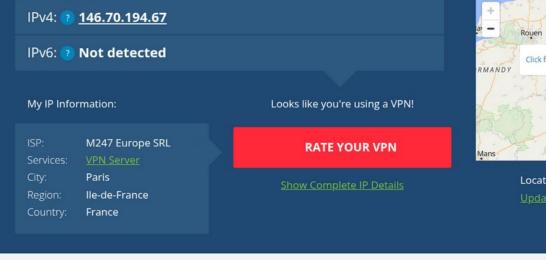
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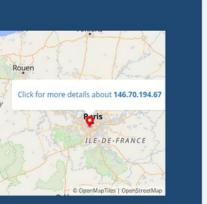
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What is My IP Address - GDPR & Click https://lookyloo.circl.lu/tree/e67f2969-0a04-4ad6-94ca-7ffb1bf9f99b



Location not accurate? Update My IP Location



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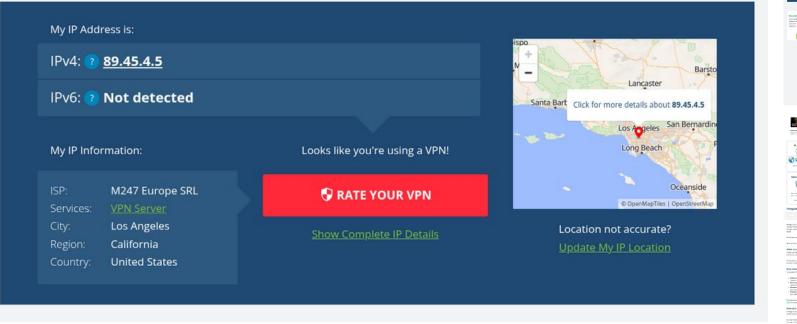
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What is My IP Address - No GDPR https://lookyloo.circl.lu/tree/fb750aa2-79b2-4f0d-af50-de27ff283796



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#### Résumé

Vincent Shogun et sa compagne ont choisi de préserver la vie privée de leur fils de presque un an en refusant de dévoiler son visage sur les réseaux sociaux. Sur Instagram, le couple explique son choix.

Sommaire

COUVERTURE COMPLÈTE SUR VINCENT (LES CH'TIS)

C'est aujourd'hui un homme transformé. Personnage extrêmement volubile lorsqu'il a participé à la première saison des "Ch'tis" sur W9, Vincent Shogun a vu sa vie changer en l'espace de quelques années. En effet, suite à cette expérience, le jeune homme de 35 ans a participé à une multitude de téléréalités : "Les Princes de l'amour", "Les Anges", "La Villa des cœurs brisés\* ou encore "La bataille des couples". Côté cœur, l'ex d'Hillary, de Milla, de Barbara, de Jelena ou encore de Virginie a eu du mal à trouver chaussure à son

pied.

Qui phue est, <u>ite Nordingia</u> a di faire face à ses démons après avoir consommé pendant longtermo des substances illicites. Hoursesment, la vie de Vincent Shogun a radicalement changé et c depuis que <u>ce dennice</u> a croisé la route de Cela: Tous innoreas, tous le desur cont fini par se flancer en décembre 2023. Si la jeune finne rá torijours pas la hague au doigt. Il faut dire que <u>la decus tourterens</u> rivotra pas es le temp de s'ennuyer.

En effet, a l'automo <u>is</u> <u>tear</u> <u>els</u> <u>els</u> <u>els</u> <u>rear</u> <u>els</u> <u>els</u> <u>is</u> <u>els</u> <u>s</u> <u>s</u> <u>s</u> <u>s</u> <u>s</u> <u>s</u> <u>s</u>





Vincent Marwa (1 Vincent recours : Brisés) h compagr et le rést la compa jours api

#### MENTIONNÉS DANS CET ARTICLE



La publication a été dévoilée sur le compte de Célia. Cette dernière raconte alors : "Il y a quasiment un an, nos vies ont changé à jamais. Devenir parents, c'est un bouleversement qu'aucun livre, aucun conseil ne prépare vraiment. Ce n'est pas toujours simple, ce n'est pas toujours beau... mais c'est un amour immense, brut, qui nous a appris à nous oublier pour lut. Puis, la compagne de la <u>star du</u> Nord ajoute : "On a choisi de le protéger, de ne pas l'exposer, de ne pas faire de lui un enfant vitrine qu'on montre au monde. Il aura le droit de choisir ce qu'il veut partager, quand il sera préf.

Un choix tout à fait honorable et c'est également pour cette raison que le couple a été beaucoup moins présent sur Internet. "Cette Puis, la compagne de la <u>star du</u> <u>Nord</u> ajoute : 'On a choisi de le protéger, de ne pas lexposer, de ne pas faire de lui un enfant vitrine qu'on montre au monde. Il aura le droit de choisir ce qu'il veut partagier, quand il sera préf.

Un choix toui à fait honorable et c'est également pour cette raison que le couple a été beaucoup moins présent sur l'internet. 'Cette première année, ell e a été pour thir. Pour nous Loin des réseaux, loin du regard des autres le cenercier ses abonnés. 'Merci à cuu quí font compris E. trarecte autout à toutes les manans qui suvent. Cettes qui se sont entires seules, dépassées. Engiquées et él foitment aunorreuses en même temps, le vous revise.'et yous resense. El je vous remercier?

Écrit par Charlotte Arrigoni





Découvrez la nouvelle Alfa Romeo Junior Alta Romeo Junior



Ce SUV compact fait grande impression

#### leune boomne è à une allifés : Les t.es Angest, T.a és 'ou encore best: Côté cœur, a, de Barbara,

#### https://lookyloo.circl.lu/tree/06d8eadd-e19e-4d3b-8e27-f1846 de55b23

```
"uuid": "53d4a56e-2dca-4656-a664-fd347ea84cf0",
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 "account": "org_KKBTSgXgyQiSgba5T",
 "filterSettings": {
   "image": {
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     "filter": "include"
   "iframe": {
     "bidders": [
     "filter": "include"
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x8v4v4_F7pE2-eS1n_pGvp6D9-YnM_9B299_bbffzPn__ql_-_X_vf_n37v943n77v___BaAAEw0KiCMsCAEIlAwggQAKCsICKBAEAACQMEBACYMC
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```

POST to https://pbs-eu-central.ay.delivery/cookie\_sync

#### "status": "ok", "bidder\_status": [

"bidder": "bliink",
"no\_cookie": true,
"usersync": {

"url%: "https://cookiesync.api.bliink.io/getuid/20pr=1&consent=CQTt-UAQHT-UAAHABBENBVFsAP\_gAEPgAAqILSNT\_G .bWlr-T73aftkeYxP9\_h77sQxBgbJE-4FzLvW\_JwXx2ESNAzatqIKmRIAUXBIQNLHJDURVCgaogVryDMaEyUOTNKJ6BkiBMRI2NYCFxvm4tjeQCY rr991c1mB-t7dr83dzyy4hHn3a5\_2S1WJCdAYetDfv82BKT-9IMd\_x8v4v4\_F7pE2-eS1n\_g6vpE09-YnM\_9B299\_bbffzPn\_ql\_-x/f\_n37v9 h77v\_\_\_\_BAAEw0KiCMsCAEILAwggQAKCsICKBAEAACQMEBACYMCNIGAC6wkQAgBQADBACAAEGAATAAAIAEIgAoAKBAABAIFAAGABAMBAAQMAATAL (CAAEB0DFMCCAQLABIZIONMCUABIICWyoQSAIEFcIQizwCCBETBQAAAAAFAAAAPABYDEkgJUJBAFxBNAAAQAABRAgQIJGTAAFAZstAeDJ9GRpgGD5gJ UwDIAiCMhINCE3rSDxSFEKAA.f\_wACHWAAAAASus\_privacy=Gurl=https%3A%2F%2Fpbs-eu-central.ay.delivery%2Fsetuid%3Fbidderf Dbbliink%26gdpr%3D1%26gdpr\_consent%3DCQTt-UAQTt-UAAHABBENBVFsAP\_gAEPgAAqILSNT\_6\_\_bWLr-T73aftkeYxP9\_h77sQxBgbJE-4F; .vW\_JWXx2ESNAzatqIKmRIAU3TBIQNLHJDURVCgaogVryDMaEyUOTNKJ6BkiBMRI2NYCFxvm4tjeQCY5vr991c1mB-t7dr83dzyy4Hhn3a5\_2S1WJ AYetDfv8ZBKT-9IMd\_x8v4v4\_F7PE2-eS1n\_p6vp6D9-YnM\_9B299\_bbffzPn\_ql\_-x/f\_n37v943N77v\_\_\_BAAEw6KiCMsCAQLABIZIONMCUABIICWyot AAE#ACQMEBACYMCNIGAC6wkQAgBQADBACAAEGAAIAAAAEGAAAABIFAAGABAMBAAQMAATALAQCAAEB8DFMCCAQLABIZIONMCUABIICWyot AAE#CQEEBQAAAAAFAAAAAPBYDEkgJUJBAFx8NAAAQAABRAgQIJGTAAFAZstAeDJ9GRpGD5gKQUwDIAiCMhINCE3rSDxSFEKAA.f\_wACHw AAA&25Gqpp%3D2%26fpgD1%201%26f%3D%24UID\*,

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"bidder": "pubmatic",
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"usersync": {

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Response to POST

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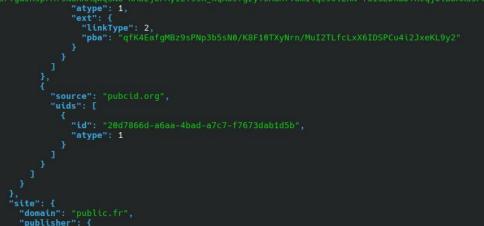
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Browser data

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POST -> https://pbs-eu-central.ay.delivery/openrtb2/auction

Response to bid

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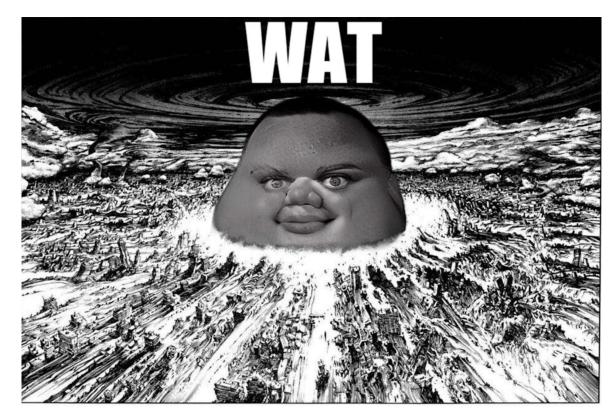
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```

# WAT

- Crypto?
- Crypto scam?
- Al slop?
- Al slop crypto scam?





# The Dollar. Upgraded.

Digital dollar stablecoins that are accepted both on-chain and in the real world.





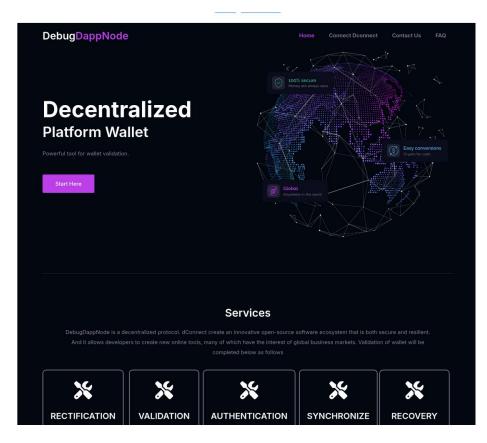
# It's still the US Dollar, but for a new era

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File Information

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Submit to Pandora				
10 🗸 entries per page				Search:
Capture Time	Capture Title		Landing page	
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https://lookyloo.circl.lu/tree/473107ed-085e-410b-8a77-ed285b6a5f36 - Swiftcoin ?!

### https://trojan-trading.pages.dev/

### https://lookyloo.circl.lu/tree/9d968095-3eaa-4b97-94d0-ef166a96ffbe

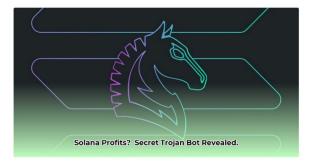
#### Trojan Trading &

#### Home Posts Trojan Trading Bot: Solana Profits Now

February 7, 2025 · 5 min · 985 words · Ricardo Sharpe

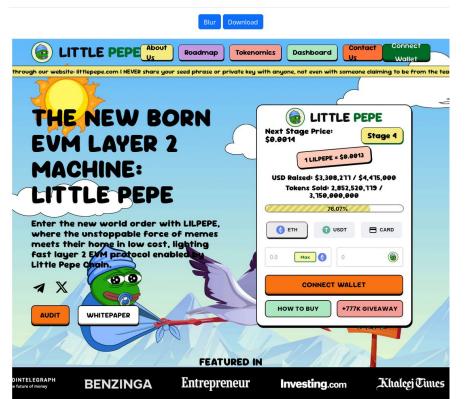
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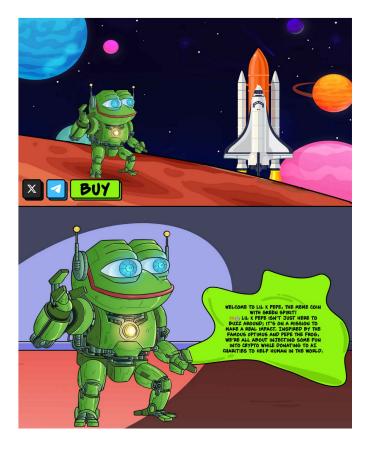
## Is Trojan the Key to Solana Success? A Comprehensive Review

Solana's high-speed, high-risk environment demands sophisticated tools for traders. The Trojan trading bot promises to deliver, boasting a staggering \$1.9 billion in lifetime trading volume and over 145,000 users. But does it live up to the hype? This review explores Trojan's strengths, weaknesses, and the crucial considerations for maximizing its potential, whether you're a seasoned trader or just starting out.



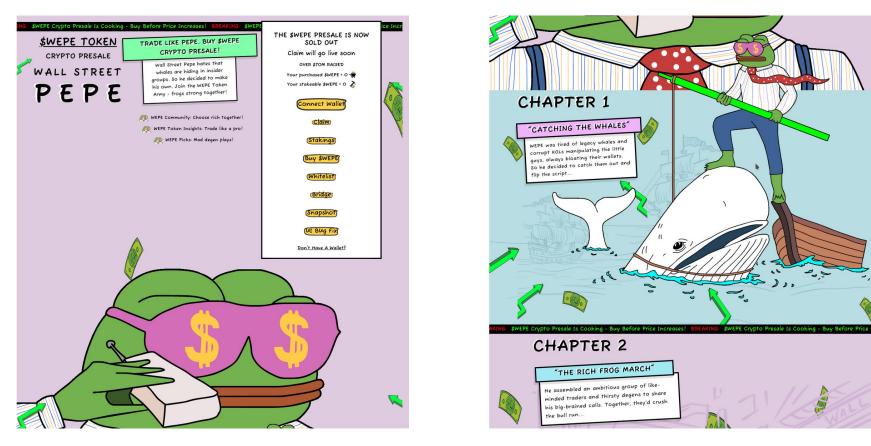
## littlepepe.com

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## www.lilxpepe.lol

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### https://lookyloo.circl.lu/tree/76daa149-056a-4b80-bb94-778320117a33

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Don't have a wallet?

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## Demo interfaces

- https://lookyloo.circl.lu
- <u>https://pandora.circl.lu/</u>
- <u>https://phishtankapi.circl.lu/</u>
- <u>https://monitor.circl.lu/</u>

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- Github: <u>https://github.com/rafiot</u>