Fraunhofer Institute for Applied
and Integrated Security AISEC

Stefan Tatschner [@rumpelsepp], FOSDEM 23, 05 Feb 2022

gallia: An Extendable Pentesting Framework

Overview

1. Meta
2. Status Quo
3. Outlook
4. Demo

Meta
About Me

Google Search: “Homer Donut”

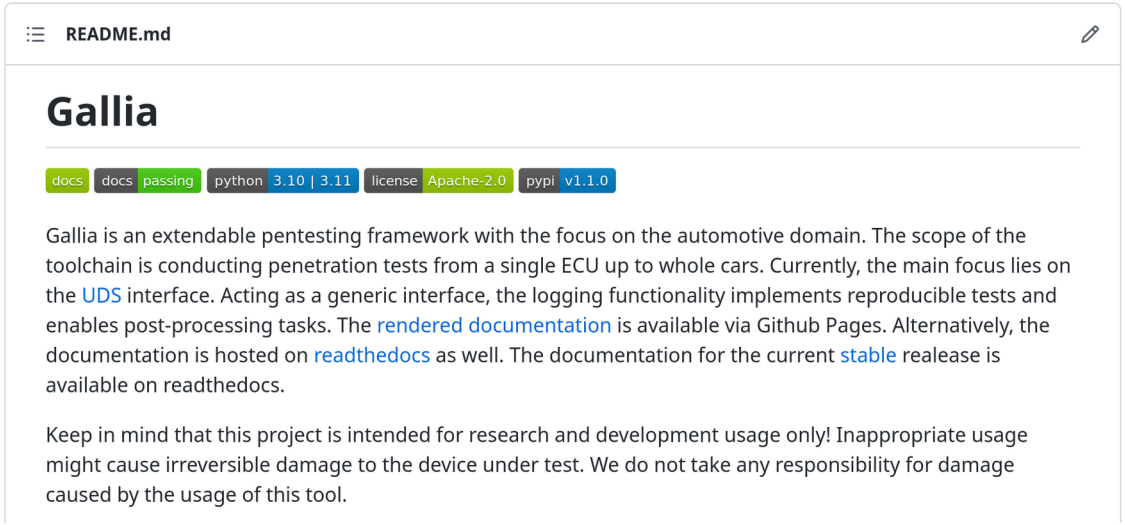
5HF3+QG Munich, Germany

- Stefan Tatschner
- Security Researcher
- Maintainer of `gallia`

Github	`@rumpelsepp`
Matrix	`@rumpelsepp:hackbrettl.de`
Mastodon	`@rumpelsepp@mastodon.social`
LinkedIn	`in/stefan-tatschner`

Meta

About gallia



README.md

Gallia

docs | docs passing | python 3.10 | 3.11 | license Apache-2.0 | pypi v1.1.0

Gallia is an extendable pentesting framework with the focus on the automotive domain. The scope of the toolchain is conducting penetration tests from a single ECU up to whole cars. Currently, the main focus lies on the UDS interface. Acting as a generic interface, the logging functionality implements reproducible tests and enables post-processing tasks. The rendered documentation is available via Github Pages. Alternatively, the documentation is hosted on readthedocs as well. The documentation for the current stable realease is available on readthedocs.

Keep in mind that this project is intended for research and development usage only! Inappropriate usage might cause irreversible damage to the device under test. We do not take any responsibility for damage caused by the usage of this tool.

`https://github.com/Fraunhofer-AISEC/gallia`

- **origin:** SecForCARs (`secforcars.de`) `https://youtu.be/0xkBNoBu8XQ`
- **language:** Python >= 3.10 (`$latest - 1`)
- **FOSS**: `github:Fraunhofer-AISEC/gallia`
- **PyPI**: `pypi.org/projects/gallia`
- **license**: Apache 2.0
- **maintainers**: `@rumpelsepp, @peckto`

→ modular tool for (automotive) penetration tests

Meta
About gallia

penetration test

authorized simulated cyberattack on a computer system, performed to evaluate the security of the system

https://en.wikipedia.org/wiki/Penetration_test

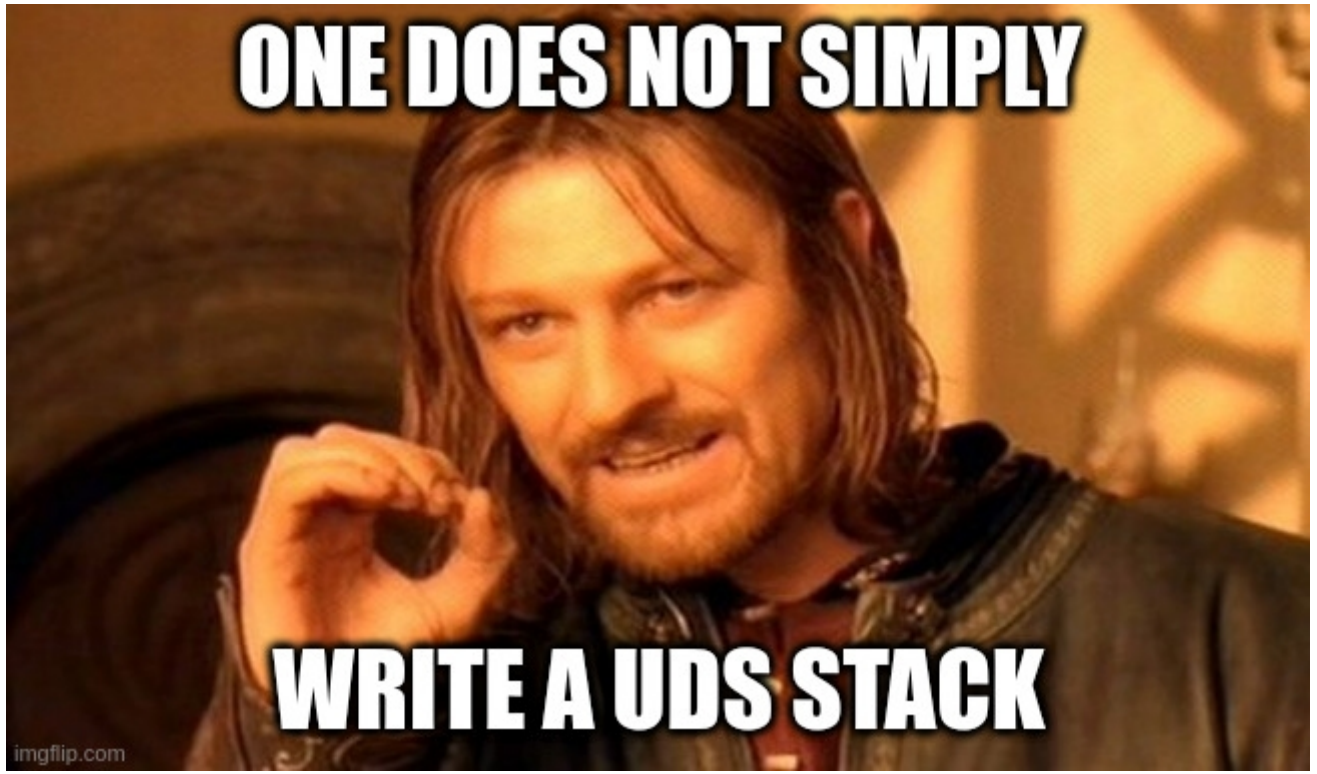
Meta
About gallia

Google search: “simpsons broken car”

Meta
Challenges

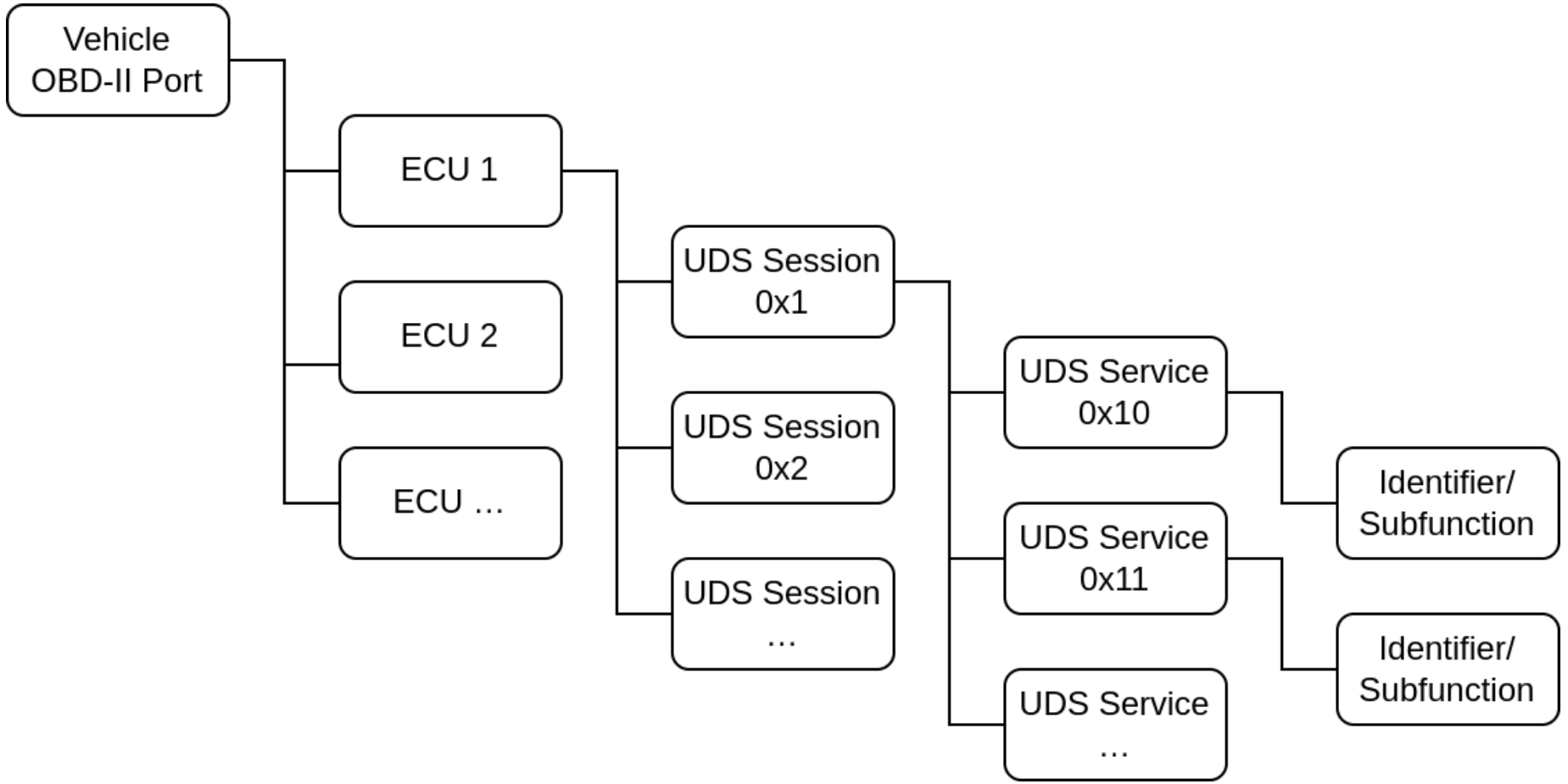
- **raison d'être**: penetration tests on automotive ECUs (→ UDS)
- **postprocessing:** machine readable logs
- **reproducibility**: defined directory structure for artifacts
- **customizability:** modular software stack
- **extendability**: plugin interface and public API
- **software stack:** protocol stack needed

Meta
Challenges



Status Quo

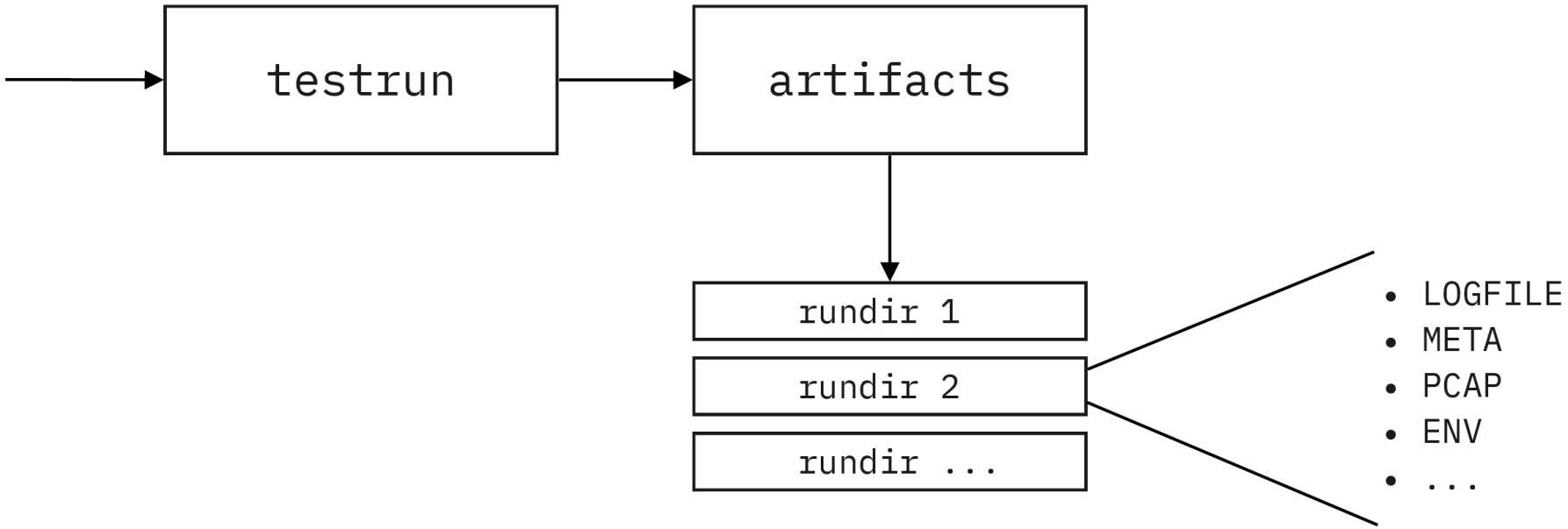
Status Quo
Architecture



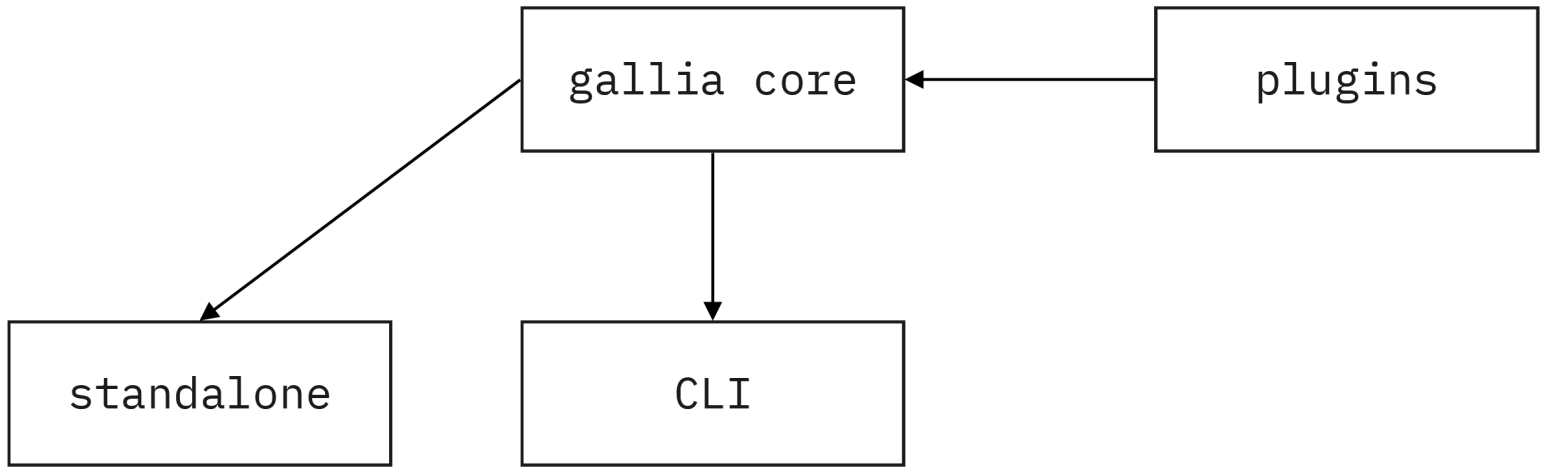
Status Quo
Features

- **CLI tool**: provides ready to use scanners (nmap like);
  `https://fraunhofer-aisec.github.io/gallia/uds/scan_modes.html`
- **UDS stack**: including DoIP, ISO-TP, ...
  `https://fraunhofer-aisec.github.io/gallia/transports.html`
- **automation**: remote control power-supplies (e.g. power-cycle during scan)
  `https://fraunhofer-aisec.github.io/gallia/automation.html`
- **logging**: machine readable (JSON and SQL) logging format with tooling
- **virtual ECU**: for development

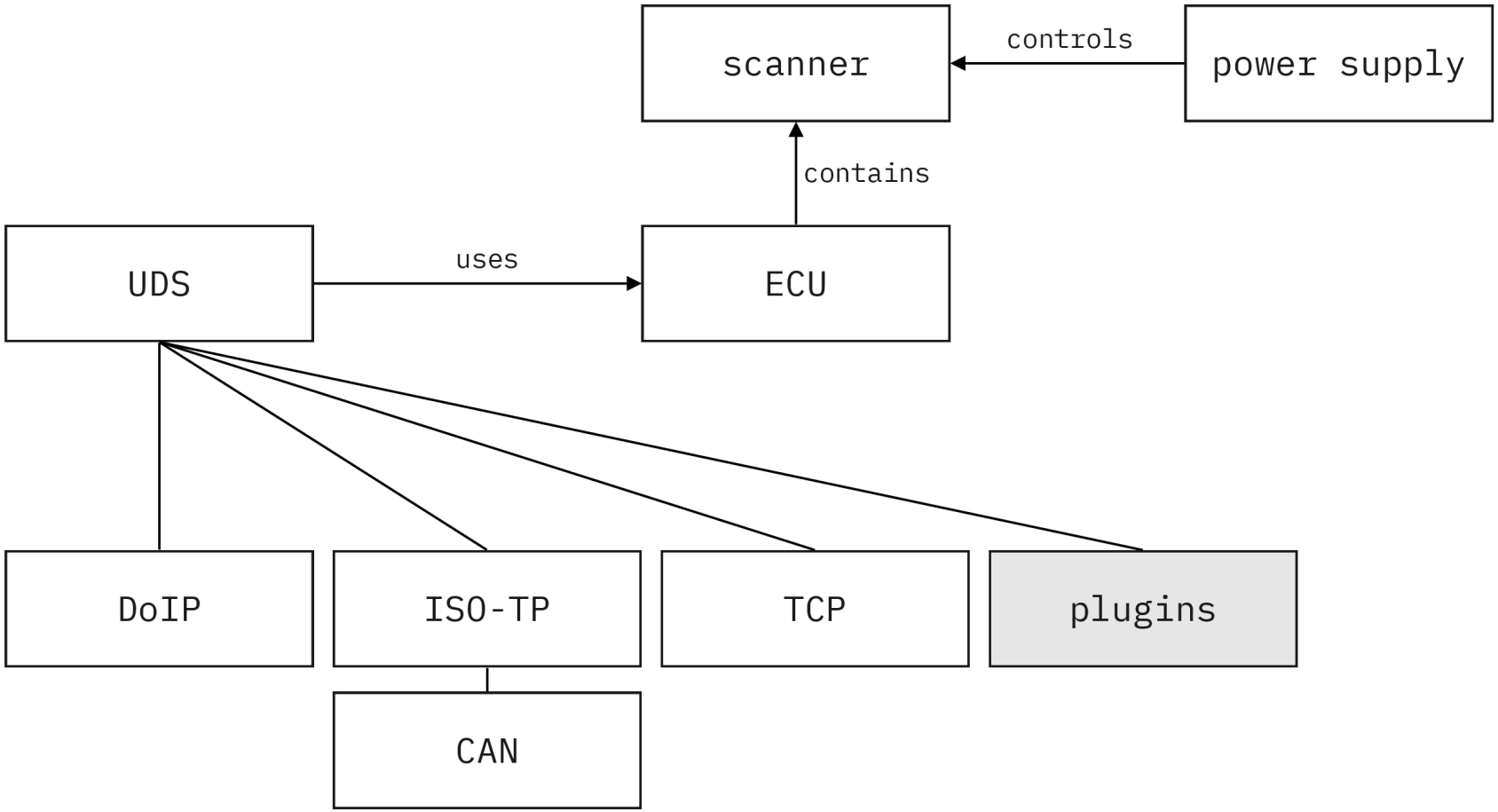
Status Quo
Architecture



Status Quo
Architecture



Status Quo
Architecture



Status Quo
Plugin Interface

hello.py

```python
from argparse import Namespace

from gallia.command import Script


class HelloWorld(Script):
    """A hello world script showing gallia's plugin API."""

    COMMAND = "hello"
    SHORT_HELP = "say hello to the world"


    def main(self, args: Namespace) -> None:
        print("Hello World")


commands = [HelloWorld]
```

pyproject.toml

```toml
[tool.poetry.plugins."gallia_commands"]
"hello_world_commands" = "hello_gallia.hello:commands"
```

https://fraunhofer-aisec.github.io/gallia/api.html

Status Quo
Random Technical Facts

- **`poetry`:** easy dependency management
- **`asyncio`**: `async/await` is used everywhere
- **fully typed**: passes `mypy --strict`
- **full config via `argparse`:** defaults via `gallia.toml`
- **entry points**: extendable using Python's entry point API
- **transport URIs**: configure network stack on the CLI (verified by `pydantic`)

```
$ gallia foo --target doip://192.168.100.88:13400?src_addr=0x0e00&dst_addr=0x1243
```

Outlook

Outlook

Outlook
MOAR!

Google Search: “MOAR meme”

- **power supplies**: Moar models!
- **transports**: Moar protocols (e.g. HSFZ)!
- **scanners**: Moar scanners!
- **scope**: Moar scope (plugins, scanning techniques, …)!
- **testing**: Moar breakage! Moar memes!
- **packages**: Moar distros!

Please test and contribute!

Demo

Demo

https://rumpelsepp.org/research/demos/gallia-fosdem23.mkv

Meta
Contact

Thank you!

Stefan Tatschner

Github `@rumpelsepp`
Matrix `@rumpelsepp:hackbrettl.de`
Mastodon `@rumpelsepp@mastodon.social`
LinkedIn `in/stefan-tatschner`

`https://www.aisec.fraunhofer.de/`

Backup
Project Name

https://gamenewsplus.net/wp-content/uploads/2018/02/asterix-and-obelix.jpg

Hint!