Ifxapp

A reusable Python-based Qt widget library for radar applications

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Motivation

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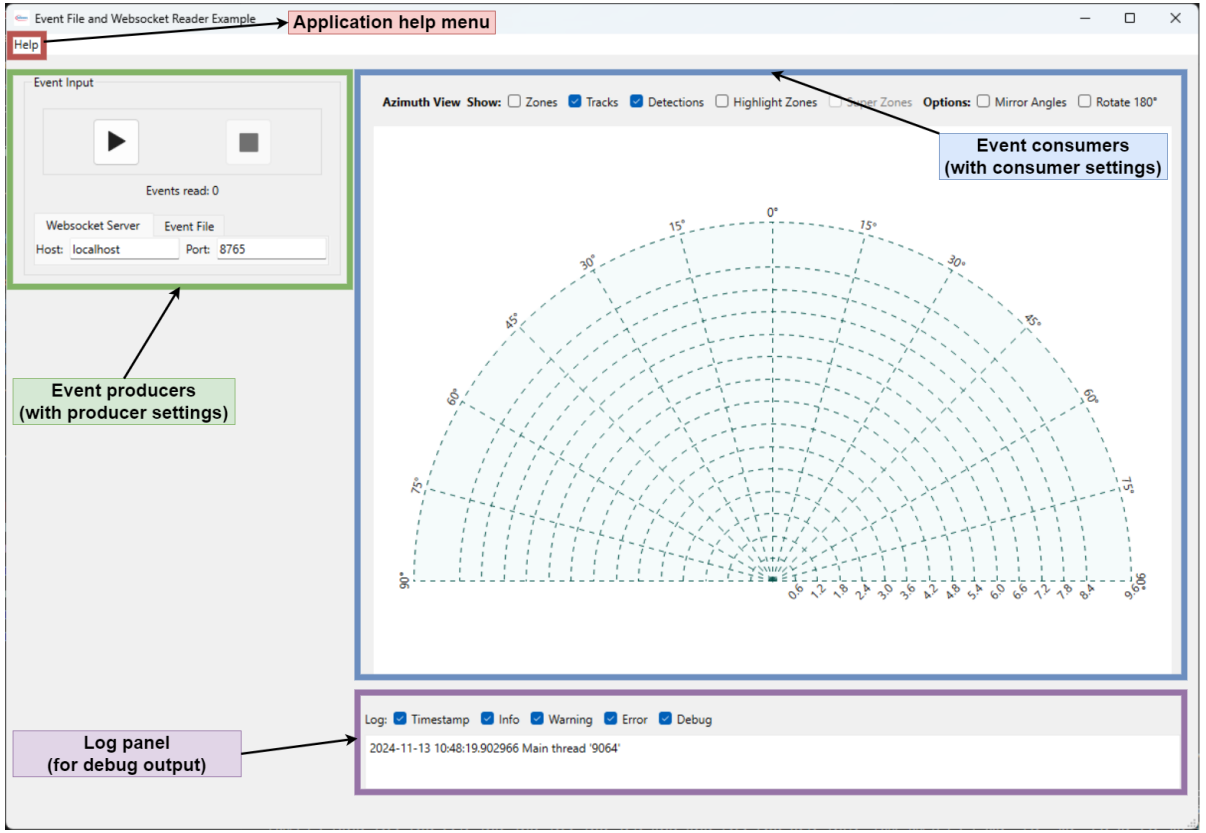
Current status: PSS RFS develops **different applications** (SmartTV, Air Condition, Security Camera & Doorbell), in **different teams** spread **around the globe**!

How to lift synergies between these development efforts?

Motivation: lfxapp

By providing a <u>reusable</u> GUI library for radar data visualization!



Benefits:

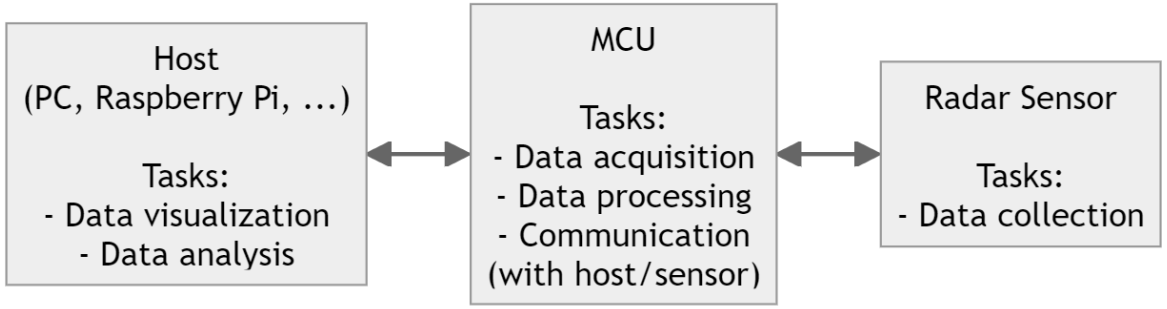
- Common look & feel
- Can be used across different projects
- Builds up abstractions
  I.e., embedded devs can focus on data communication, algo devs on algo development etc.

Assumptions

- An **application** usually runs on a microcontroller (MCU) and **consists of**:
  - An **algorithm*** which processes data from a radar sensor (Smartar) and
  - **Code to communicate** to a PC and to the actual radar sensor.

* The algorithm is usually implemented in Matlab and converted to C by using Matlab's code generation feature.

An application is usually also **complemented by** a small **Python-based GUI** to visualize the radar data on host side.



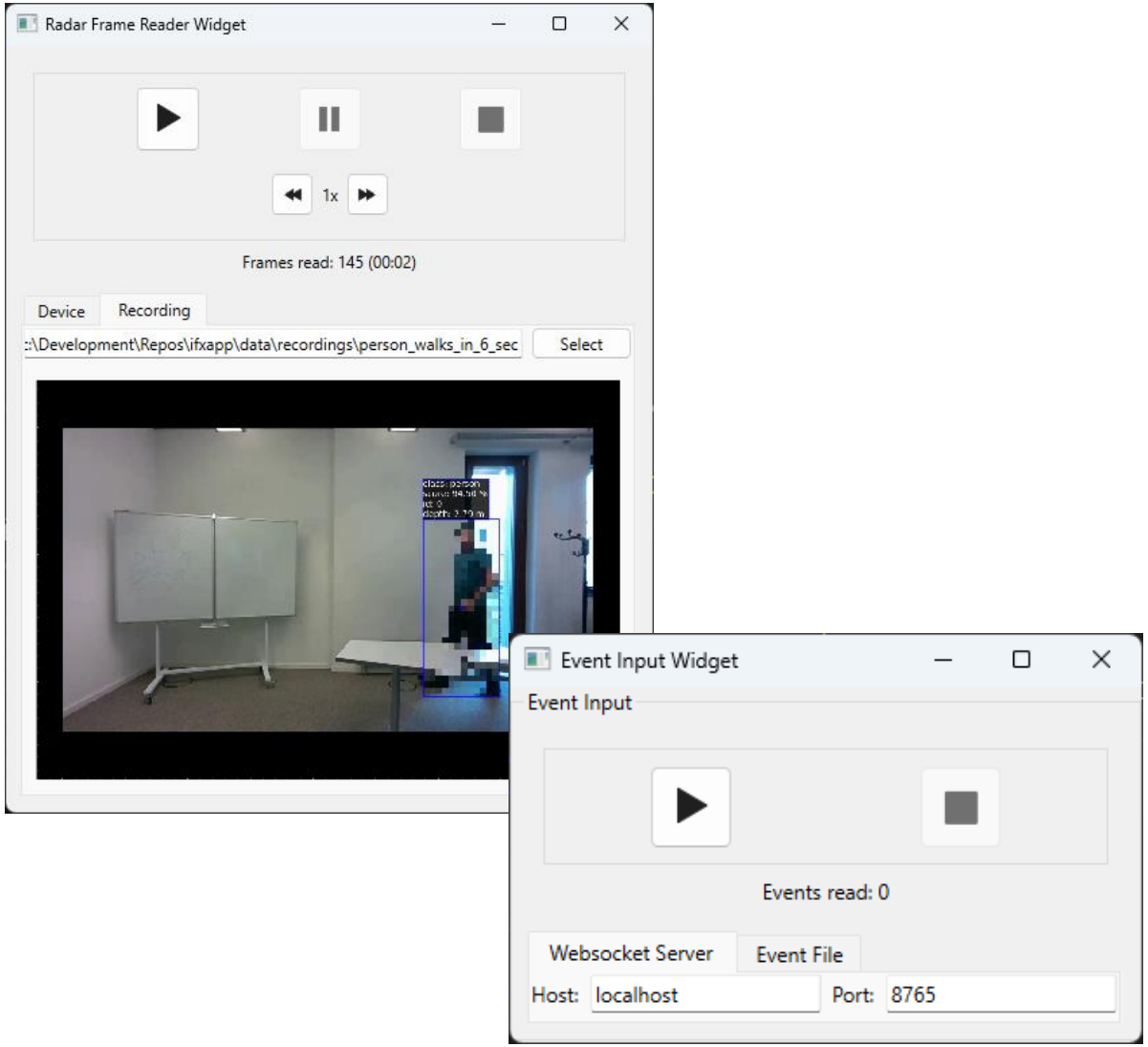
Hardware components of an application

Ifxapp: Overview

Project goals

Ifxapp:

1. Offers **Qt GUI widgets** with a common look-and-feel to visualize algorithm events defined in ifxalgoapi. I.e., ifxapp consumes ifxalgoapi events instead of ADC raw data!



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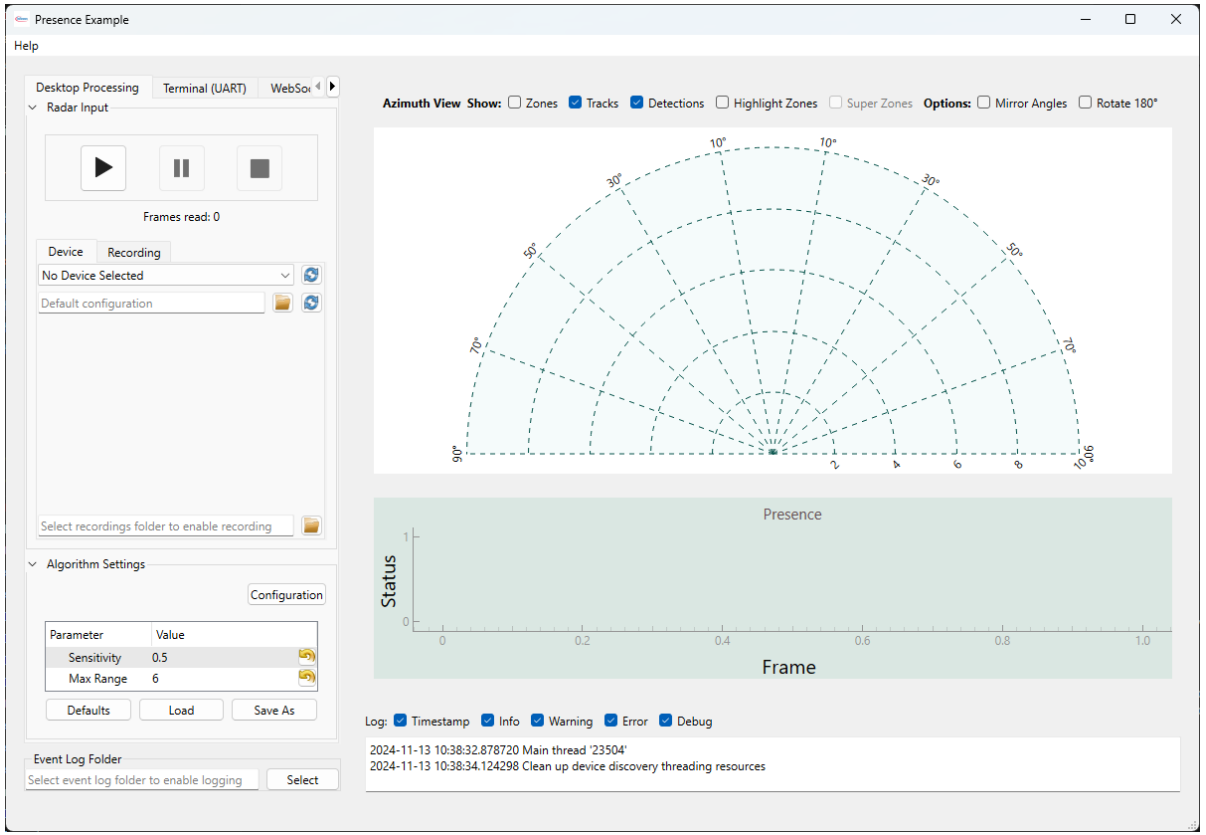
2. Allows to quickly build **GUI main windows** for customer demos but also during algorithm development.



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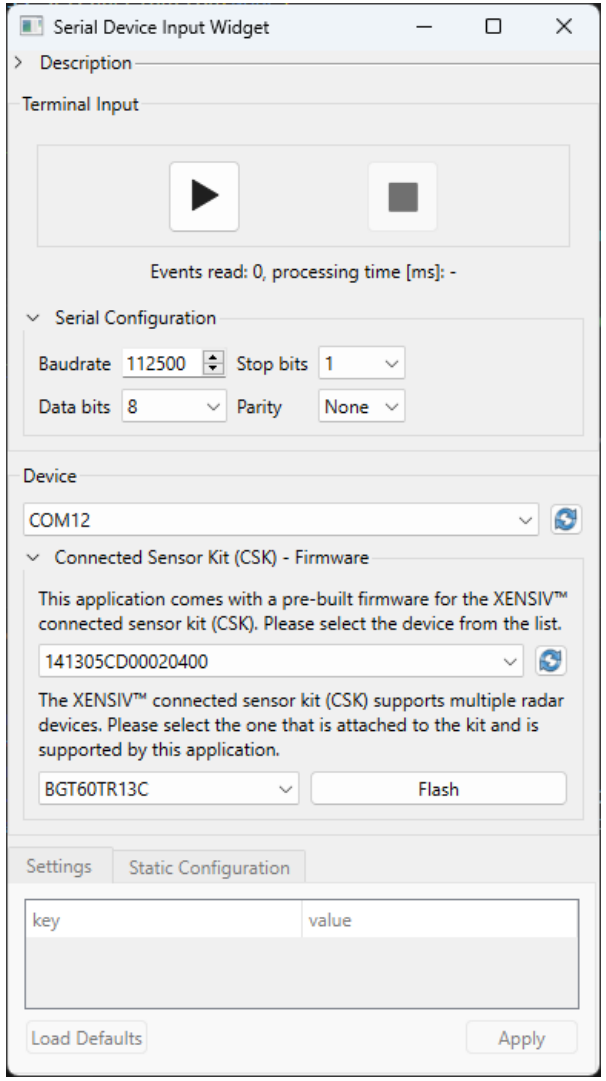
2. Allows to quickly build GUI main windows for customer demos but also during algorithm development.
3. Offers **access to radar sensors** (via Strata firmwares and evaluation kits like CSK).



Ifxapp: Feature overview and event sources

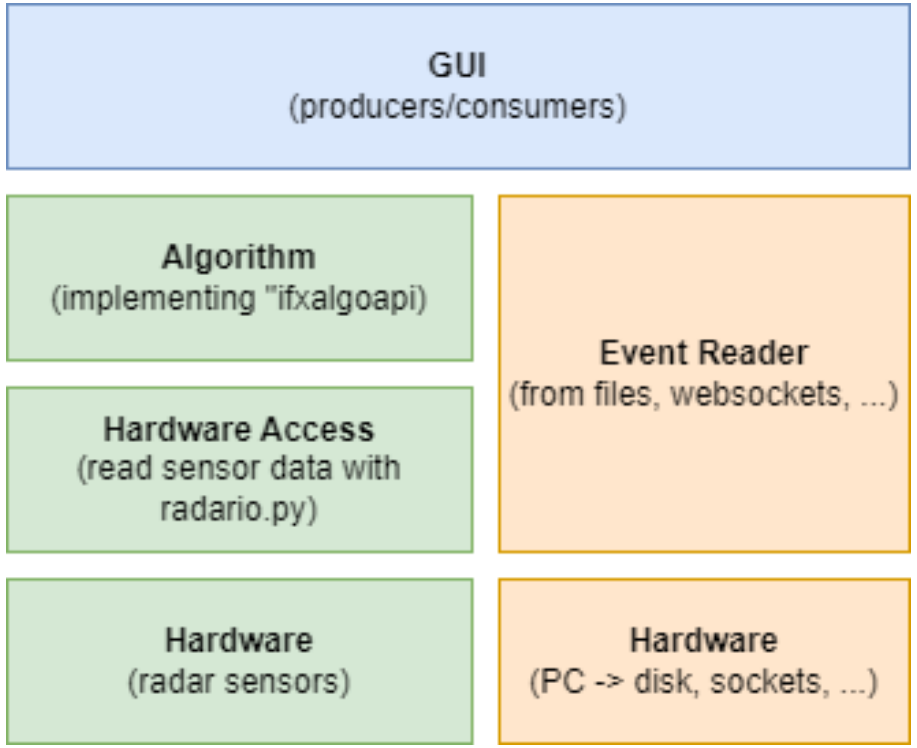
Ifxapp can read radar data (algorithm events) from the following sources:

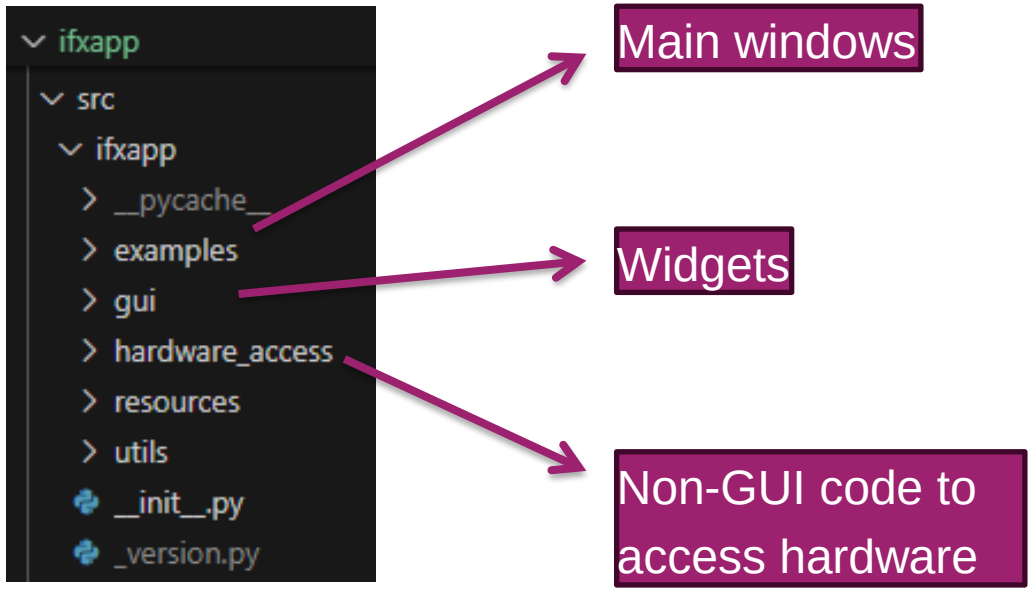
- Files
- Radar sensors
  - Sensor on-chip processing chains (e.g. motion detector)
  - Access radar processing chains on embedded systems (i.e., directly fetch algorithm output from a MCU FW like CSK)
- Websockets (e.g., process radar raw frames in Matlab and send it to ifxapp via websockets)

Ifxapp visualizes:

- ifxalgoapi events (AlgoPresenceEvent, AlgoTrackingEvent, …)
- Video recordings from ifxdaq
- Planned: Custom plots to enable developers to debug their algorithm

Software architecture



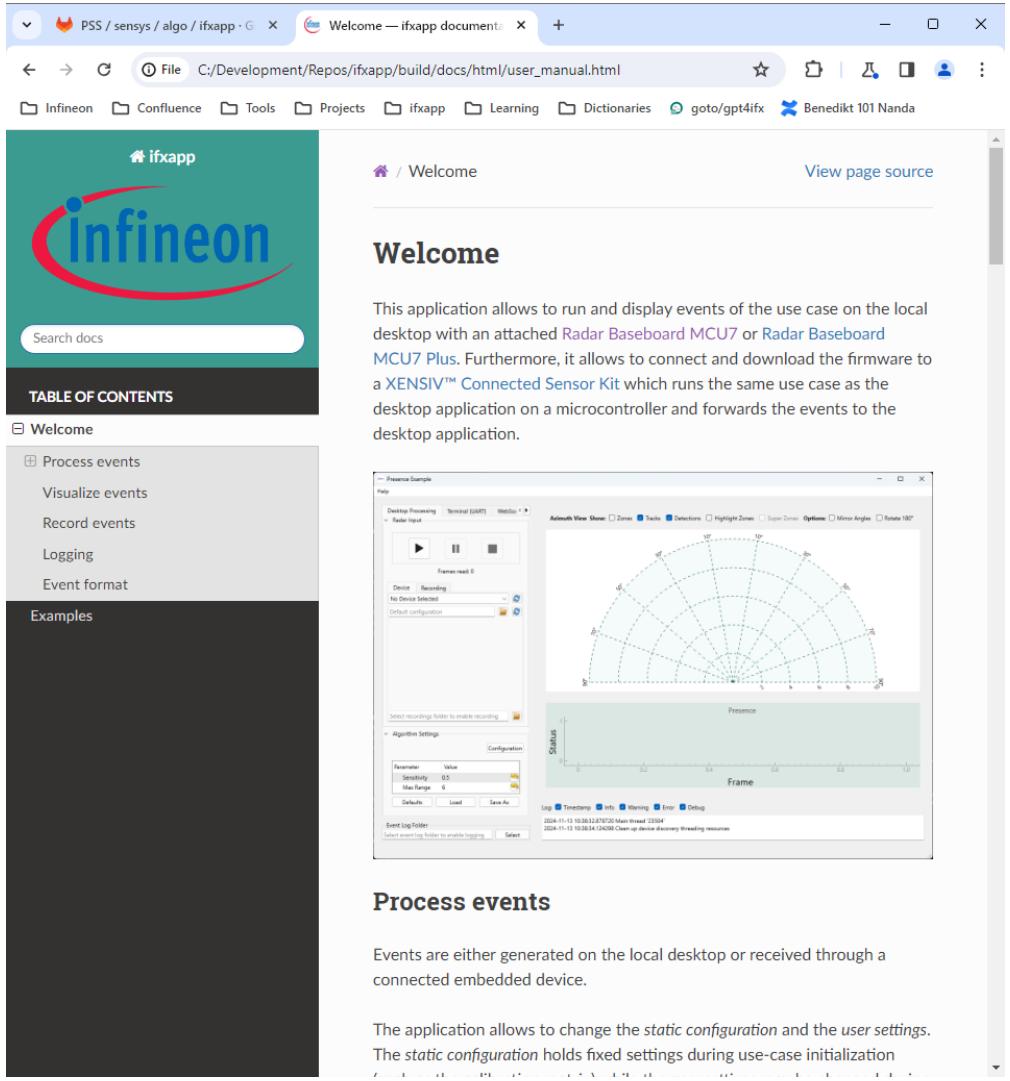


Project setup

- Repo on GitLab
- Ticket-driven approach with feature branches and merge requests
- Release notifications on Webex
  - A Git tag triggers (1) Python .whl creation (2) HTML doc and (3) executable generation (with cx_Freeze)
  - https://gitlab.acme.com/pss/ifxapp/-/releases
- HTML documentation (currently not uploaded to Artifactory)

Dev tools:

- Python 3.9
  - pre-commit 3.7.1
  - cx_Freeze 7.2.2
  - pytest 8.2.1
  - ruff 0.7.1
  - Sphinx 5.2.1
- VS Code 1.87
- Code coverage: ~30%



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Outlook

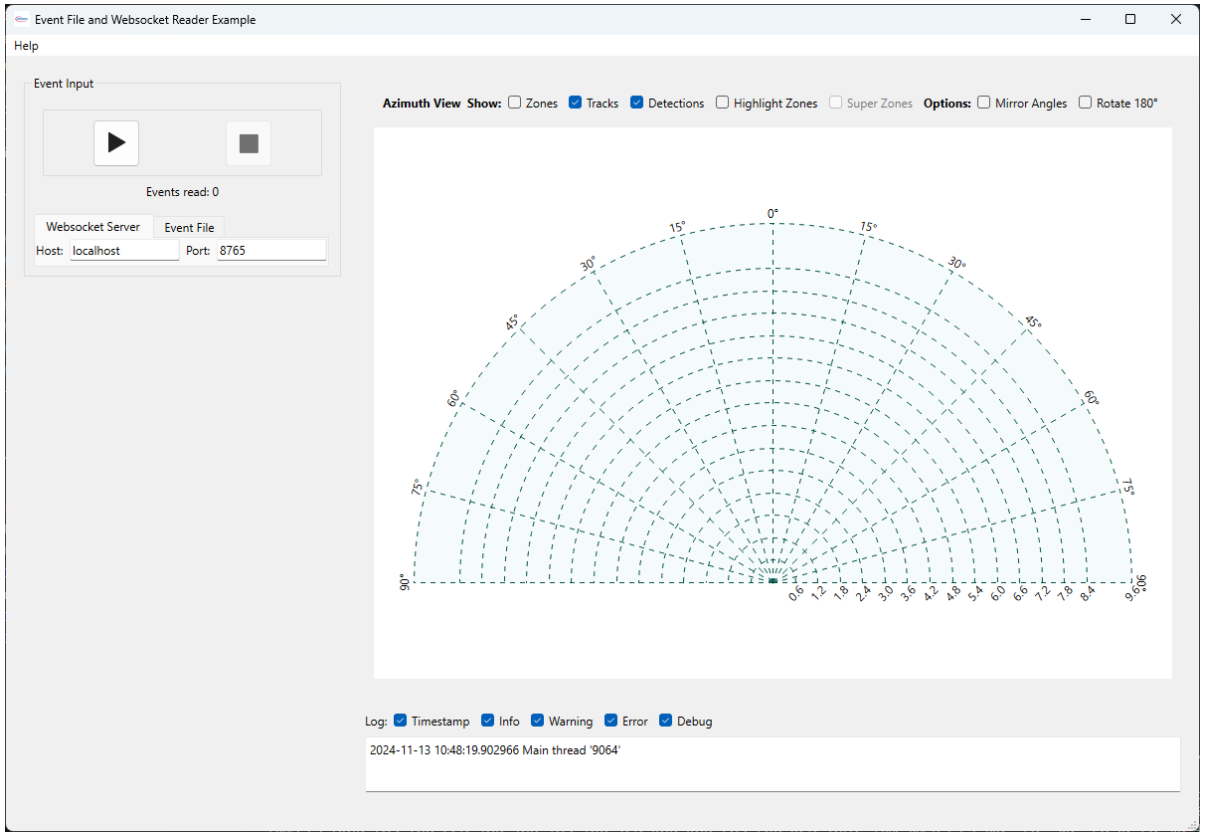
- **Current focus:**
  - Get stable release out the door with minimal feature set to unblock projects.
- **Next:**
  - Code refactoring (use design patterns, mitigate technical depts etc.)
  - Increase code coverage (even for a GUI project it is too low)
  - Implement new features

lfxapp: Demos

Demos

Demos can be found under [src/ifxapp/examples/](#) folder:

- [event_file_and_websocket_reader_example.py](#)
- presence_example.py
- smartar_motion_detector_example.py



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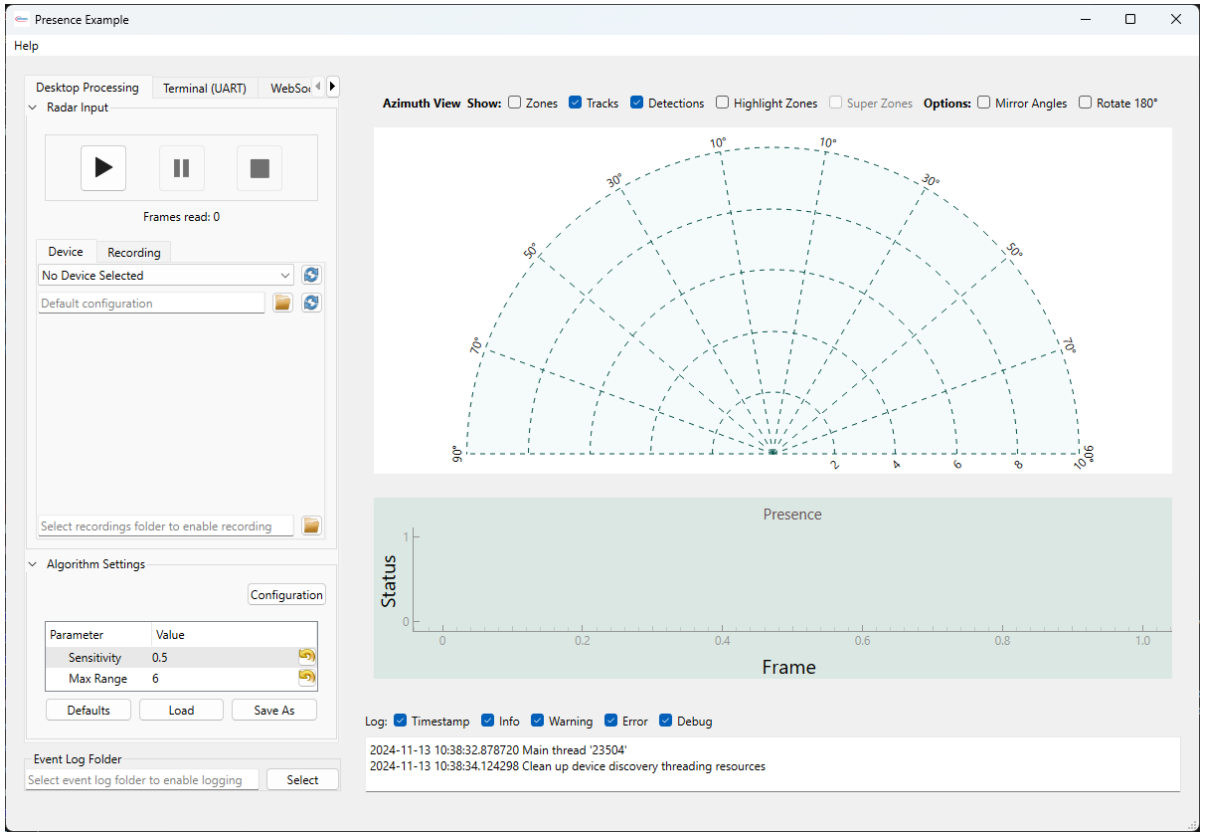

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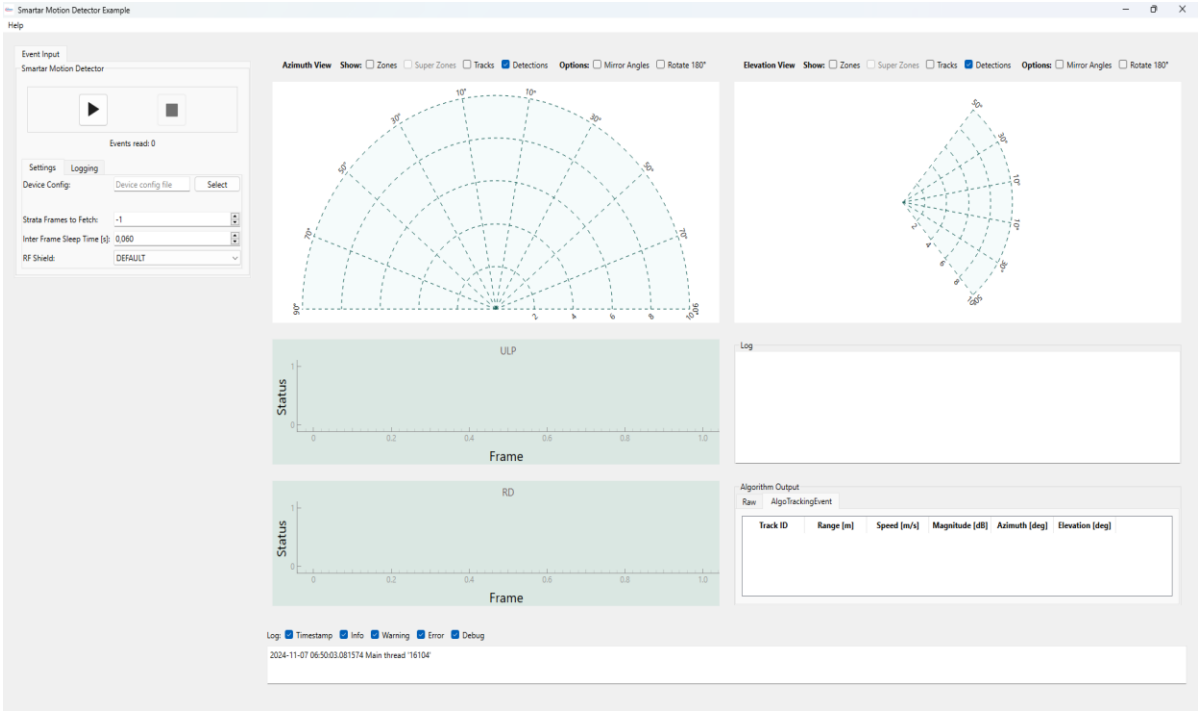

How to get started

Try out ifxapp applications and GUI widgets:

1. Clone and initialize the repo and install ifxapp Python dependencies from `requirements.txt`

```
git clone git@gitlab.acme.com:pss/ifxapp.git
cd ifxapp
./scripts/configure_repo.sh
code vscode.code-workspace &
```

   Note: On Windows, use "Git Bash for Windows" to execute these commands.

2. Start a demo application:

```
source .venv-3.9/Scripts/activate
python src/ifxapp/examples/event_file_and_websocket_reader_example.py
```

3. Start individual ifxapp widgets, for instance:

```
source .venv-3.9/Scripts/activate
python src/ifxapp/gui/event_consumers/segment_plot.py
```