PUSHING SEISMIC DATA ANALYSIS AND AI TO THE EDGE

SCALABLE LARGE-N SMART SENSOR NETWORKS

Third ITU/WMO/UNEP Workshop on
AI for Natural Disaster Management

slides: https://quakesaver.quakesaver.io/presentations/itu-workshop

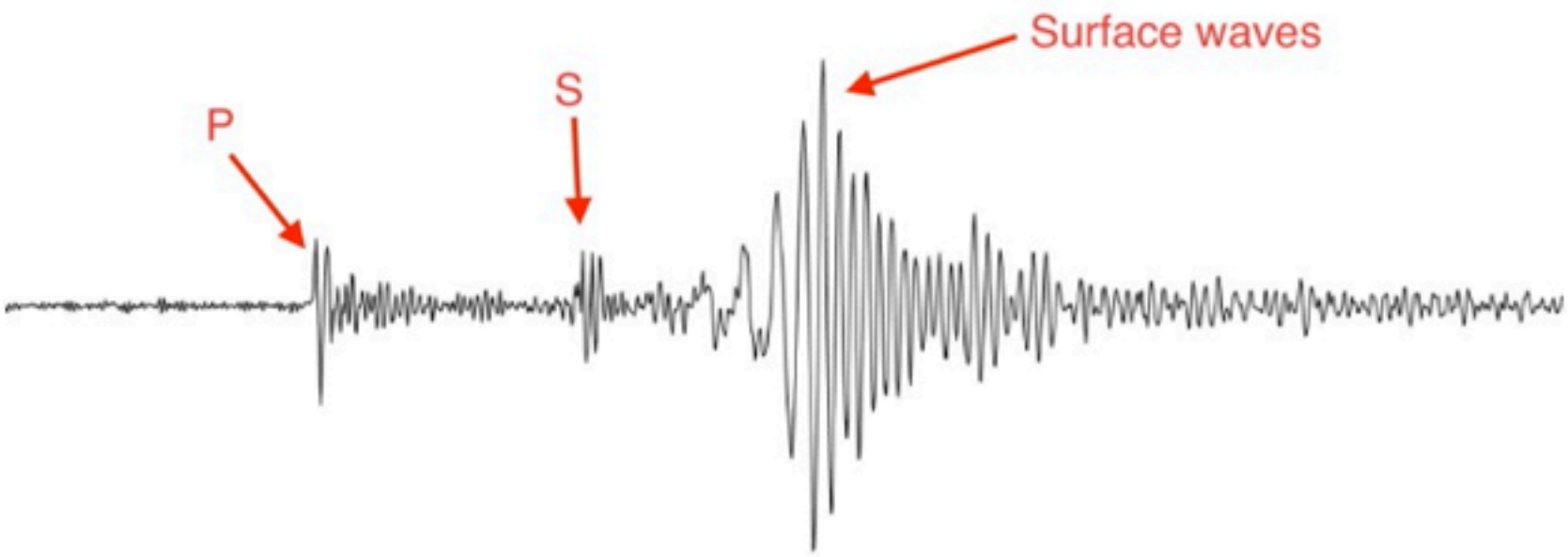
DISCLAIMER

This talk is partially about AI

WHAT MAKES EARTHQUAKES RISKY?

HOW CAN THIS RISK BE MITIGATED?

A TYPICAL EARTHQUAKE



DURING AN EARTHQUAKE

Accurate and **fast** earthquake early warning

evacuation, stopping trains, turn of gas

Measure building sway

BEFORE AN EARTHQUAKE

Knowing **building properties**

Material, height, footprint, age, ...

Understanding **sub-soil**

AFTER AN EARTHQUAKE

Fast shaking evaluation

Building damage assessment

Informed decisions of early responders

THE IDEAL WORLD

Very dense seismic networks

Monitoring on building level

CHALLENGES

Streaming **a lot of data** (data traffic)

Sensors, infrastructure, maintenance

Data privacy

Data center - single point of failure

QUAKESAVER

Founded in 2018 as a spin-off from GFZ

Highly **affordable** sensors

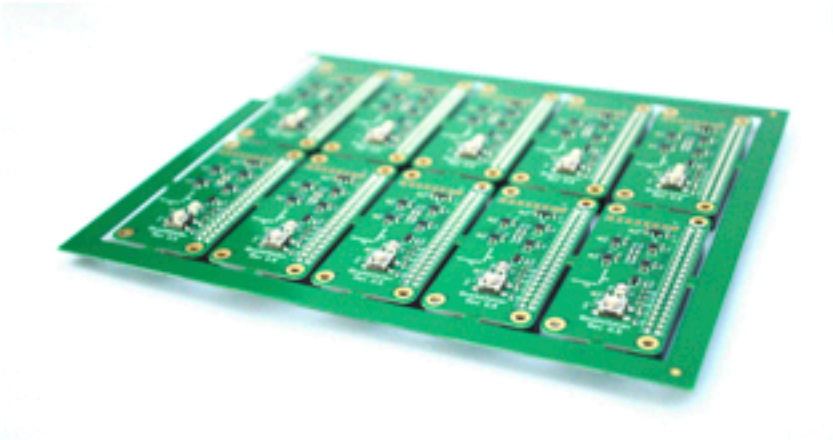
Open source software

Robust and **secure** sensor systems

Scalable fleet deployment

Flexible and **extensible**

SENSORS



HIDRA

Highly sensitive short period sensor

structural health monitoring

Regional and weak seismicity

Fully integrated system

Rugged

MEMS

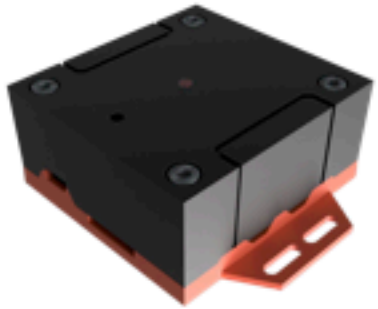
In-door installations

Strong motion measurement

Building analysis

Structural health monitoring

Patent pending



SHARED FEATURES

Combining **affordability** with **performance**

Operate on a dedicated embedded Linux

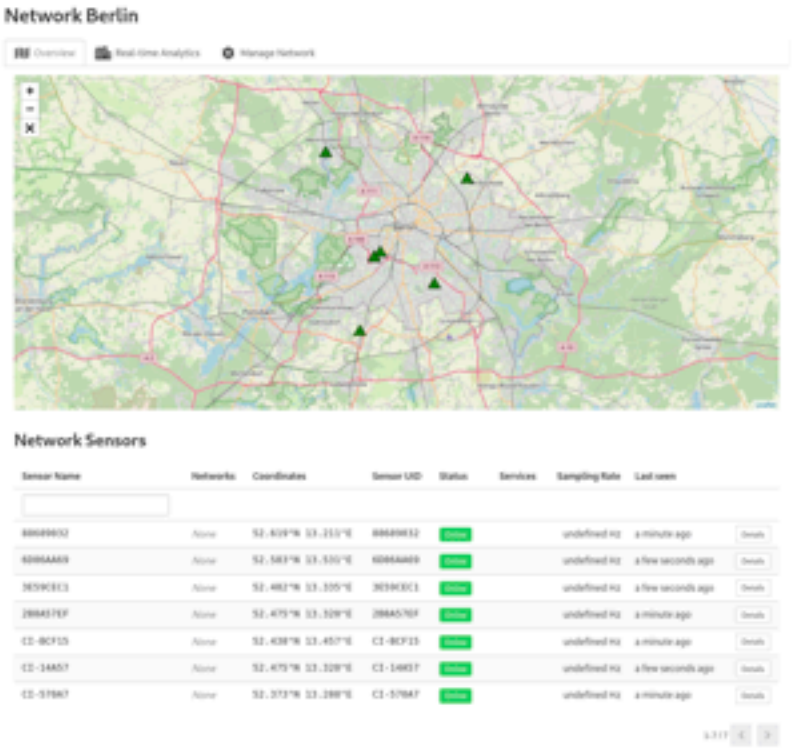
Complete remote control and updates

Open source sensor software

Extensible through **your** plugins

Capable CPU

SENSOR FLEET MANAGEMENT



Simple management of large-N networks

Real-time digital twin

Remote configuration

Low-latency data streams

SENSOR INSTALLATIONS

Japan

Germany

Switzerland

France

Montenegro

Turkey

PUSHING ANALYSIS AND AI TO THE EDGE

BENEFITS

Distribute the workload and responsibility

Increased robustness

Autonomous decision making

Improved data privacy

Real-time data analysis

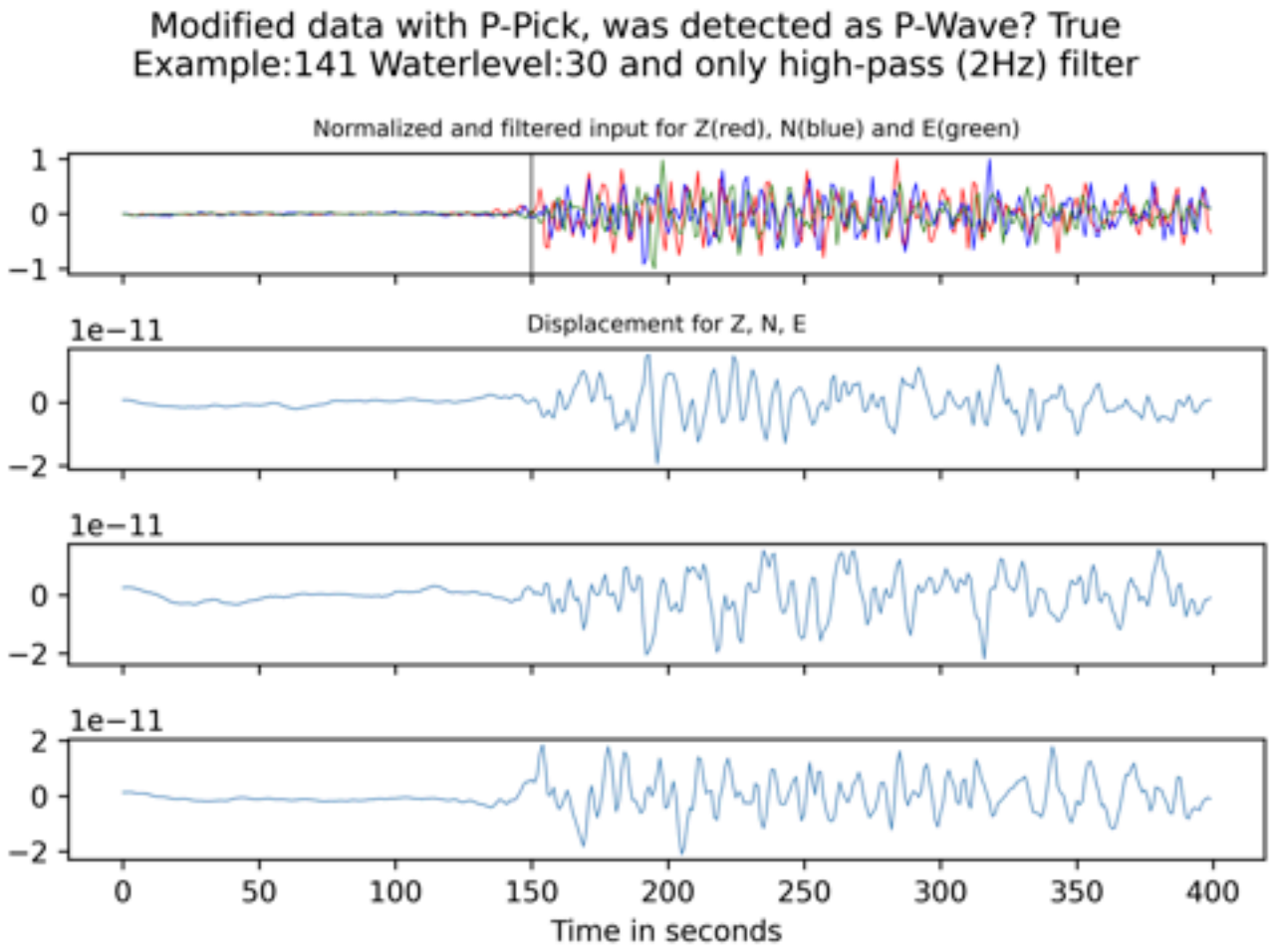
Drastically reduce transmitted data

Scalability and cost-effectiveness

ONGOING AI PROJECTS

In collaboration with
Jannes Munchmeyer (GFZ) and **Viola Hauffe** (University of Magdeburg)

AI EVENT DETECTION



AI SINGLE STATION METHODS

Estimate distance and magnitude

Evaluate uncertainties

CONCLUSIONS

Pushing data analysis (AI and others) to the edge

Improves scalability

Real-time data analysis at minimum data transmission

Enables large-N networks

A SHOUT-OUT

Share your ideas!

Bring your ideas to market

Your institutes will help you with that

QUESTIONS!

RESOURCES

https://resiliencymaps.org

https://www.youtube.com/watch?v=iGtRko8y4Fo&t=68s

P phase detection example courtesy by Viola Hauffe

screenshots, rendered sensor images by QuakeSaver GmbH