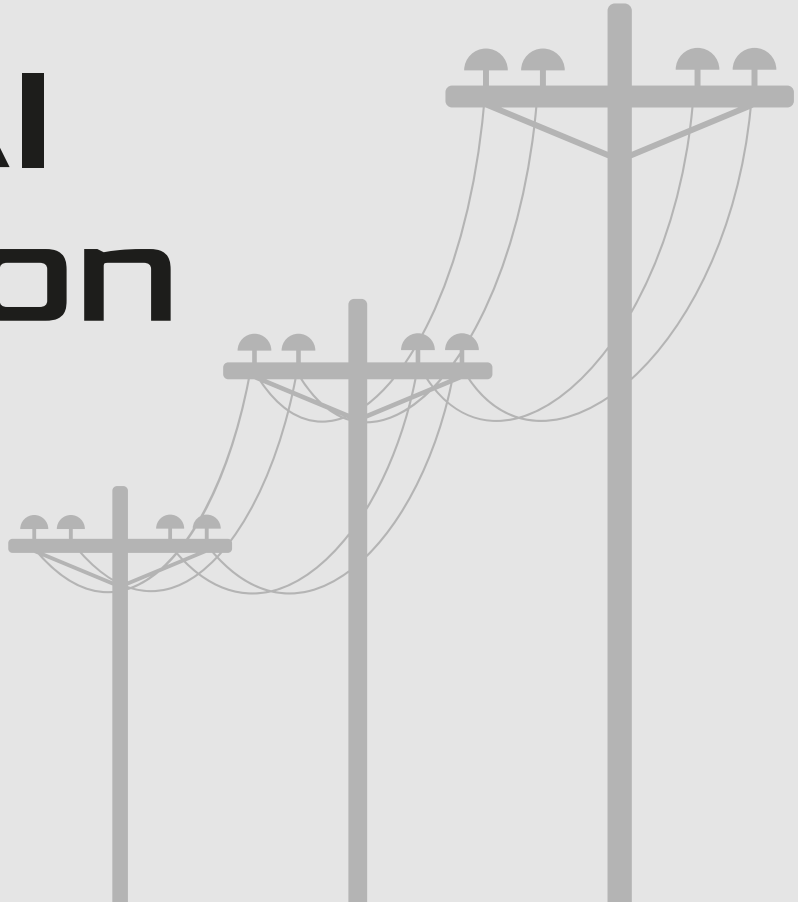
G04 - WingmanAI

WingmanAI Visualisation Extension

Smart grid data visualisation extension
For Wingman



Contents of this presentation

Here is what you can be expecting from our presentation:

1. Who are we
2. What did we do and who our customer is
3. Tools and technologies
4. Teamwork and cooperation
5. Weekly working hours and categories
6. Challenges and risks
7. Demo
8. Closing

Who we are?

Johanna Jaatinen (Finnish),
Project Manager

Esa Särkelä (Finnish),
Backend Developer

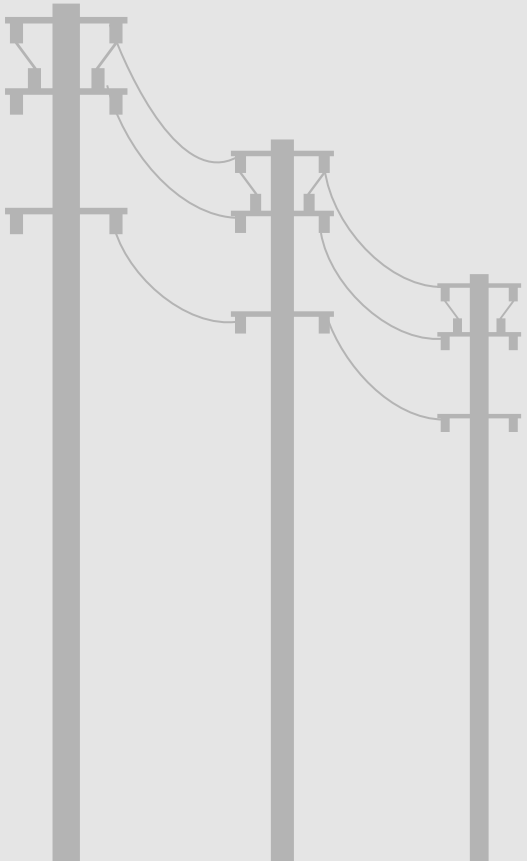
Alkete Ademaj Pula (Albanian),
UI/UX Design, Product Owner

Leevi Alanen (Finnish),
Developer

Jani Sarja (Finnish),
Developer

Mariette Shabulinzenze,
Developer

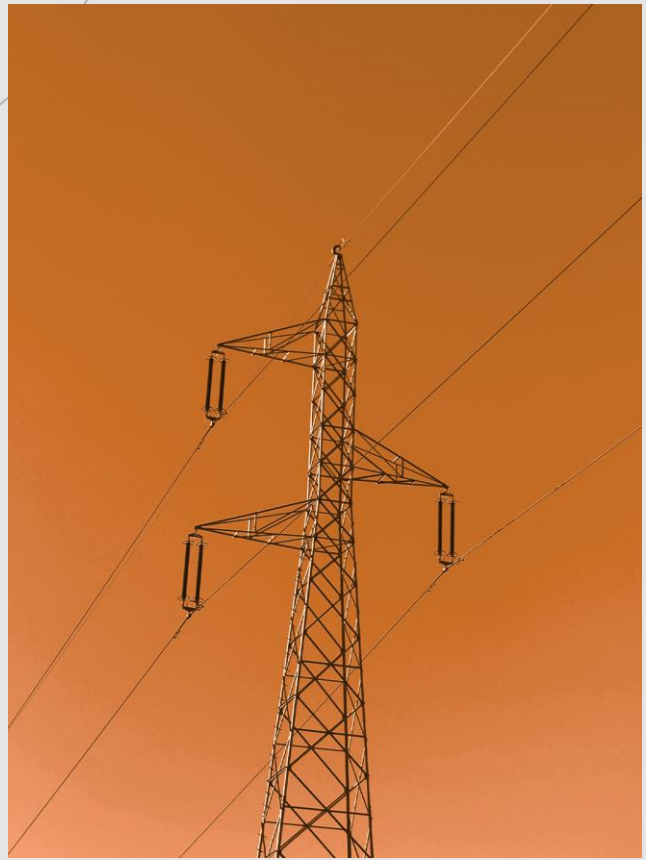
Mikhail Silaev,
Developer



Our Customer

TENTRIO OY

- Tentrio Oy is a software house from Oulu that offers SaaS solutions to their customers.
- Their service Wingman is offered to electric grid companies to analyse the alarms the electric meters send to the meter reading service.
- Wingman sends messages to customers and maintenance based on the analysis e.g., send messages to API to deliver information to other systems.



About the project

- The purpose of the project was to develop a Proof of Concept-project to show how the smart grid data could be visualised in the UI as well as how to handle the data in the backend to utilise a degree of AI to analyse the data being sent by the smart grid transformers.

- The aim of the project was to make a prototype to manage the data and visualise it on the map with different filters and to showcase different weather components that would be meaningful for the backend AI.

- The project also focused on deploying the project to a server provided by the customer.

Frontend tools and technologies

Frontend

React: opensource JavaScript library, used for building the User Interfaces (UI) of the application/product

CSS: cascading style sheet, style sheet language, used for styling the frontend

Docker: a virtual container for a software or an application, used for developing and deploying the application to run on a container

Backend tools and technologies

FastAPI — High performance web framework for building APIs with Python
* easier integration with data-analysis and ML tools

SQLA — Object Relational Mapper (ORM)
* Efficient and high-performance database access

MySQL — Popular open source relational database
* customers' preferred database solution

docker — Containers for deployment and service orchestration

Pydantic — Data validation

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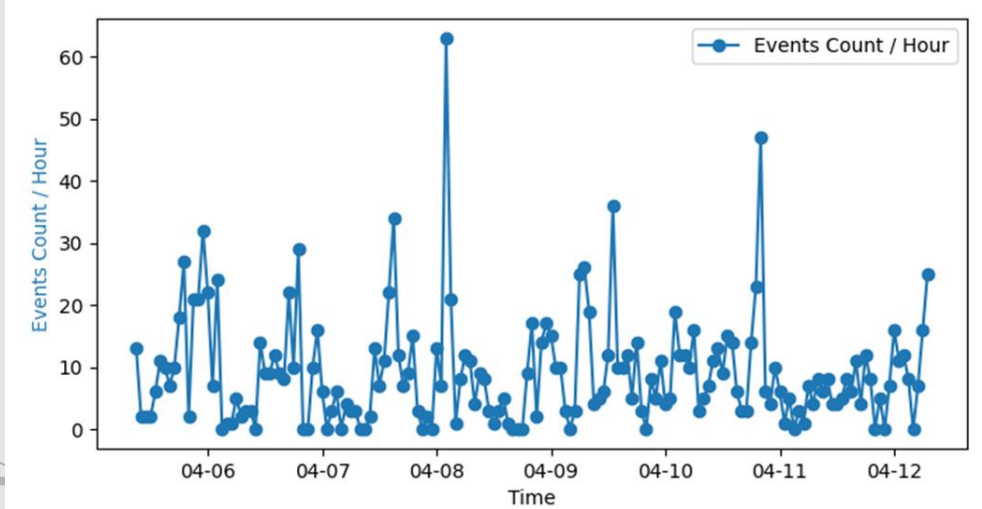
AI Algorithm: alarm number time series

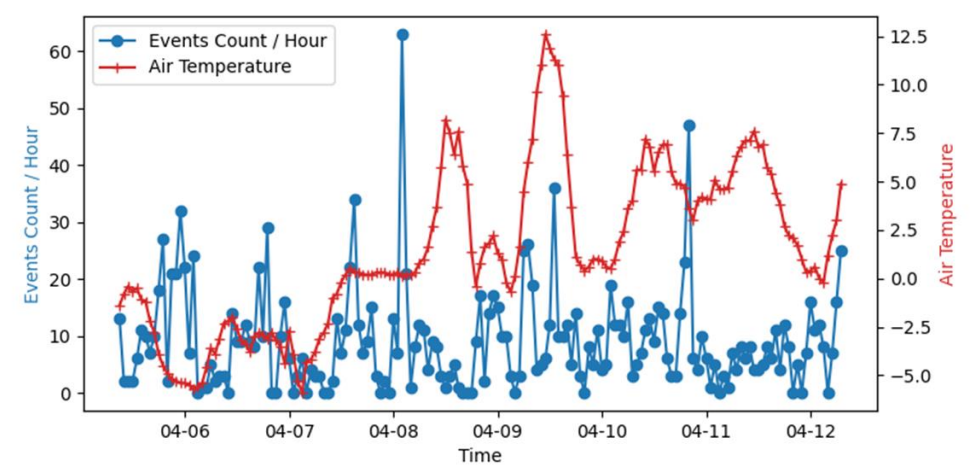


Time
series formed using Pandas addre
ssing MySQL DB given
by customer.

Available under **Analytics** tab

pandas

AI Algorithm: alarm number time series



Weather data from Finnish Meteorological Institute (FMI) Web Feature Service (WFS) → SQLite database.

Time series for Air temperature and other measurements in Pandas.

Available under **Analytics** tab

FINNISH METEOROLOGICAL INSTITUTE

pandas

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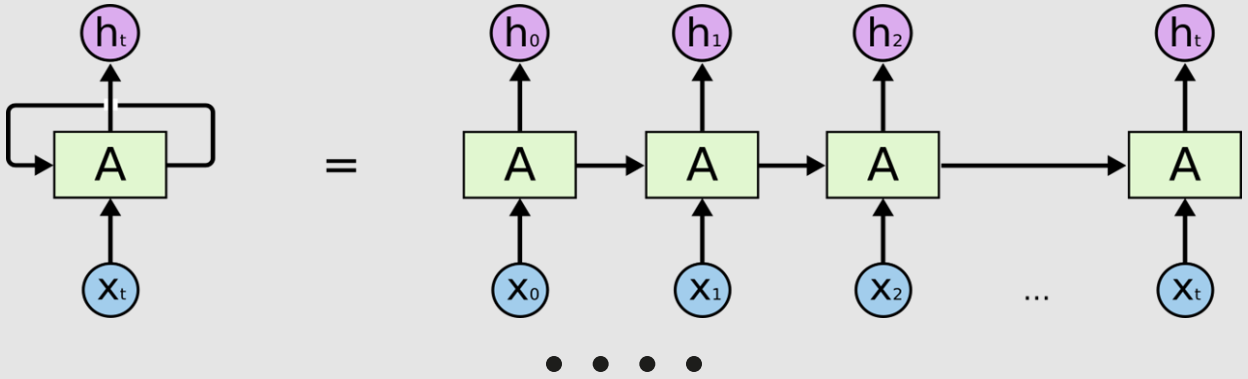
AI Algorithm: alarm number time series

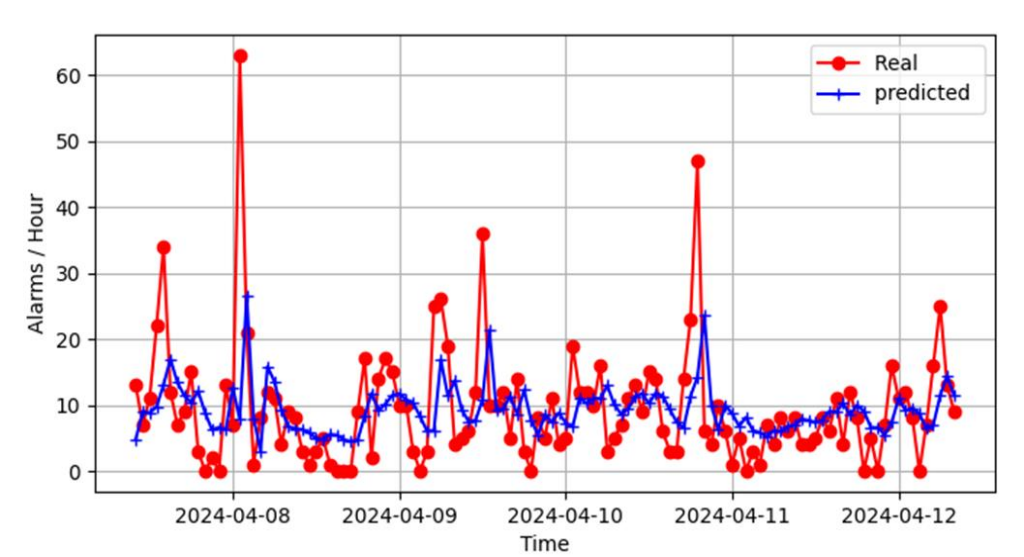
We predict the number of alarms for the next hour using Long Short-Term Memory (LSTM) neural networks.

LSTM is a powerful deep-learning technique for time series forecasting.

We adopt the LSTM realization for stock prise prediction https://blog.gopenai.com/



AI Algorithm: alarm number time series



Prediction of the Alarm number during the next hour

Available under **Analytics** tab

Problem: TensorFlow does not run on the production server

Accuracy can be increased by adding weather features →□ future work

pandas

TensorFlow

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QA & Testing

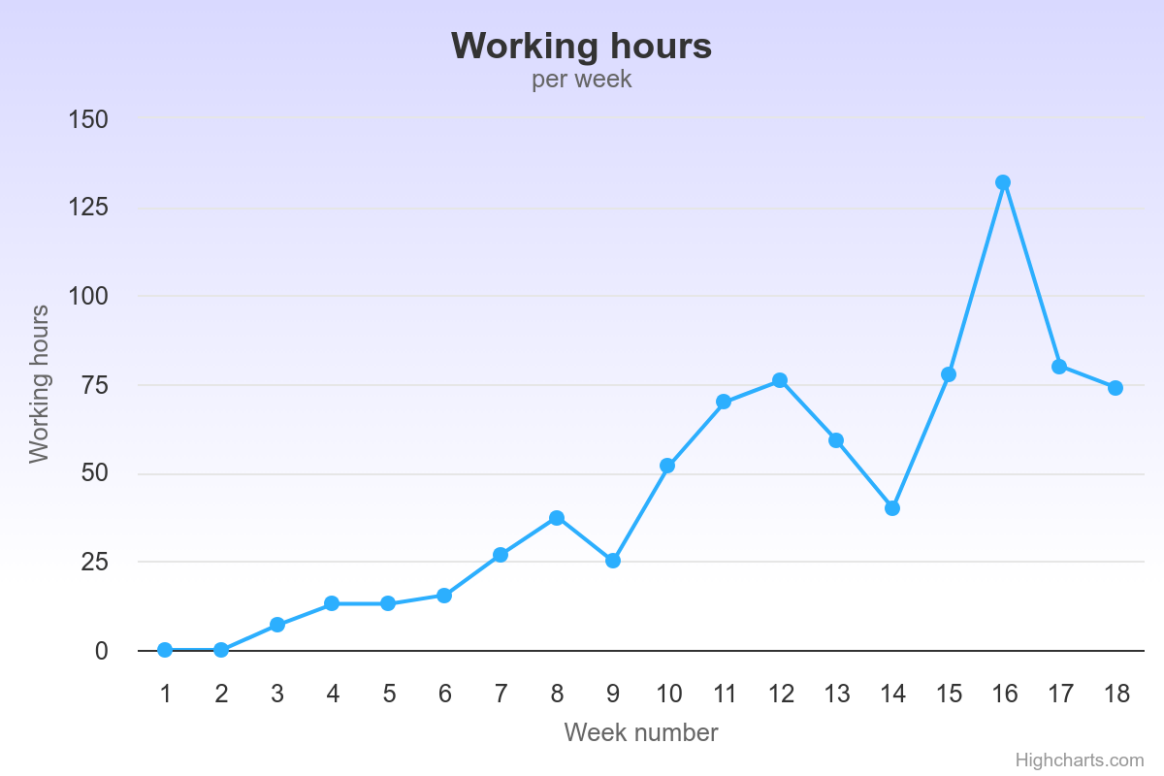
- Feature branch workflow in Github
- General testing on local development environment done by each developer
- QA Sprint focused on identifying bugs in the application
- Found bugs were logged and assigned as tasks to the team members
- Browser testing with developer's tool in Chrome, Safari and Firefox.
- Automated site auditing using lighthouse to test performance, accessibility and general usability of the application

SCRUM-BUT, YES BUT…

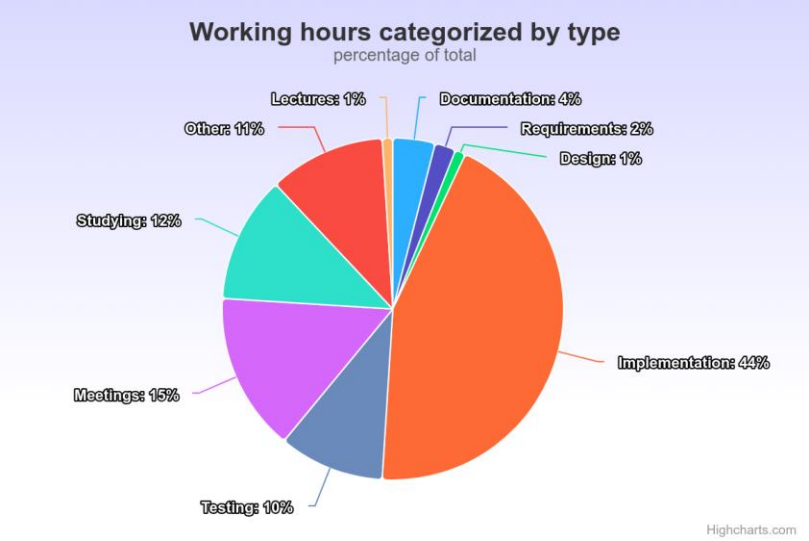
Agile approach; two weeks sprints

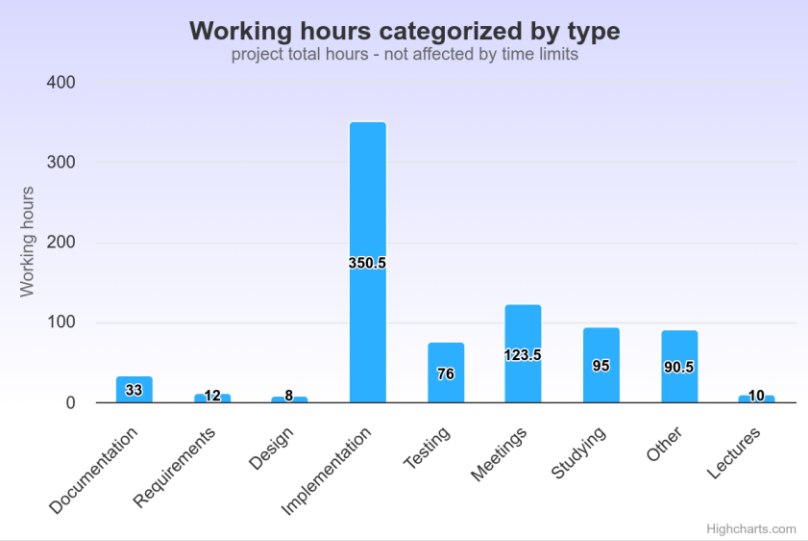
- Sprints contents planned in the first sprint mostly by Project Manager
- Tasks voluntary picked up from the backlog not assigned by Project Manager
- Who knows how to do, does
- Smaller sub-team/pair discussions about the implementation
- Follow-up on Slack and Telegram
- Proactive way of working
- Required active participation

WEEKLY WORKING HOURS (MMT)



WORKING HOURS BY CATEGORY





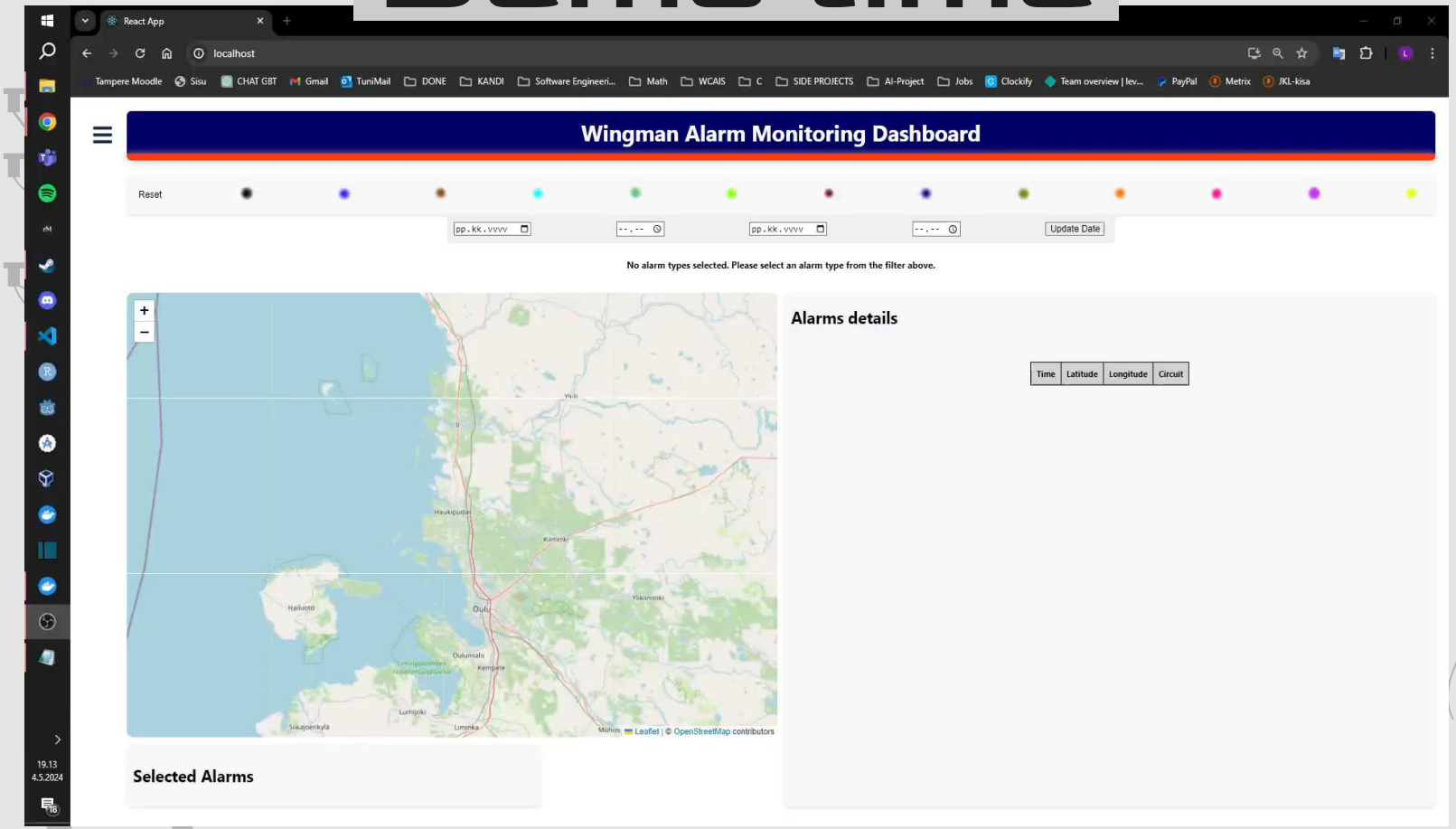
Challenges

- Remote working
- Working in English and Finnish to avoid language barriers
- Conflicting schedules
- The mode of working required active participation

Risks and realisation

Explanation	Realisation
Team members' low productivity; 3; 2; 6	Team members were fairly active and took initiative
Indistinct scope, feature creep; 2; 2; 4	We were able to focus on the core features
Ill-defined requirements; 3; 2; 6	Requirements were a bit vague which might have slowed implementation down a bit
Team members leaving the project; 3; 2; 6	No one left the group
Difficulties in implementing the software with the selected technologies; 3; 2; 6	Mostly no major difficulties but technologies were new to most people
Lack of feedback from the customer; 4; 2; 4	Feedback from customer was sufficient
Communicational difficulties between team members; 3; 3; 5	Always challenge in remote work
No time to learn necessary technologies and tools; 4; 2; 9	Team members had time to study the necessary tools for their own tasks

Demo time


React App
localhost
Wingman Alarm Monitoring Dashboard
Reset
pp.kk.vvvv
--.--
pp.kk.vvvv
--.--
Update Date
No alarm types selected. Please select an alarm type from the filter above.
Alarms details
Time
Latitude
Longitude
Circuit
Selected Alarms
Oulu
Haukipudas
Kiiminki
Hailuoto
Oulunsalo
Kempele
Liminka
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THANK YOU FOR YOUR TIME