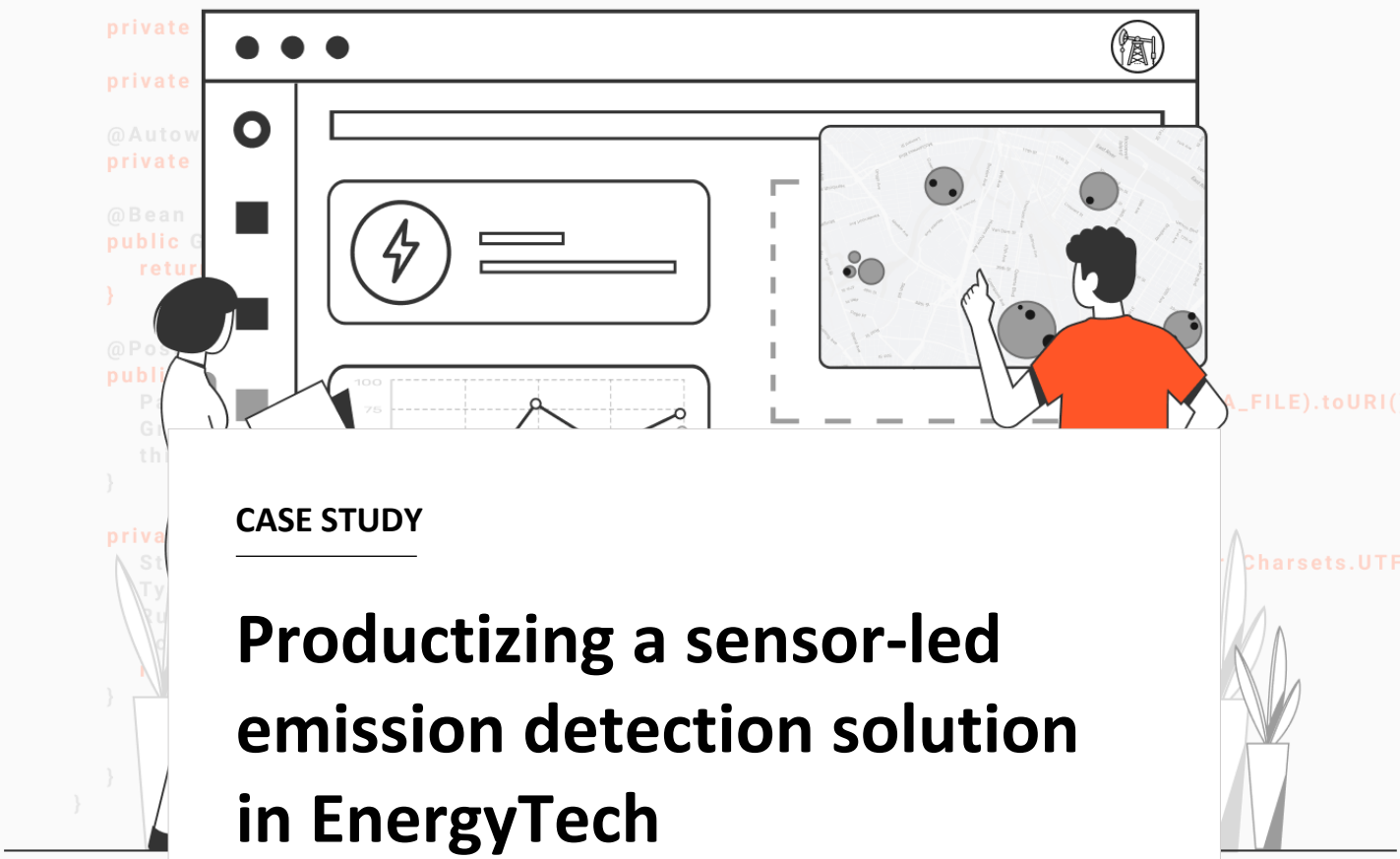


CASE STUDY

Productizing a sensor-led emission detection solution in EnergyTech

Zemoso

Rising emissions is a major concern for EnergyTech companies around the world. The oil and gas sector is one of the biggest contributors to harmful emissions. Total indirect emissions from oil and gas operations are 15% of total energy sector emissions. One Fortune 500 company that wanted to actively reach zero emissions, enable compliance, and reduce the adverse effects of emissions during oil and gas production reached out to Zemoso with a product idea.

Between the Paris Agreement and Biden's executive order, the pressure is on and intelligently managing emissions has become a top priority for all energy production and processing companies.

We helped accelerate development and deployment of a solution to track emissions at remote rigs and production centers. The product's goal was to locate leaks, quantify the rate of leakage in real-time, and inform stakeholders. To enable that, we co-created a product

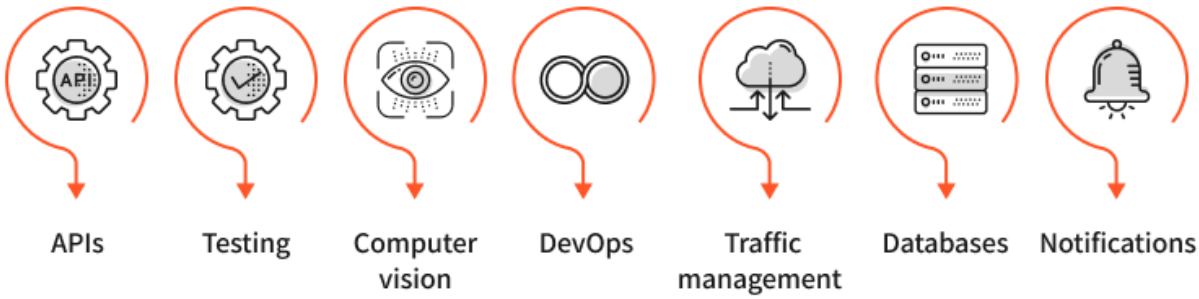
that processes the variety of data being relayed through a ground-based sensor network and automates time-consuming processes, leading to immediate, corrective action.

Methodology

We started with our proprietary version of Google Ventures Design Sprint and ran weekly sprints delivering features and enhancements incrementally. Multiple scrum teams worked on different aspects of the project with a Scrum of Scrums to keep things on track. The Zemoso pod was agile and scaled up or down depending on the skills needed at any given point in the project.

Engineering focus

We used a microservices architecture. Each service is independent. The front-end was built in React and Redux. Local and remote data is managed via Apollo Client. GraphQL, an intermediate layer, was used to make deployments faster and easier. Material UI was used to develop user interface components. The back-end was developed in Spring Boot Java. Drools Rule Engine was used to specify the action that needs to be taken if a particular condition is met. RabbitMQ is the message broker.



APIs used

Third-party integration with Cesium, a geographic information system (GIS) API was used to pinpoint location, which was integral for proactive action.

Testing

Test automation was done using Cucumber and Selenium; Cucumber strengthens automation testing. Selenium ensures accuracy and speed. We automated API testing as well.

Computer vision and analytics

Zemoso used message queuing and telemetry transport (MQTT) protocol to connect remote devices. We ensured that the images can be resized and the system can ingest data from globally dispersed devices.

DevOps

Following DevOps best practices, we implemented CI/CD using Jenkins, and GitHub (both local and remote). We also used containerization to futureproof the product and lay the groundwork for faster service deployments in the future.

Traffic management

We used a content delivery network (CDN) to deliver data and videos fast with low latency. We used Amazon Simple Notification Services (SNS) for messaging, and AWS Lambda to respond to new information and events. We also set up the system in a way that onsite resources were connected to the cloud infrastructure and it could easily handle sudden changes in data traffic (handling millions of requests per second).

Databases

We used PostgreSQL, Redis to ensure sub-millisecond response times, enabling millions of requests per second. Amazon S3 was used to store generated reports and images.

Notifications

The sensors at the node station capture live readings and send the data in seconds to Amazon Web Services (AWS). This data is then sliced, diced, processed, and indexed based on similarities or discrepancies. A supervised learning Machine Learning (ML) model and an unsupervised ML model generated notifications. We also helped deploy rules to classify the notifications based on priority.

Key outcomes

- Zemosos completed end-to-end product development with on-time delivery
- Zemoso built a customizable and intuitive interface for new features
- Zemoso worked with live data and generated reports which aided in
    - Reducing error rates
    - Reducing turnaround time
    - Allowing multiple persons to use it at the same time

The product ultimately enabled the customer to meet emission reduction goals by reducing emissions by over 20%.

P.S. Since we work on early-stage products, many of them in stealth mode, we have strict Non-disclosure agreements (NDAs). The data, insights, and capabilities discussed in this blog have been anonymized to protect our client's identity and don't include any proprietary information.