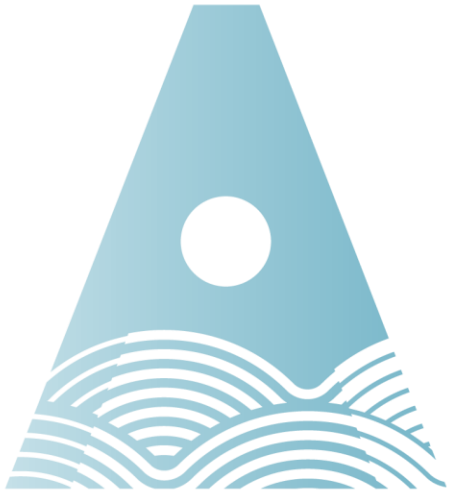
Fleet Management System



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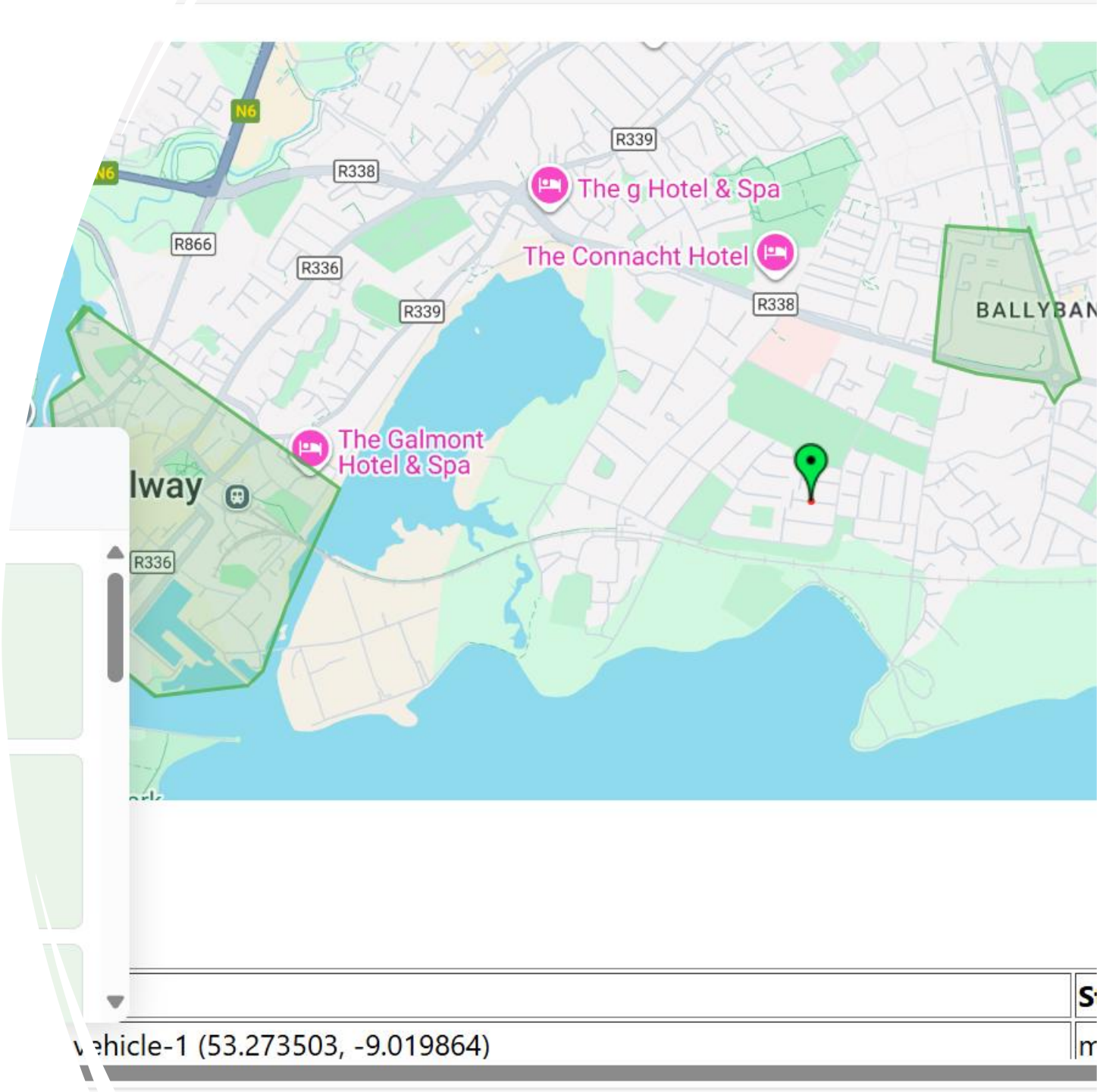
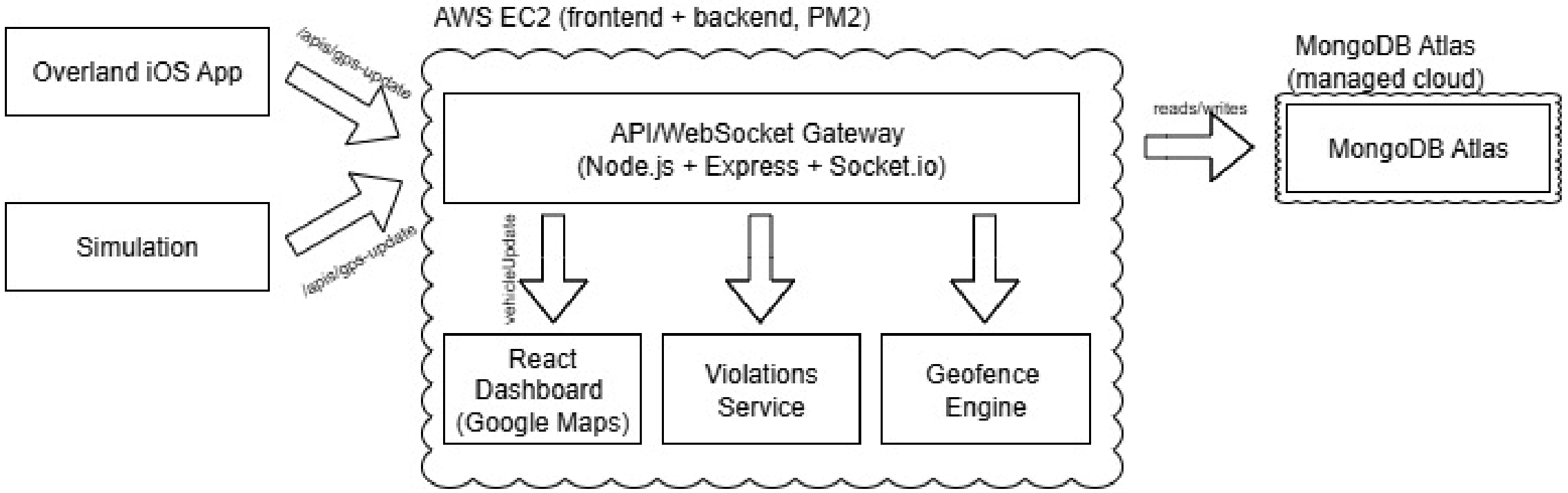
Overview

- Goal: live vehicle tracking, geofences, real-time entry/exit alerts
- Area: cloud, networking, geospatial
- Why: lightweight visibility for small operators (low cost, quick to deploy



Architecture



Technologies

Frontend:

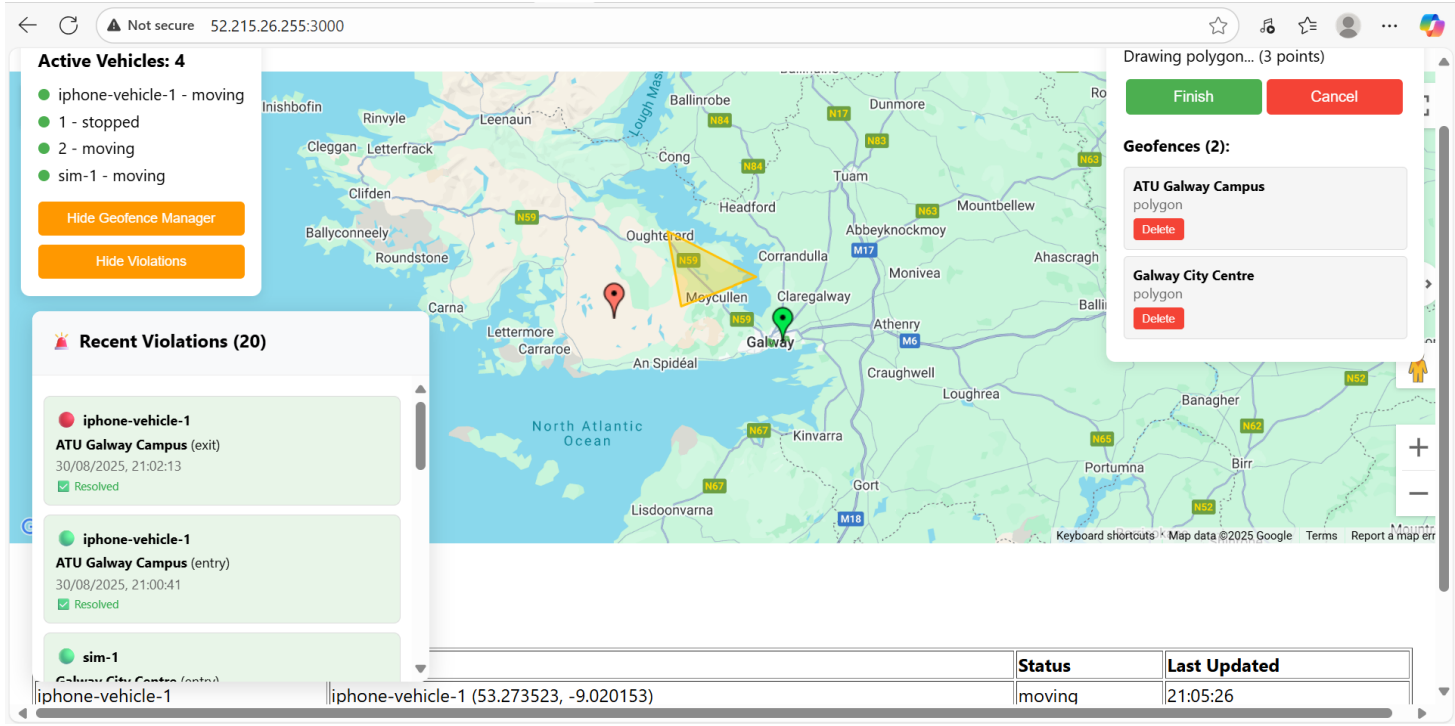
- React
- Google Maps JavaScript API
    - markers, polygons, polylines

Backend:

- Node.js
- Express
- Socket.IO
- MongoDB Atlas
- AWS EC2
- PM2

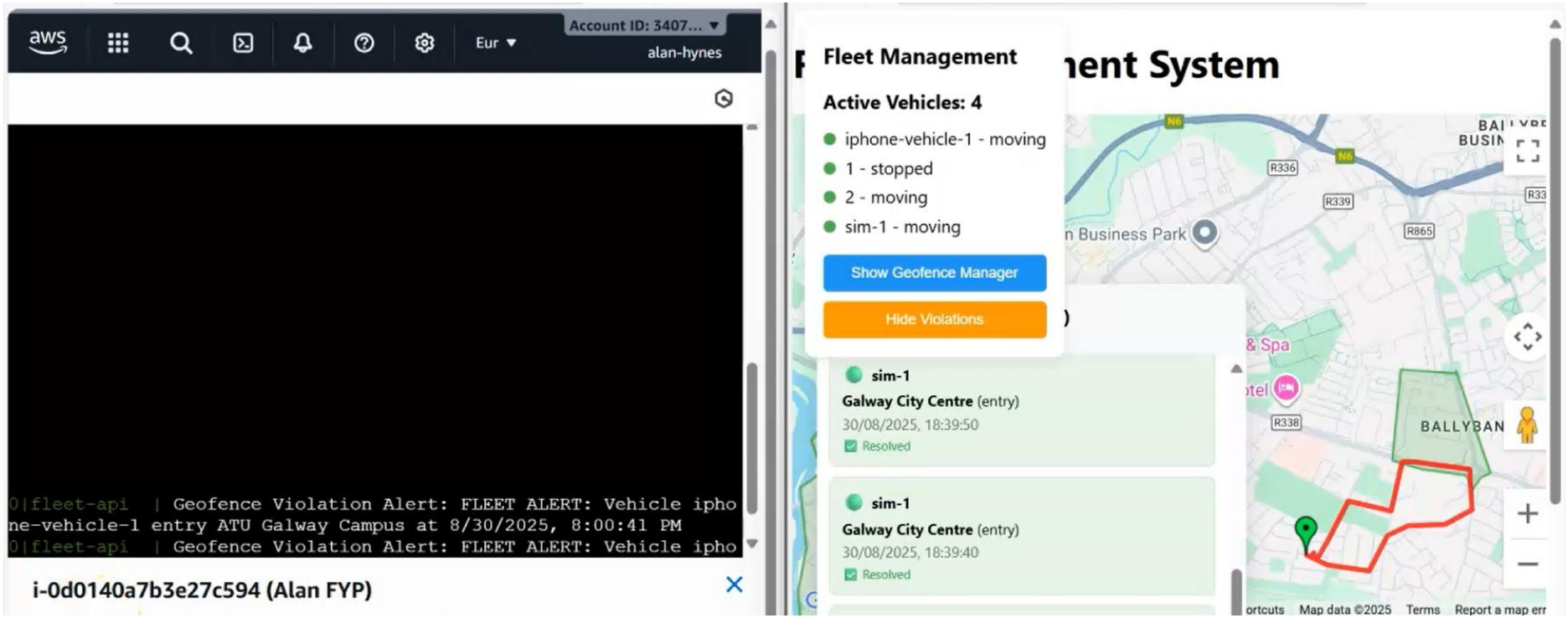
Dashboard

- Colour-coded markers; live updates via Socket.io
- Geofence manager (draw polygon; create/delete)
- Violations panel (entry/exit, Resolve)
- History view (recent route replay)



Results

- Real entry/exit events logged at Galway City Centre & ATU Galway Campus
- Latency: updates within a few seconds
- Stable on EC2 during tests



Challenges & Fixes

Overland upload queue after downtime	Fix: clear queue in iOS settings
GPS jitter near edges	Fix: merge window to debounce
Deployment reliability	Fix: PM2 + /health checks