

CoDRIVE - a solution for Connected and Autonomous Vehicles

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Major Emission Commitments

China:

- Maps its path to carbon peak in **2030** and neutrality in **2060**

US:

- Pledged to reduce emissions by at least **50%** by **2030** and be carbon neutral by **2050**

European Commission:

- Cuts greenhouse gas emission by at least **50%** by **2030** and achieves climate neutral by **2050**

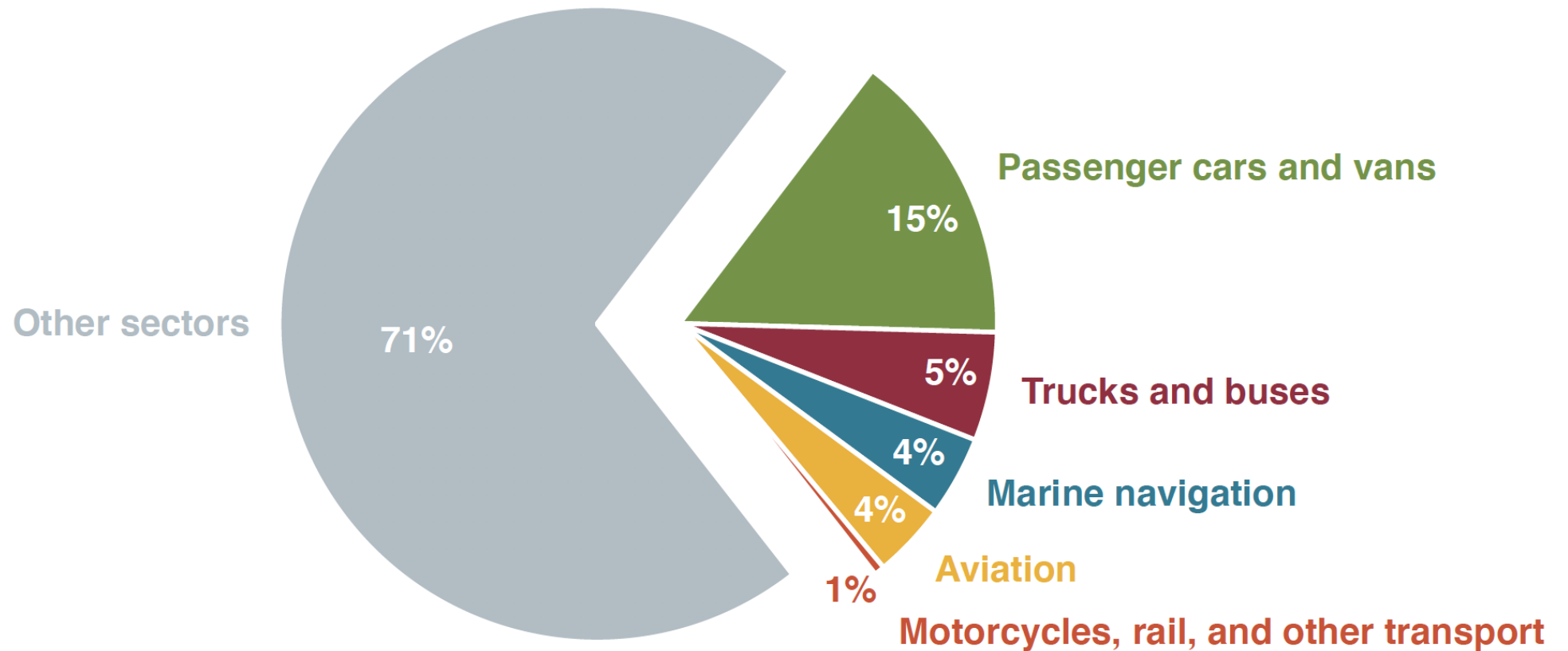
The U.S. transportation sector - which includes cars, trucks, planes, trains, and boats - now emits 1.9 billion tons of CO₂ annually. The electric power sector emits 1.8 billions tons;

29% of total EU-28 greenhouse gas emissions came from the transport sector.

Direct Transport Emissions

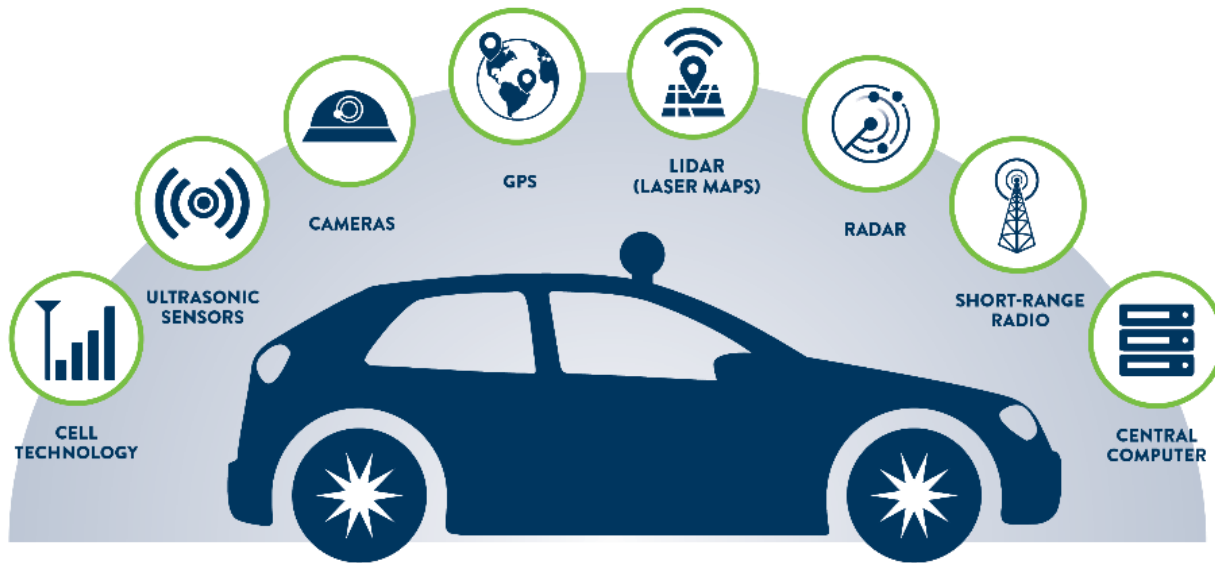
Greenhouse gas emissions in the EU

2018 total: 3.8 Gt CO₂e



<https://theicct.org/blog/staff/eu-carbon-budget-apr2021>

Connected and Autonomous Vehicles (CAV)



Key CAV techs: positioning, perception, communications, mapping, data sciences inc. AI

Roles CAV play:

- **Increased safety**
- Greater mobility and equity
- **Transport efficiency**
- User experience
- **Maximize health and environment**

Vehicle to everything (V2X) communications essential for full exploitation of CAV potentials

<http://www.dot.state.mn.us/automated/>

Geospatial Provisions in Europe

The European Geostationary Navigation Overlay Service (EGNOS) **supplements the current GPS and future Galileo** by reporting on the reliability and accuracy of their positioning data and sending out corrections



The **Copernicus Land Monitoring Service** is free to access by any citizen or organisation in the world, especially Sentinel 1

Galileo provides **independent high-precision positioning services** so European nations without relying on other GNSS systems

CoDRIVE Introduction

CoDRIVE: **C**ooperative **D**evelopment of a **R**oadmap for **I**nitial **V**2X Implementation in **E**urope

Key objective: *Exploitation of a reliable, robust and resilient (3R) absolute positioning system for intelligent mobility services* enabled by precise localization (positioning and perception) and vehicle-to-everything (V2X) communication

Consortium:

UbiPOS UK Ltd. (Prime contractor): A UK SME for positioning and navigation solutions

UNOTT: A top 1% global university with campuses in China and Malaysia

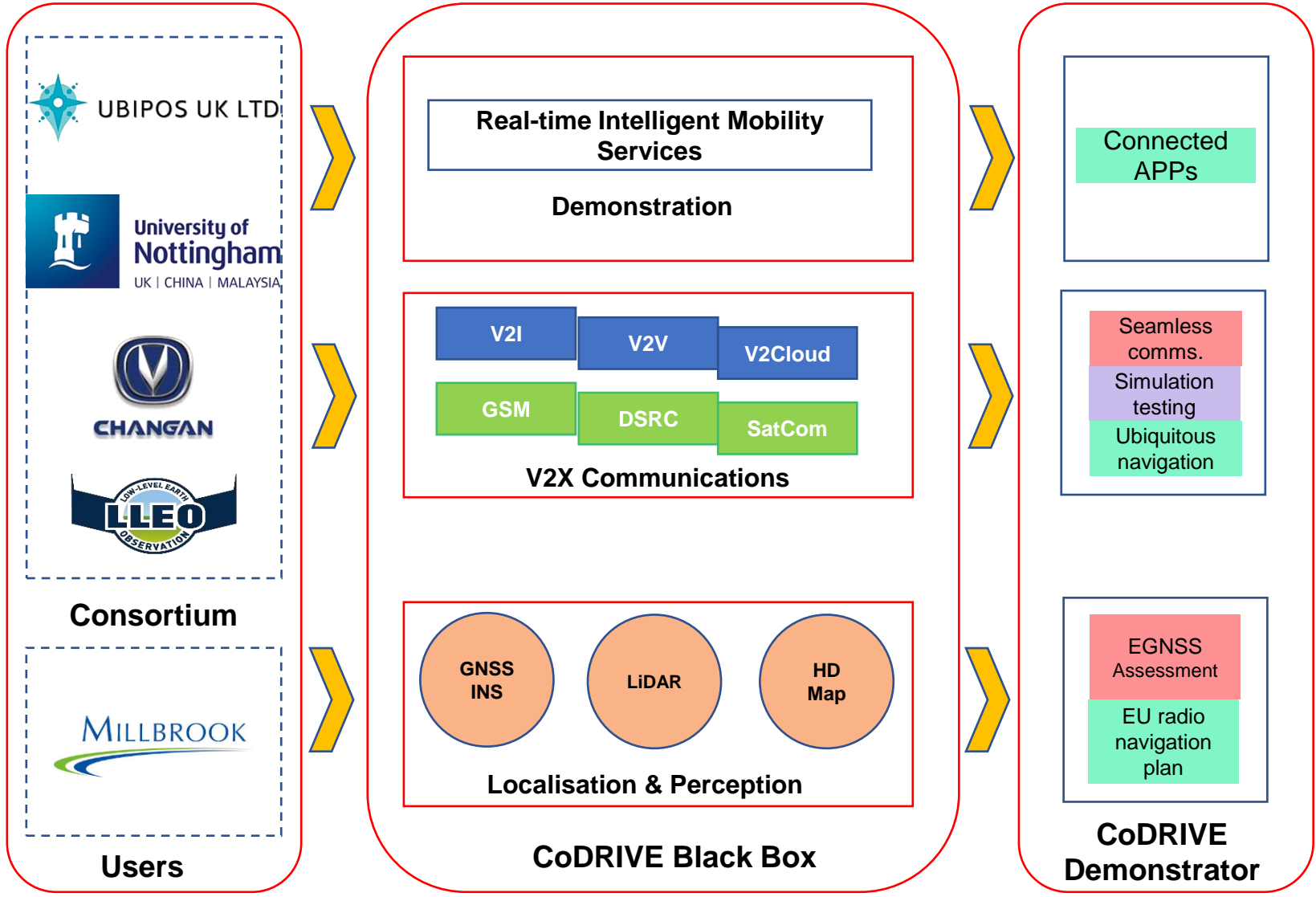
Chang'an: Top vehicle manufacturer, and owners of world-class vehicular testing facilities and tracks in China

LLEO Ltd.: Building, operating and maintaining autonomous systems

Stakeholders: KTN, Millbrook Proving Ground, AECOM, CASM, TfWM, etc.

CoDRIVE Architecture

- Sensory system
- OBU
- Cloud platform



- Supporting communication infrastructure
- Application GUI

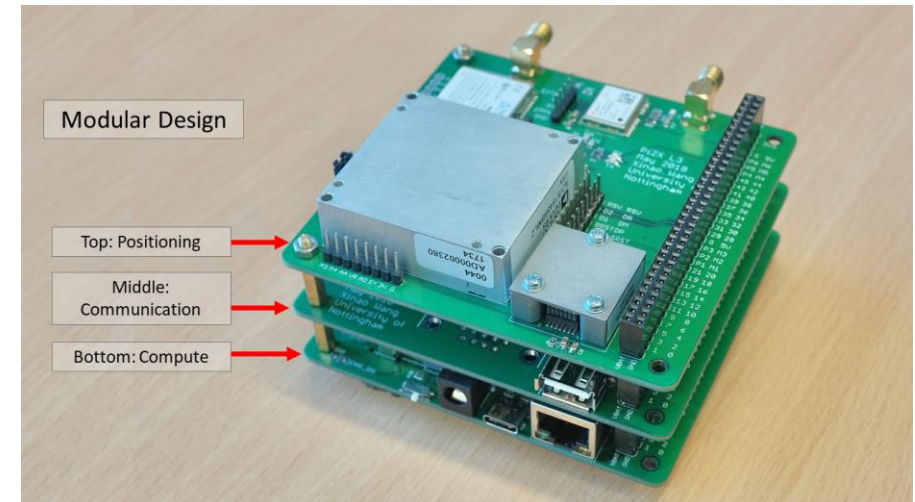
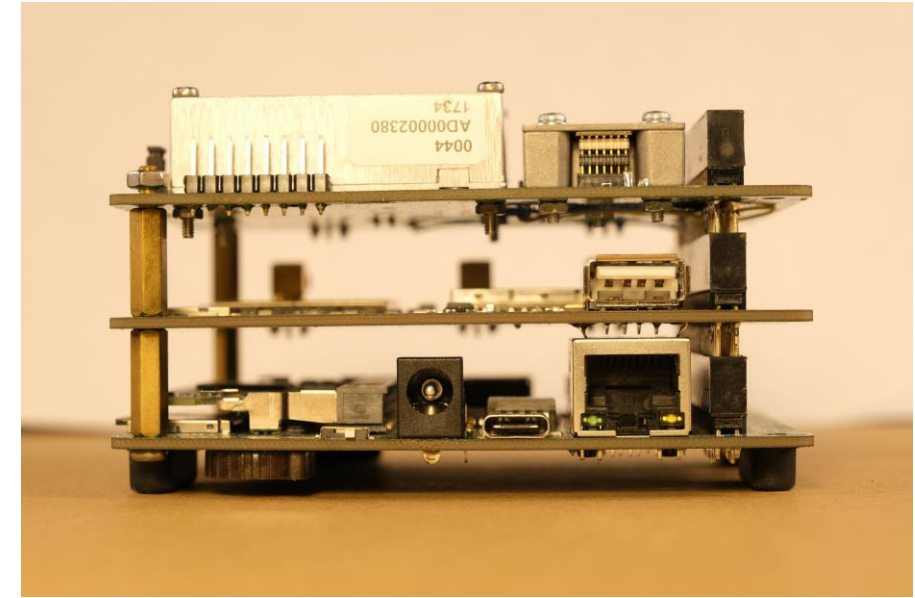
Design and Make the CoDRIVE OBU

CoDRIVE OBU:

- Low-cost V2X communication platform for vehicular environments
- Wide range of wireless protocols
- Versatile physical interfaces
- High-accuracy positioning
- Modular and stackable form factor

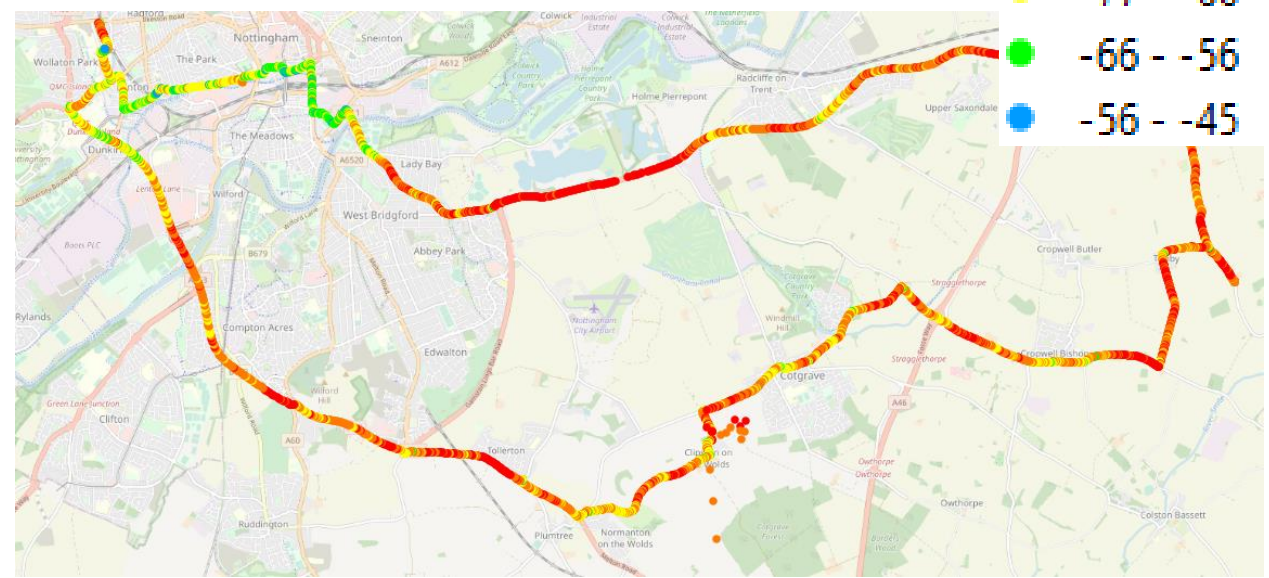
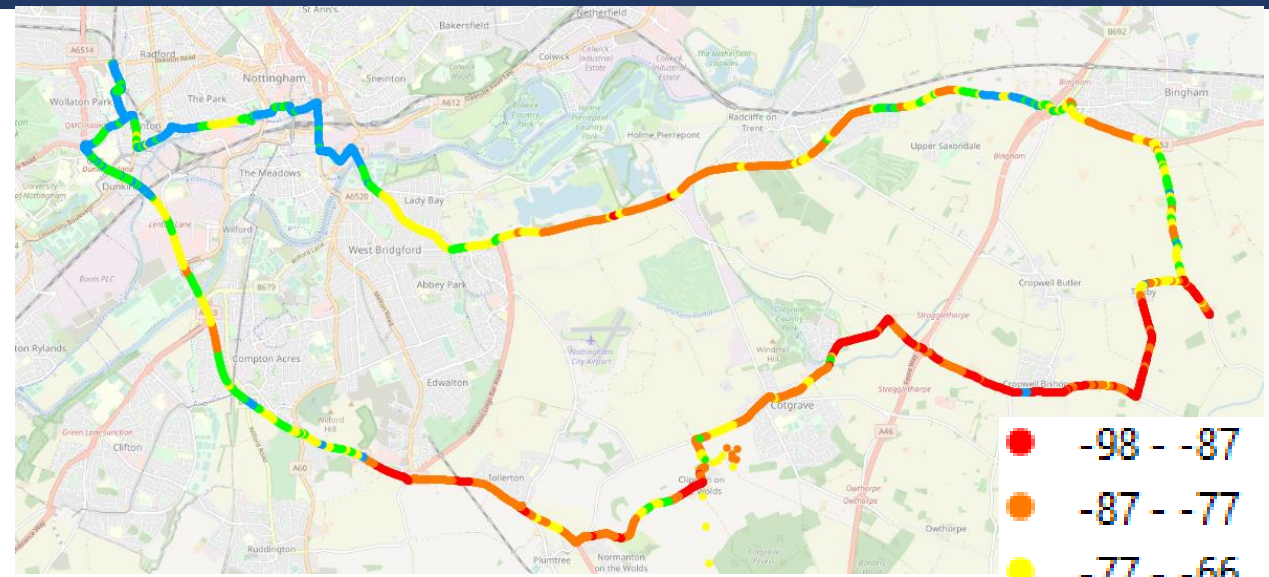
Design:

- Top layer (positioning): GNSS Receiver; RFID Reader; Inertial Sensors
- Middle layer (Communications): 5G module; DSRC Module; CAN Transceiver; Wi-Fi/BT
- Bottom layer (computation): Processor; RT Clock; Power/Ethernet/HDMI/USB

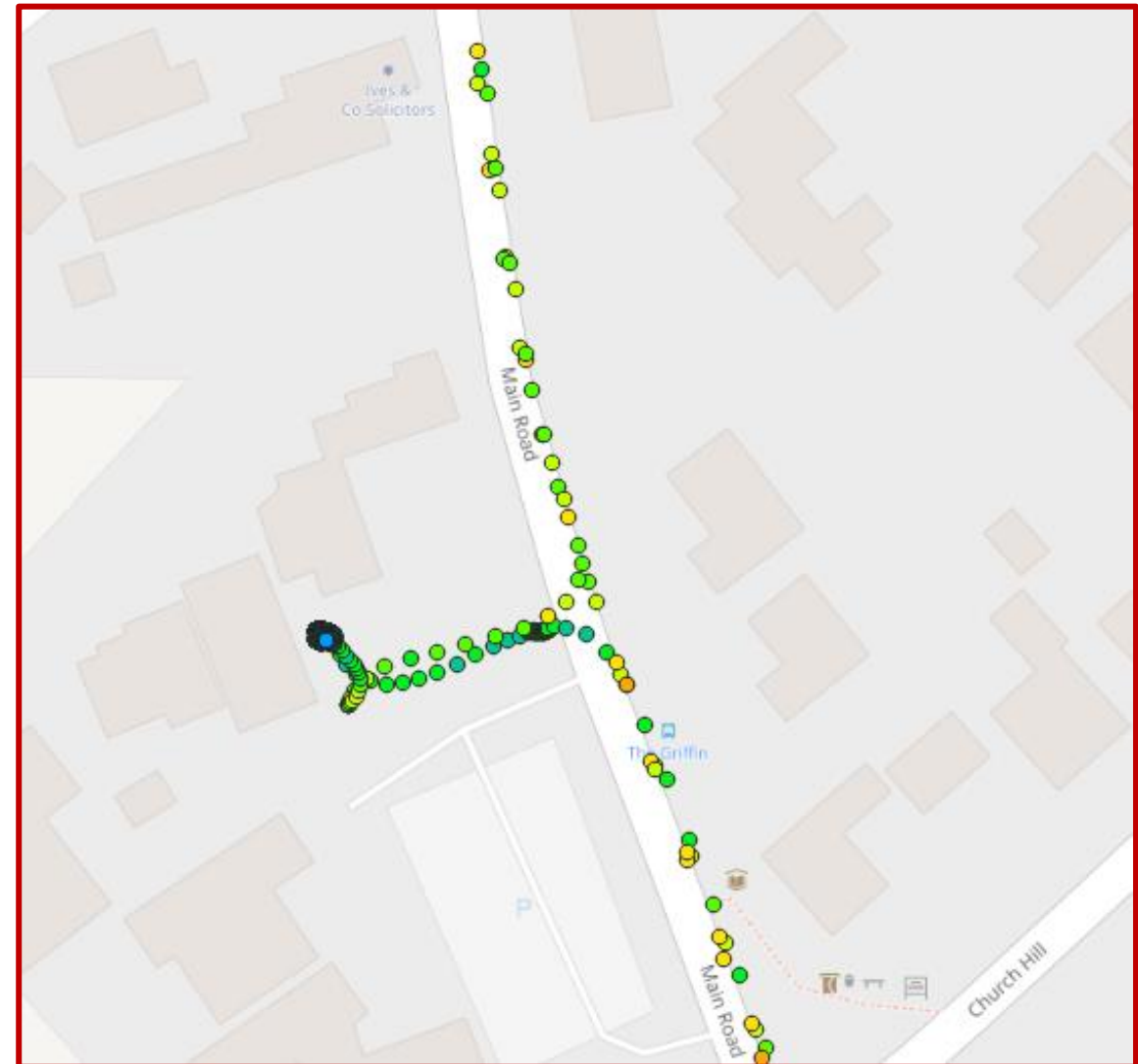
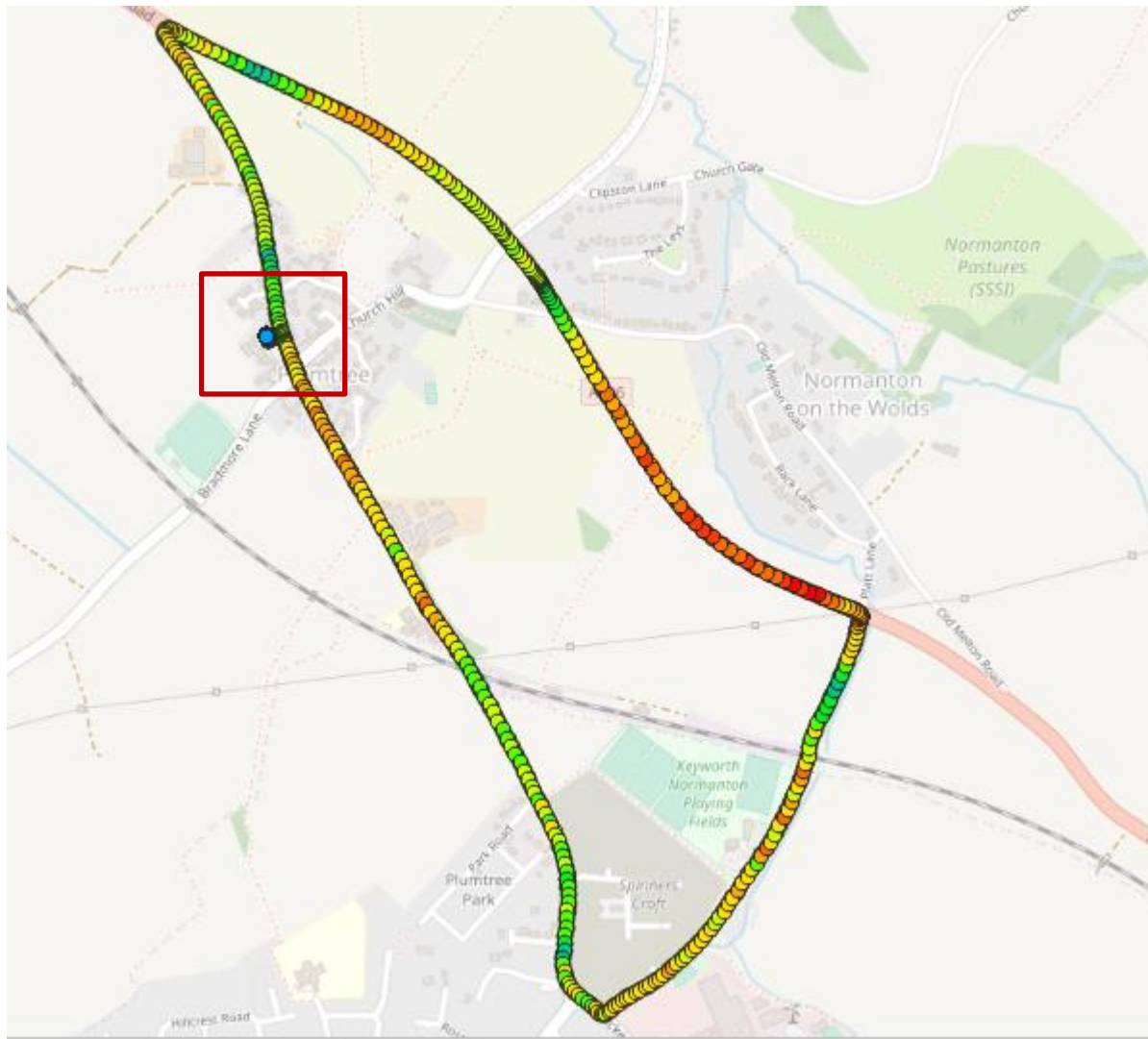


5G-enabled V2V communication

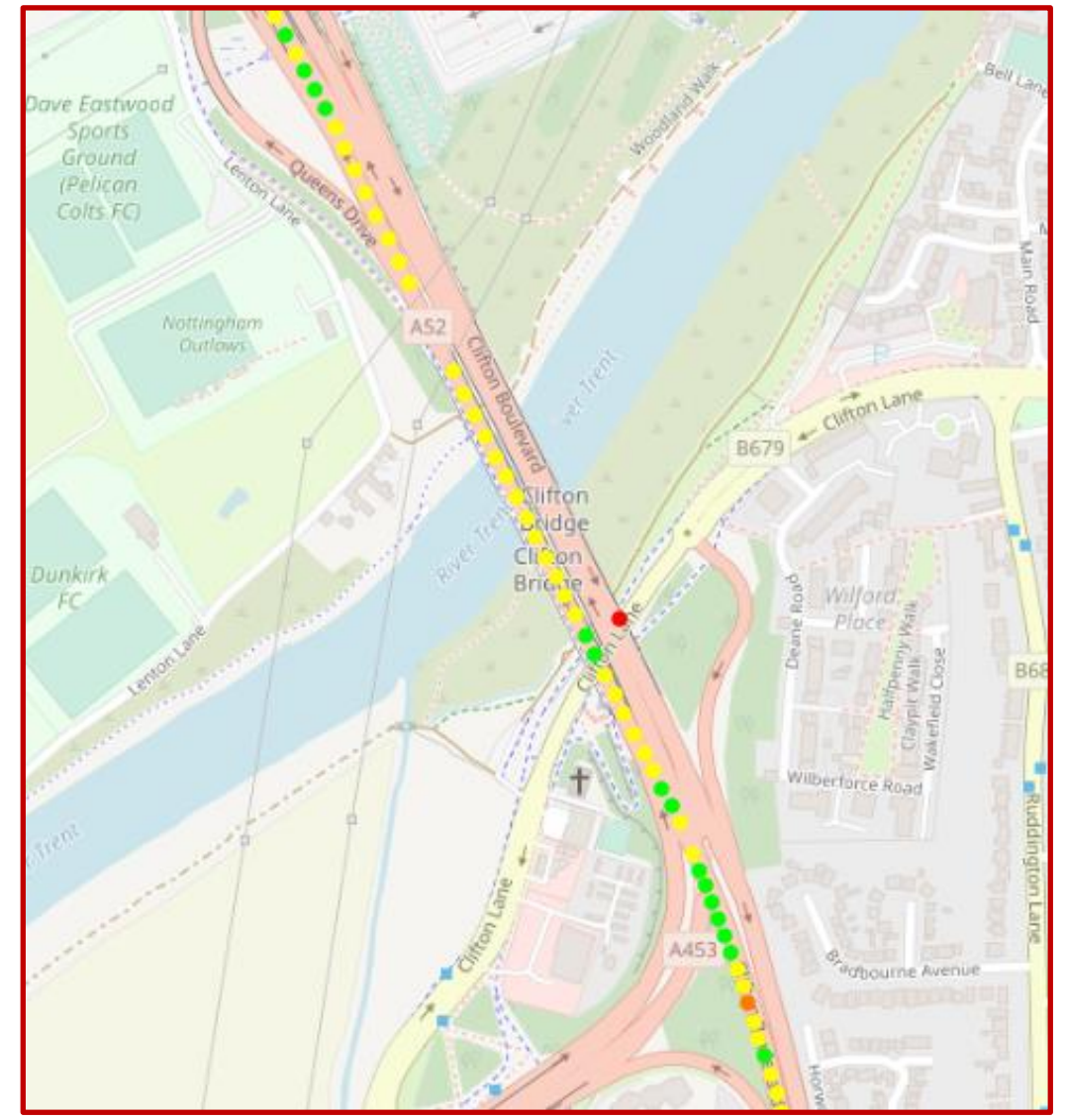
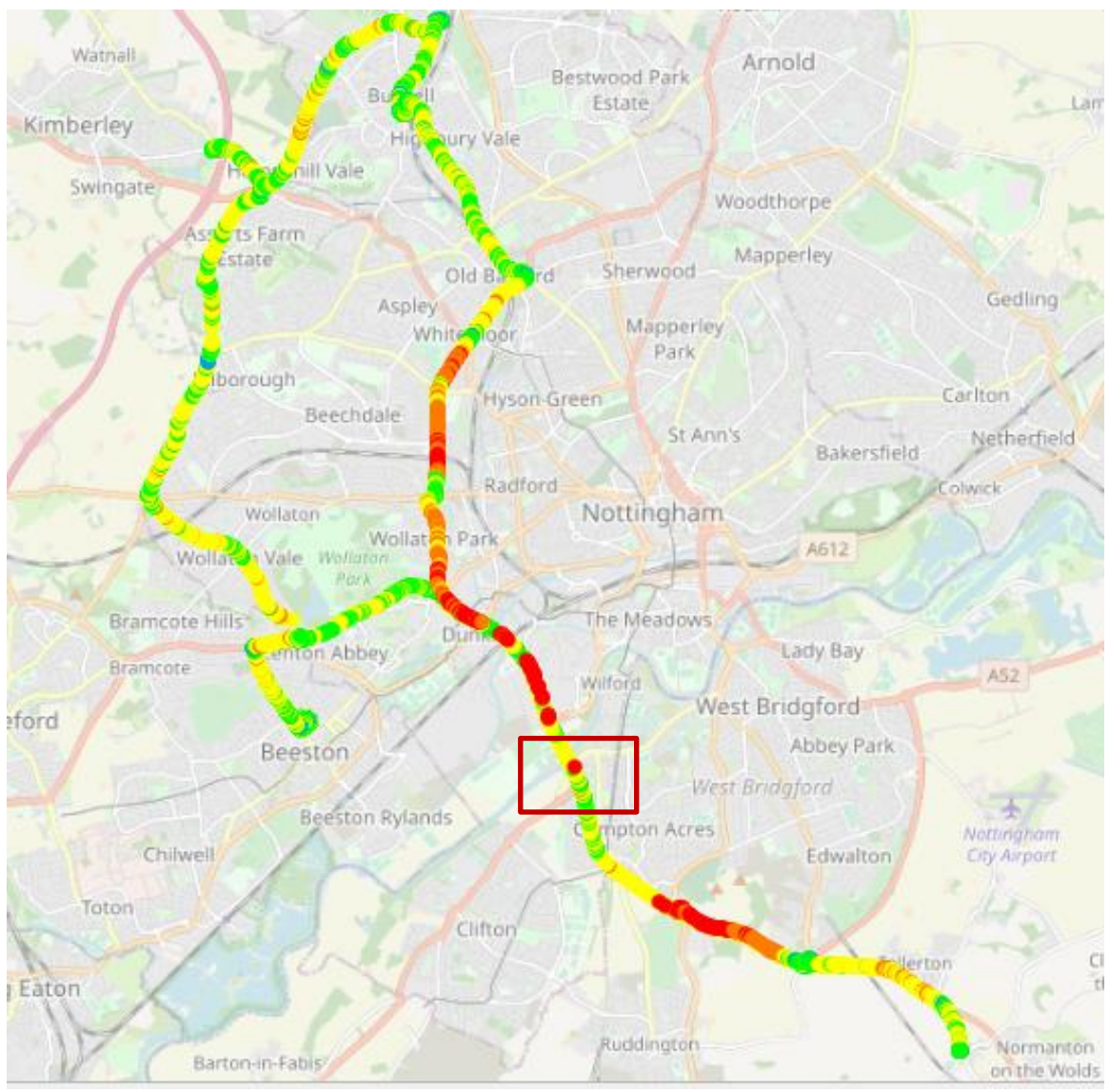
- Allows vehicles to exchange information
- Safety and efficiency improvements
- Device-to-device or via 5G network
- Competing with other standards (DSRC)
- Can be infrastructure dependent



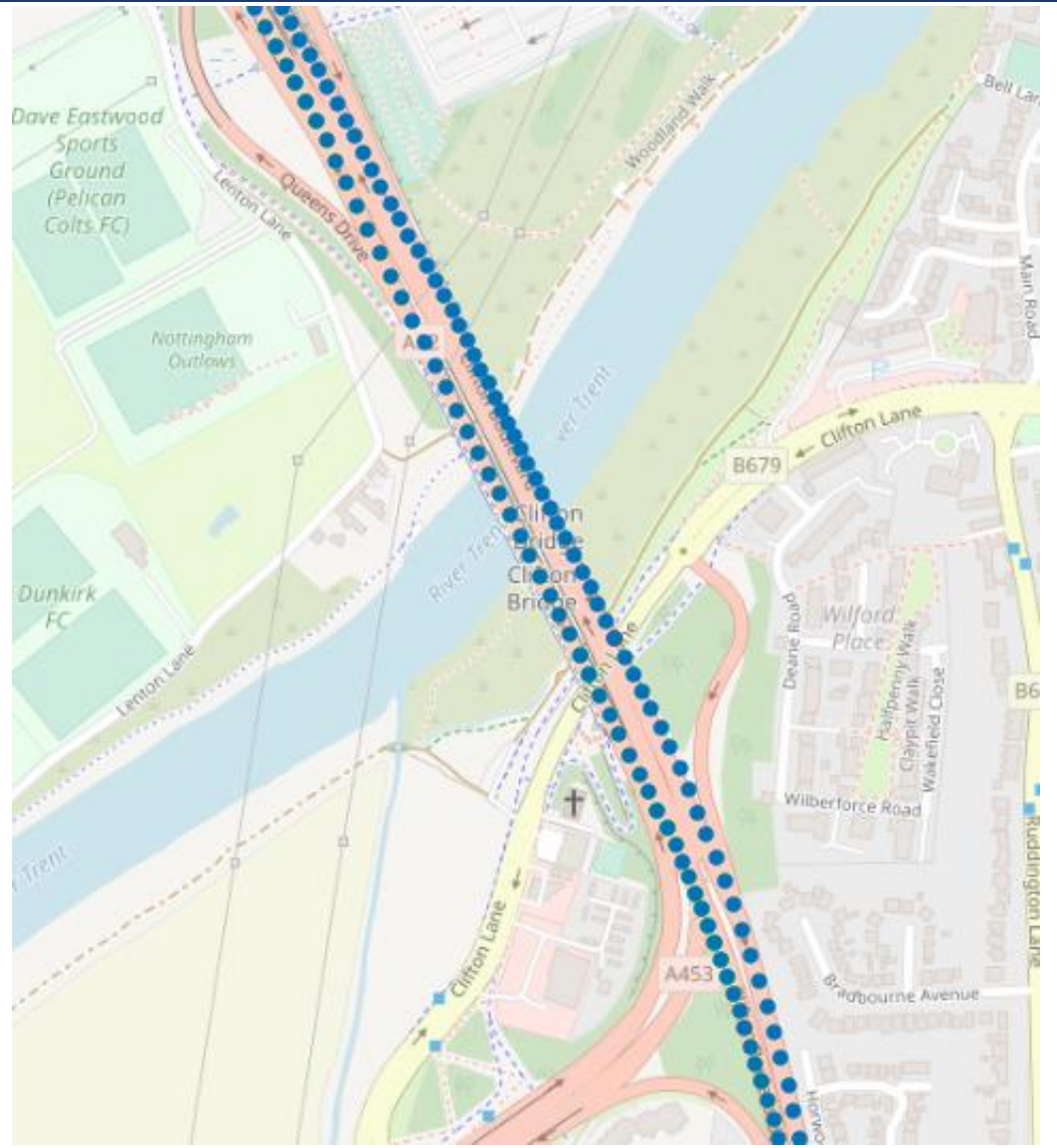
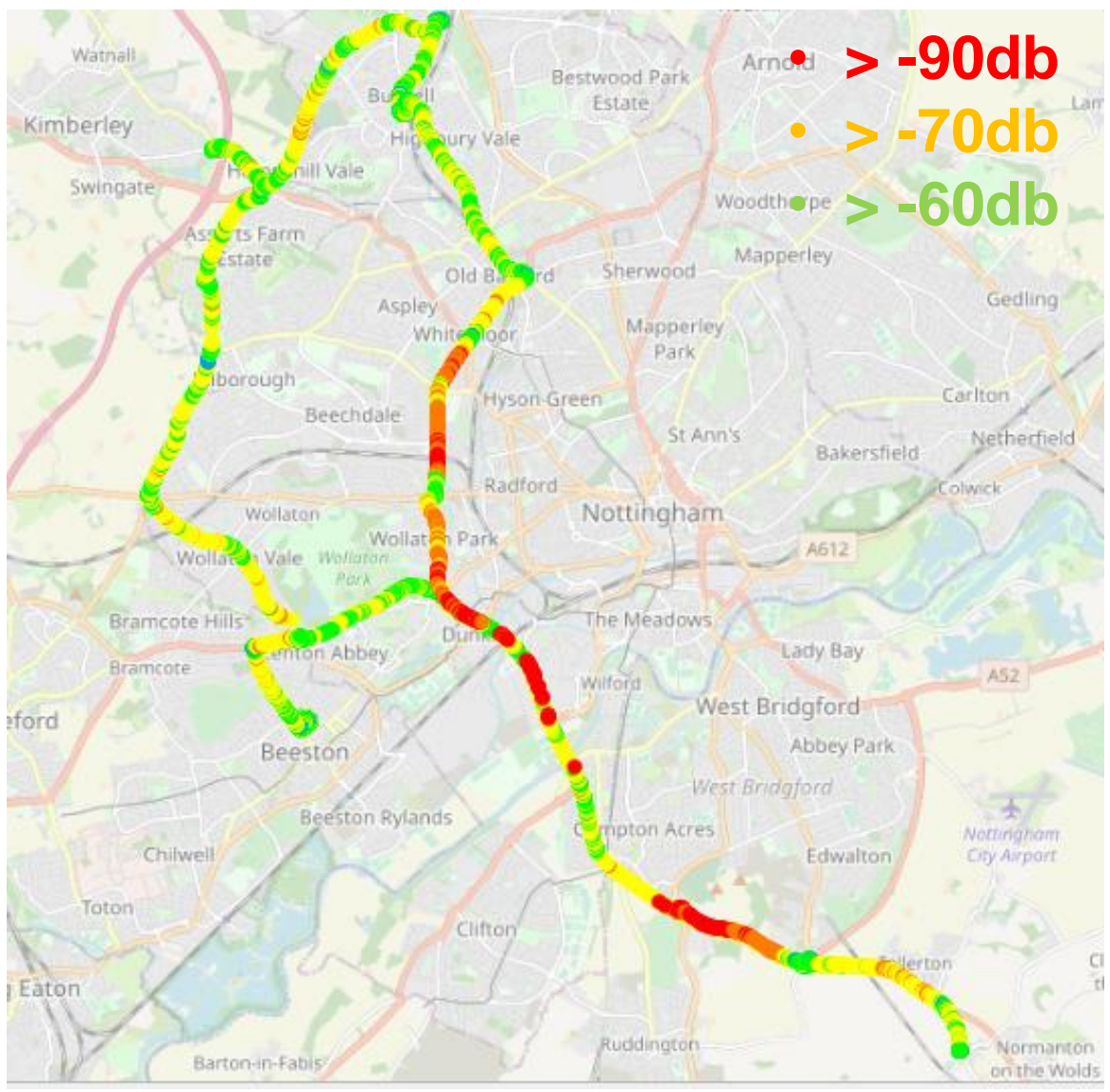
High accuracy positioning via V2V comm



GNSS/INS integration via V2V comm



GNSS/INS Integration via V2V comm



Enhancing positioning with LiDAR data



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COP26 Talk, 3 November 2021

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