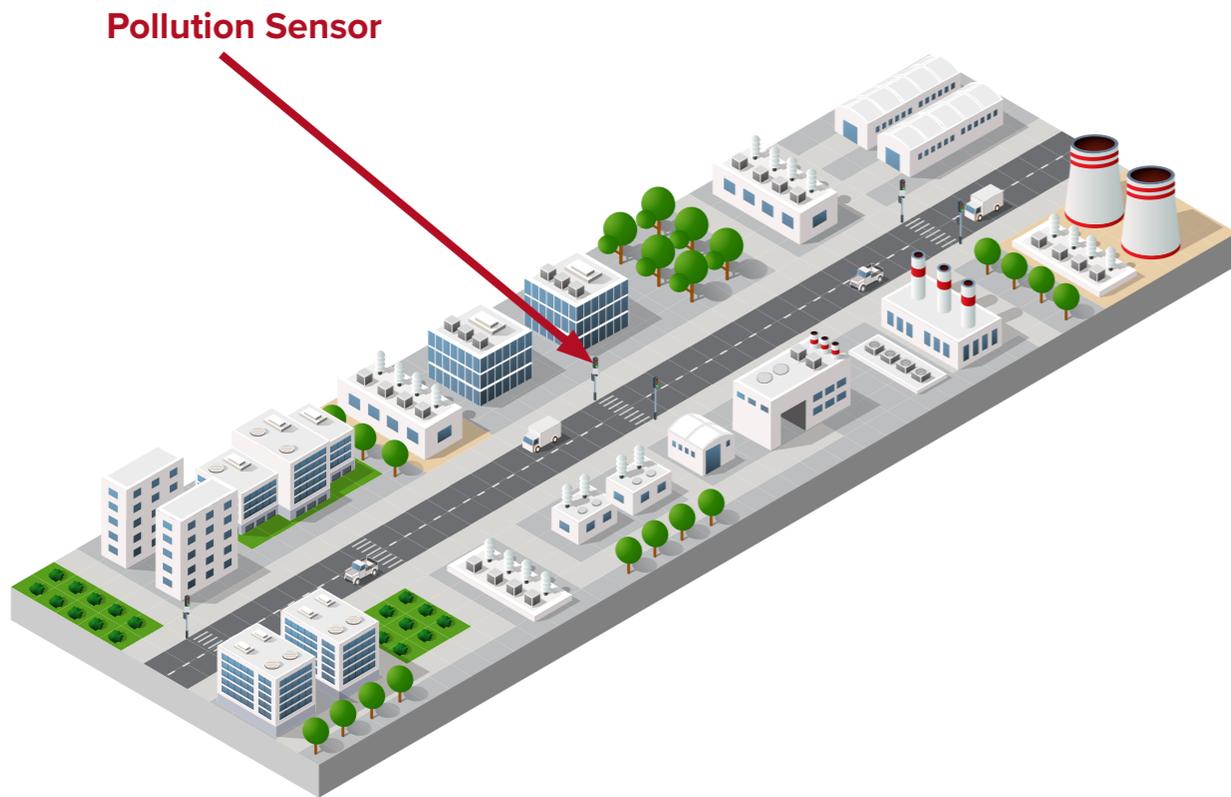


XANLABS



Reduce Traffic Pollution

In 3 Steps



Step 1

Measure

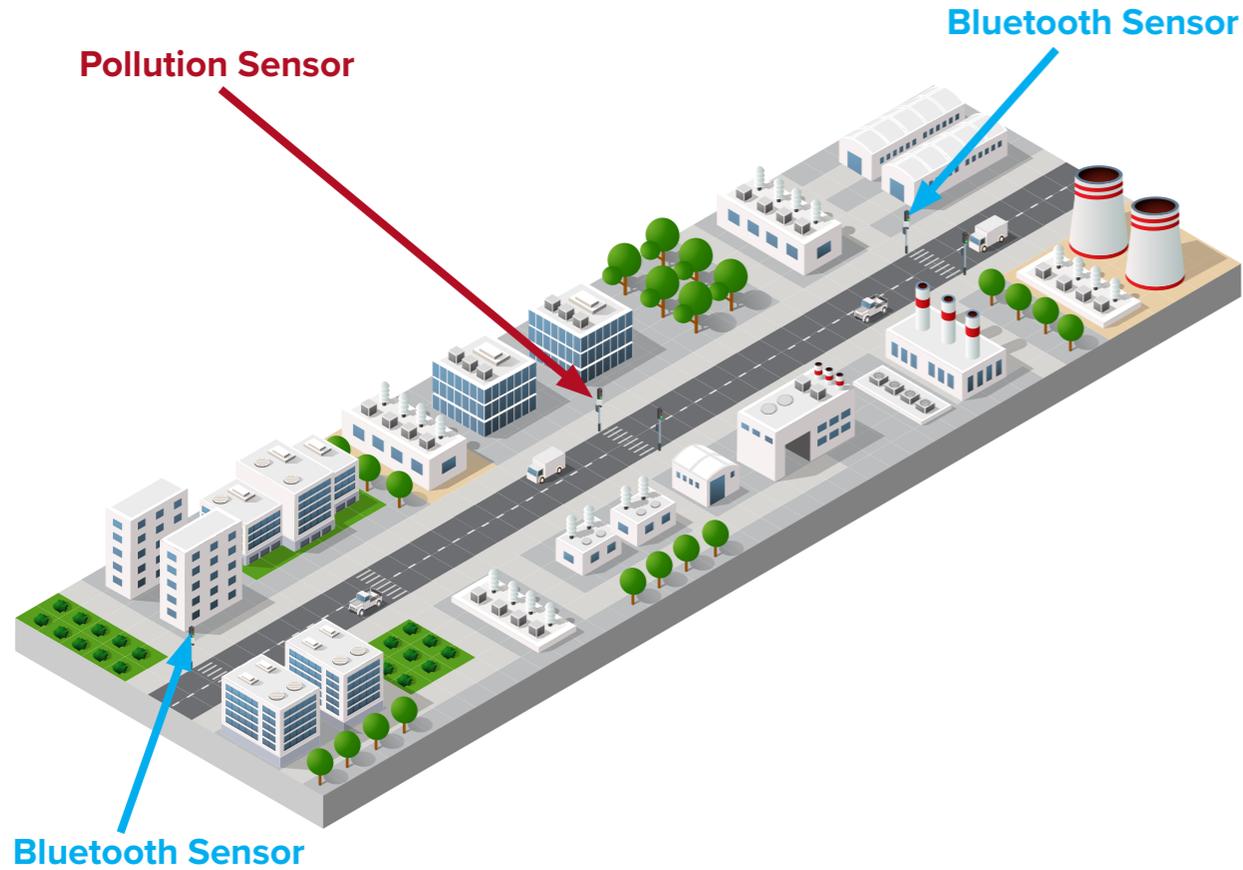
Install Pollution Sensors

XanLabs Pollution Monitors give real-time feedback.

By putting Pollution Monitors on the street, an analysis of the times and locations which have dangerous levels of Pollution can be identified.

Using XanLabs NO₂ monitors or the Multi-sensors Particle, NO₂, CO and Ozone sensors give minute by minute data that can be viewed and graphed. Alerts can be set for different levels.

-
- Alerts at preset values
 - Up to 5 years of operation
 - Auto Calibration using AI



Step 2 Analyse

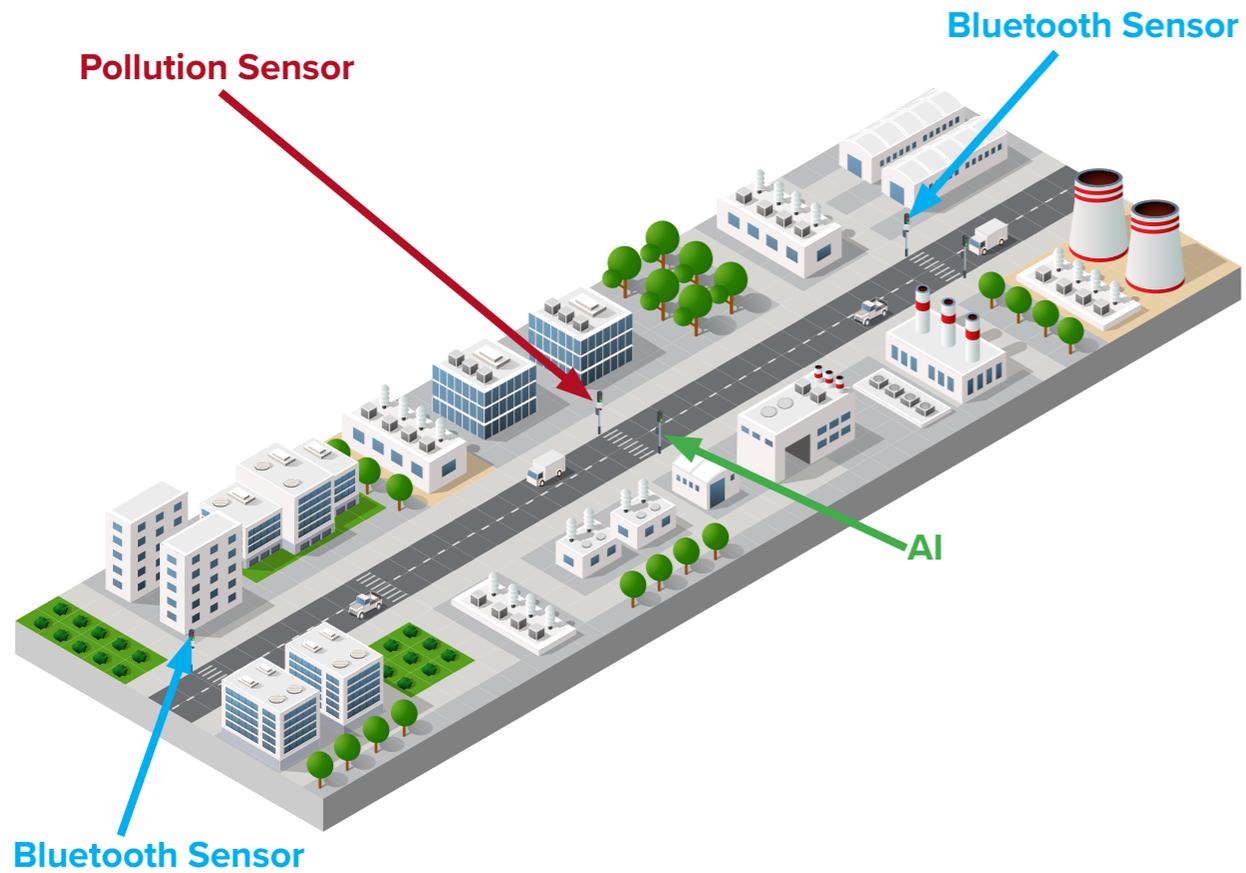
Journey Time

Using the locations identified by the Pollution Monitors, Bluetooth Sensors are then installed on those routes creating high levels of Pollution.

From our research, we have found Journey Time to be one of the most significant factors in Pollution management.

By collecting the Journey Time information, we can use that data, along with the weather and other factors, to predict Pollution levels for various time periods.

- Journey Time calculation
- Beacon Ability to allow communication to vehicles
- Mapping of Journey across the city



Step 3 Action

Produce Plans for Traffic Signals and Diversions

AI's learn from the data and analyse this in real-time, using Journey Time, weather, CCTV and other factors to map the pollution data and start predicting the one hour ahead forecast.

Data can then be sent to Traffic Systems and other Smart City applications to mitigate the event, to reduce pollution.

Traffic strategies such as Green Waves, Diversions, Driver Awareness, Tolls and Variable Speed Limits are possible.

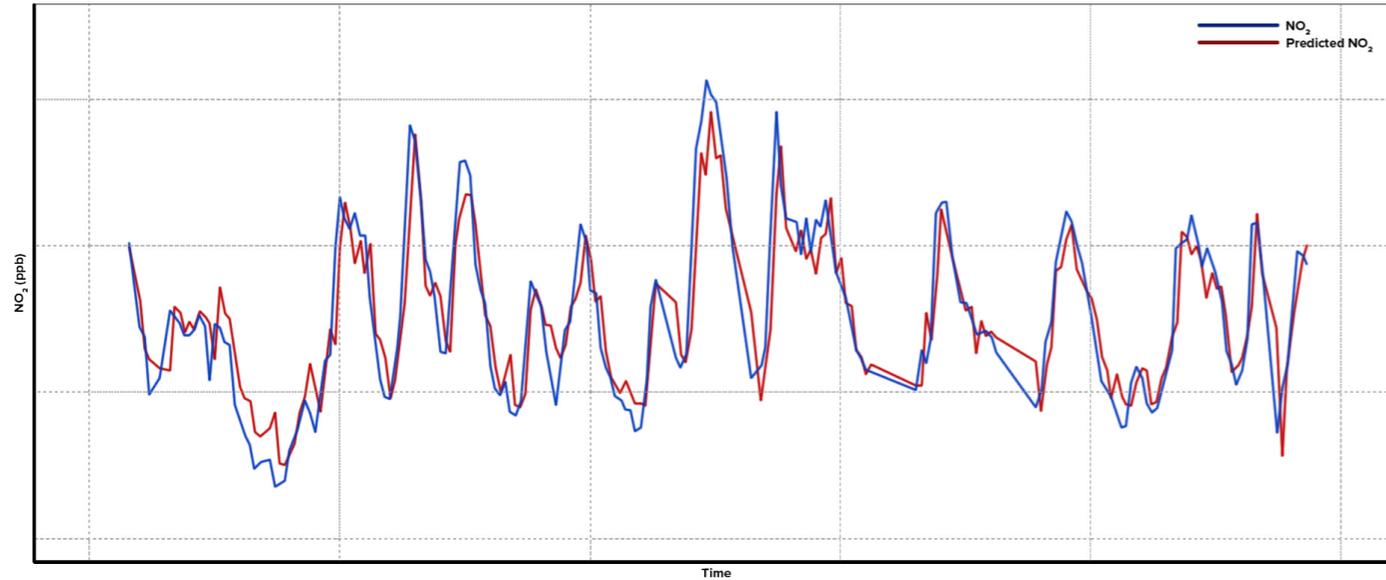
- Real Time Pollution Prediction
- Real Time Vehicle Classification from CCTV
- Green Wave Support

AI Prediction

Samples of Prediction of Pollution

Predicted Pollution vs Actual Pollution in Coventry (1 hour ahead)

Predicting NO₂ Levels 1 Hour Ahead - Coventry

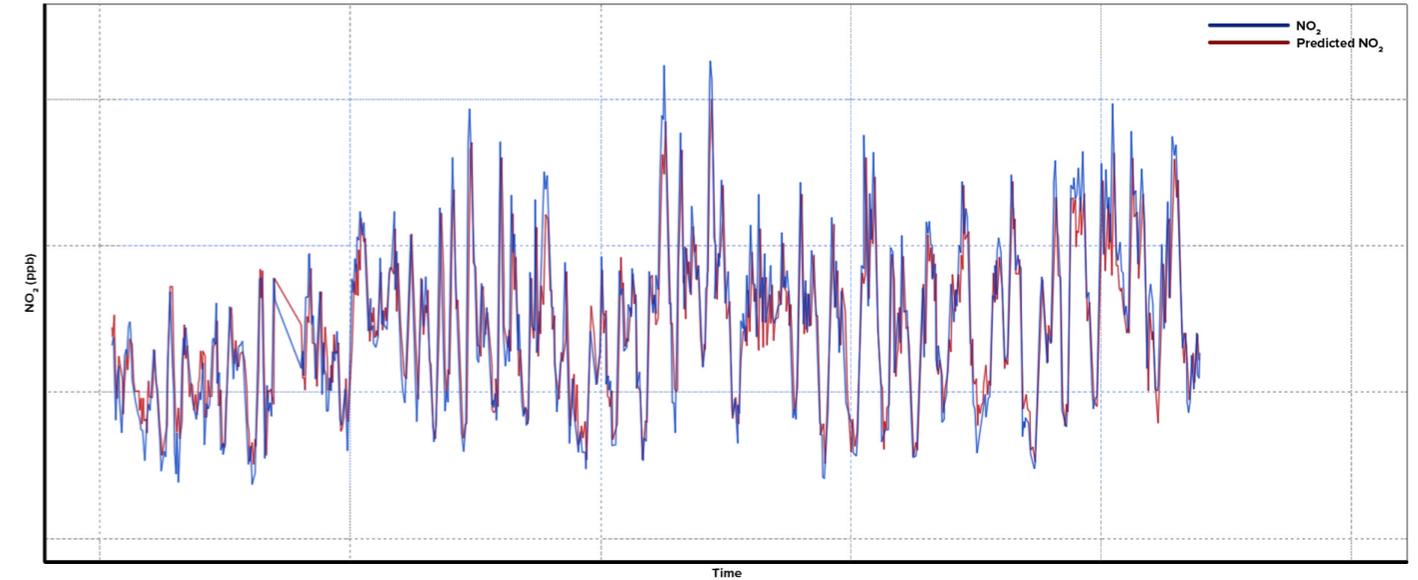


These graphs show the effectiveness of the AI, trained on pollution and journey time data while inputting other parameters to create a 26 variable model.

The red line represents the value predicted 1 hour beforehand and the blue line represents the actual value.

Predicted Pollution vs Actual Pollution in Glasgow (1 hour ahead)

Predicting NO₂ Levels 1 Hour Ahead - Glasgow



Plan Smart City

Pollution Plan options and Smart City Devices



Pollution Monitor

XanLabs Pollution Monitors provide up to 5 years of accurate data using AI-based autocalibration. Without the need to calibrate every six months reduces council effort. Sensors for NO₂, CO, Particles and Ozone pollution, provide Smart City functions.



Bluetooth Sensor

XanLabs 4th generation devices, provide up to ten times the detection rates of other devices. They supply Journey Time information as well as vehicle paths through the city. Fully compliant with GDPR. A Beacon function allows communications with Vehicles



AI

6th Generation AI provides multiple functions including pollution forecasting, Vehicle Classification and Vehicle Counting in real-time. This general-purpose AI is available in an on-street or control room environment.



Green Wave

A green wave is a method to provide vehicles with a continuous set of green lights to prevent vehicle pollution or to provide rapid transit for Buses. It uses an AI, Mobile app, Bluetooth and CCTV input.



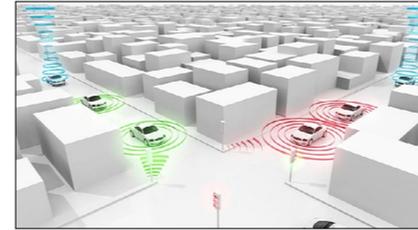
Phone APP & Tolls

A mobile application allows drivers to provide information on their journey AI's then inform them of Journey time, optimum start times, speed recommendations for a green wave and parking. Using the APP and ANPR, tolls can be enabled at peak pollution times.



Driver Start Time

By predicting Journey times, the driver can pick the correct time to drive by changing the driver's knowledge; you can change their time of driving and minimise pollution.



Diversion

Diverting traffic to alternate routes when there is pollution can reduce the amount of traffic flowing down the critical path.



Park and Ride

By giving a comparison of Journey times to the city for cars and buses on routes where a Park and Ride option exists, more drivers can be persuaded to use these services.



Variable Speed limits

An AI can use the Journey times, and Pollution values to set the speed limit using variable signs allowing the minimisation of pollution at peak times.

Legal Limits Pollution

NO₂

NO₂

NO₂ - Nitrogen Dioxide - Legal Limits

200 µg/m³ or 104 ppb 1 hour average
no more than 18 times per year

40 µg/m³ or 20 ppb averaged over 1 year

PM_{2.5}

PM_{2.5} & PM₁₀

Particles - Legal Limits

PM_{2.5}
25 µg/m³ averaged over 1 year

PM₁₀
50 µg/m³ averaged over 24 hour
40 µg/m³ averaged over 1 year

CO

O₃

CO & O₃

CO - Carbon Monoxide - Legal Limits

10 mg/m³ or 8.59 ppm
Maximum Daily 8 hour mean

O₃ - Ozone - Legal Limits
120 µg/m³ or 60 ppb
Maximum Daily 8 hour mean

XANLABS

XanLabs is a UK Research and Development company specialised in AI and the Smart City. It and its sister company NOW Wireless have delivered more than 45 cities with upwards of 30,000 devices. These range from Antennas, Bluetooth Sensors, Pollution Monitors and Mesh Nodes to CCTV and AI.

XanLabs manufactures in the UK and distributes and licences products worldwide.

E &OE

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