



## **Smart IOTs System for Environmental Health and Traffic Congestion Monitoring**



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## **Iknaia's Airscan Platform**

Iknaia have built a full end to end IOT platform that collects data from devices. Iknaia are experts in small sensor technology, building networks using Bluetooth, WiFi, LoRaWan, NB-IOT. Specialists in backhaul communications using a range of technologies including 3G/4G/5G, WiFi and satellite.

We build Air Quality Networks, Asset and Employee Tracking Solutions, Indoor Positioning and Road Traffic Management Systems using low cost sensors. Providing continuous and real-time monitoring, whilst decreasing costs, improving efficiency and productivity.

With the use of Radio Frequencies, we're able to broadcast and monitor a vast amount of information. We can provide data in situations where before would have been expensive or difficult to obtain. Data can be viewed on our beautiful user interfaces or shared and integrated with any existing third-party systems.

## **Airscan Air Quality Monitoring (AQM)**

The Airscan Air Quality Monitoring solution is a low-cost system that offers the ability to build a high-density ambient air quality network that records data in real-time. Airscan is an out of the box solution for urban air quality monitoring.

### **Airscan Hardware**



Injection moulded enclosure and heavy duty ruggedized (IP66) rated, 4mm thick, UV rated, UL94-VO fire retarded and protected from dust and capable of withstanding wet weather.

**Suitable for Indoor and Outdoor use.**

Low power consumption with battery power management with optional solar inputs to suit any applications.



Data communication options via 3G/4G/5G, WiFi or Ethernet.

Additional GPS Module can be added.

Power 12v, 11v, 220v, 240v AC Mains

Environment Operating range: -18 to 50 Centigrade

CE Certified

Power draw is less than 350 mA and weighs 0.75kg

Capacity for up to 4 electrochemical sensors from a choice of : CO, SO<sub>2</sub>, O<sub>3</sub>, NO, NO<sub>2</sub>, H<sub>2</sub>S.

Ultra-low noise sensing for gasses (ppb) and particulates (µg/m)

Photo Ionisation Detector (PID) for detecting VOCs with ionisation potentials < 10.6 eV

Formaldehyde sensor available Q3 2020

Particulate matter / dust sensor PM<sub>1</sub>, PM<sub>2.5</sub>, PM<sub>4</sub>, PM<sub>10</sub>

Environmental sensors – temperature, humidity and atmospheric pressure

Sensors are shipped calibrated but require 24hr stabilisation on boot up.

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All devices can be accessed remotely for troubleshooting, health checks, software updates, reconfiguration.

Air quality sensors have a 24mth lifespan. Units come with a 12mth warranty; additional maintenance packages can be extended.

## Airscan Journey Time Monitoring Module



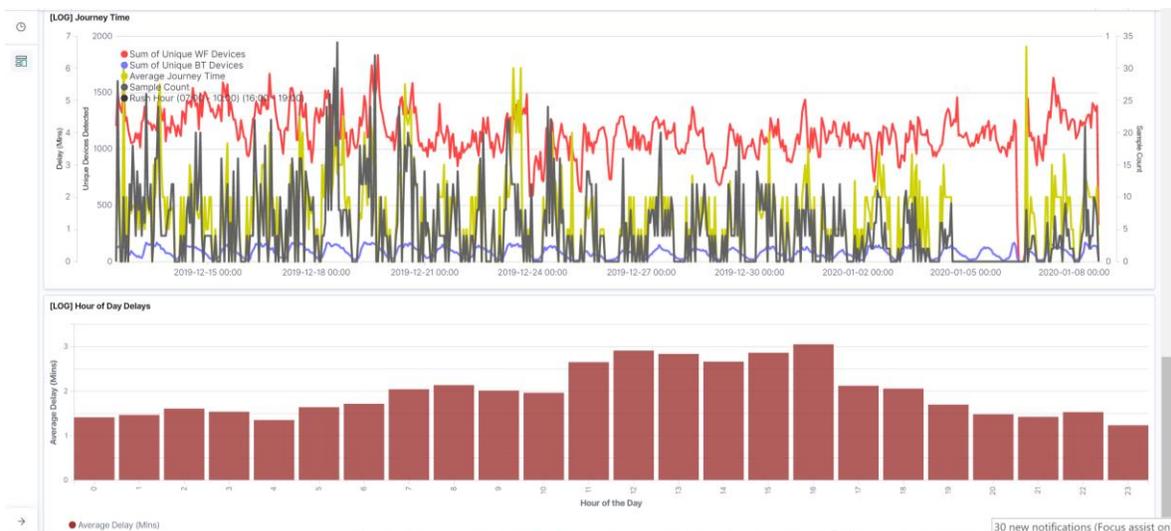
Additional Bluetooth and WiFi modules available to monitor traffic flow, congestion and average speeds.

Bi-directional monitoring, tried and tested on smart motorways throughout the UK, capturing vehicles up to 100mph.

Captured real-time data is run through the Airscan algorithms and presented onto an online management dashboard, viewable alongside air pollution data. This allows for the ability to monitor traffic congestion and the pollution effects on the environment.

This unique sensor solution enables Traffic Engineers to analyse traffic queues and congestion in an efficient way and present live journey times to drivers.

Data can be fully integrated into variable messages signs and other third-party applications.



## Airscan Acoustic Monitoring Module

Our acoustic monitoring module allows for the counting and categorization of vehicles, as well as determining their direction. Edge-computing enabled device combining acoustic and Artificial Intelligence, the Real Time Events Detector (RTExD). It helps to combat traffic-related noise pollution and detects accidents.

Airscan's acoustic module can detect and analyse all types of sounds associated with violence and insecurity such as gunshots, explosions, screaming, breaking glass, roaring crowd. Designed to be integrated into the environment where video camera installations are not needed. Ideal for improving safety, security and emergency response by monitoring such specific sounds.

Airscan is a much cheaper solution and easier to implement than video cameras and combined with Air Quality and Journey Time modules is the future of efficient smart cities.

## Airscan Software System

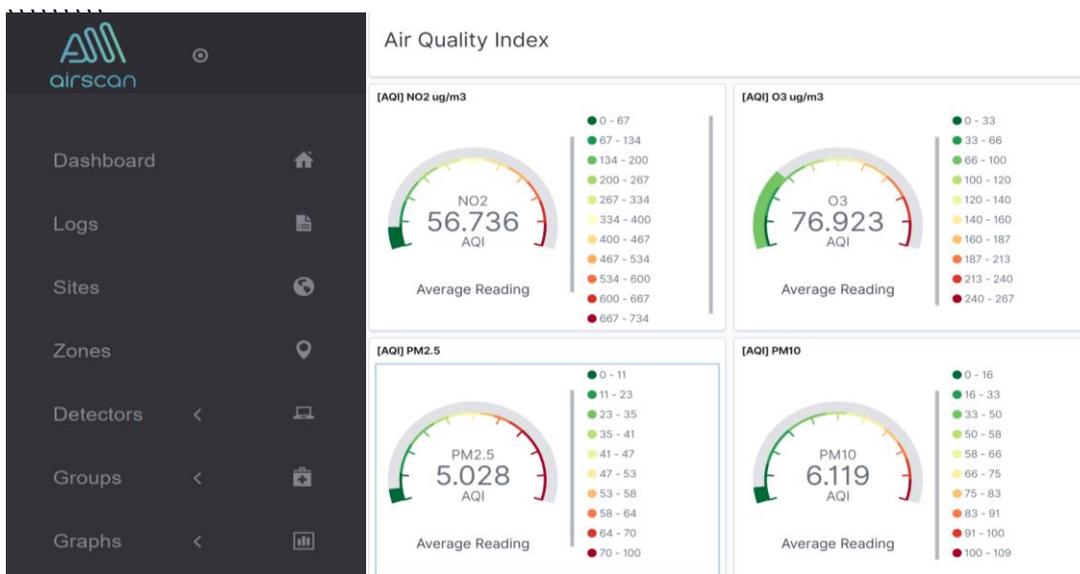
Cloud hosted data presented in real time onto a web management interface optimised for PC, tablet and all mobile devices to enable data to be always available. Whether you have one or more Airscan AQM, the dashboard will enable you to view all your data at a single point.

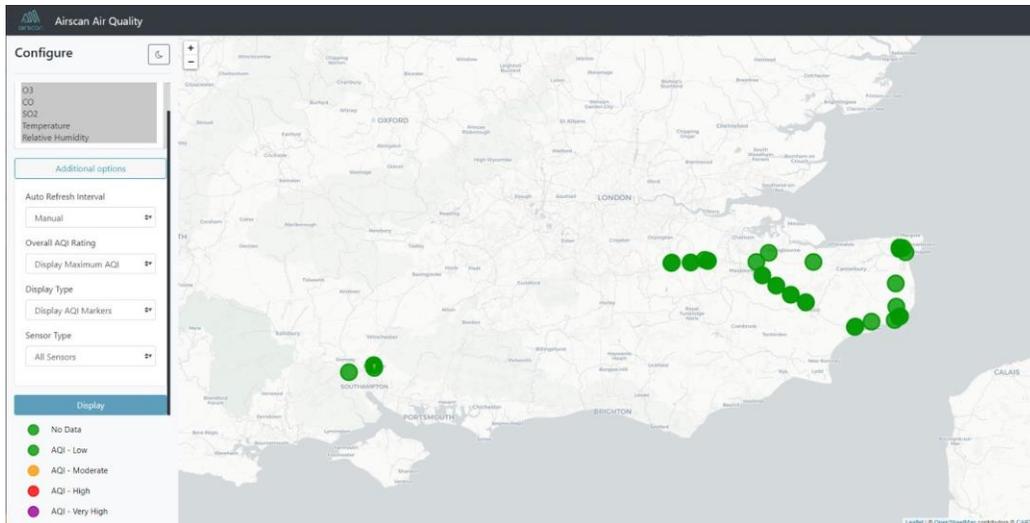
Our completely customisable dashboard provides quick view dials and more in-depth graphs in real-time and full downloadable data reports available.

Open APIs enable data to be published and fully integrated into third party applications. Compatible with multiple third-party products including variable message signs.

Third party data can also be pulled in and overlaid to present comparable source data for cross-referencing.

Data is hosted on AWS for real-time and historic reporting.





Using GPS module, Airscan units can be plotted onto a real-time map.

## Airscan System Architecture

Airscan makes use of Amazon Web Services which offers full scalability, reliability and a secure environment. Its many features and tools enable rapid development, deployment, troubleshooting and enables deep diagnostics. Amazon's AI tools allow for machine learning and easy interrogation of data to predict outcomes.

The system is flexible to add on additional IOT hardware solutions such as acoustic, light pollution, water quality, wind etc.



## AIR QUALITY SENSORS - PERFORMANCE

<b>Temperature</b>	-45 to 125 deg C $\pm$ 0.2 deg C
<b>Humidity</b>	(0 to 100%) $\pm$ 2%

### CO Electrochemical Sensor

Sensitivity	nA/ppm in 2ppm CO	220 to 410
Response time	t90 (s) from zero to 10ppm CO	< 30
Zero current	nA in zero air at 20°C	-100 to +10
Noise	$\pm$ 2 standard deviations (ppb equivalent)	20
<b>Range</b> ppm limit of performance warranty		500
Linearity ppm CO error at full scale, linear at zero, 15ppm CO		< $\pm$ 1
Overgas limit maximum ppm for stable response to gas pulse		2000

### NO2 Electrochemical Sensor

Sensitivity	nA/ppm at 2ppm NO2	-175 to -500
Response time	t90 (s) from zero to 2ppm NO2	< 80
Zero current	nA in zero air at 20°C	-70 to +70
Noise	$\pm$ 2 standard deviations (ppb equivalent)	15
<b>Range</b> ppm NO2 limit of performance warranty		20
Linearity ppm error at full scale, linear at zero and 20ppm NO2		< $\pm$ 0.5
Overgas limit maximum ppm for stable response to gas pulse		50

### H2S Electrochemical Sensor

Sensitivity	nA/ppm at 2ppm H2 S	1400 to 2200
Response time	t90 (s) from zero to 2ppm H2 S	< 60
Zero current	nA in zero air at 20°C	-250 to 100
Noise	$\pm$ 2 standard deviations (ppb equivalent)	5
<b>Range</b> ppm H2 S limit of performance warranty		50
Linearity ppb error at full scale, linear at zero and 10ppm H2 S		< $\pm$ 0.5
Overgas limit maximum ppm for stable response to gas pulse		100

### O3 Electrochemical Sensor

Sensitivity	nA/ppm at 1ppm O3	-200 to -650
Response time	t90 (s) from zero to 1ppm O3	< 80
Zero current	nA in zero air at 20°C	-70 to +70
Noise	$\pm$ 2 standard deviations (ppb equivalent)	15
<b>Range</b> ppm O3 limit of performance warranty		20
Linearity ppm error at full scale, linear at zero and 20ppm O3		< $\pm$ 0.5
Overgas limit maximum ppm for stable response to gas pulse		50

### SO2 Electrochemical Sensor

Sensitivity	nA/ppm at 2ppm SO2	320 to 500
Response time	t90 (s) from zero to 2ppm SO2	< 20

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Zero current	nA in zero air at 20°C	-80 to +80
Noise	±2 standard deviations (ppb equivalent)	15
Range	ppm limit of performance warranty	50
Linearity	ppb error at 20ppm SO <sub>2</sub> , linear at zero and 2ppm SO <sub>2</sub>	0 to -5
Overgas limit maximum ppm for stable response to gas pulse	100	

### CO<sub>2</sub> Infrared Sensor Pyroelectric Detector

<b>IAQ Range</b>		0 to 5000ppm
Temperature Signal	Integral thermistor (NTC, R <sub>25</sub> = 3000 Ω B= 3450 K)	
Operating Temperature Range	-20°C to +55°C (linear compensation from -10 to 40°C)	
Storage Temperature Range	-40°C to +75°C Humidity Range	0 to 95% rh non-condensing

### NO Nitric Oxide Electrochemical Sensor

Sensitivity	nA/ppm in 2ppm NO	350 to 550
Response time	t <sub>90</sub> (s) from zero to 2ppm NO	< 25
Zero current	nA in zero air at 20°C	10 to 150
Noise	±2 standard deviations (ppb equivalent)	80
<b>Range ppm</b>	NO limit of performance warranty	20
Linearity	ppb error at full scale, linear at zero and 5ppm NO	< ±1
Overgas limit maximum ppm for stable response to gas pulse	50	

### Photo Ionisation Detector (PID)

PERFORMANCE (using 10.6 eV lamp 001-0019-04)		
Target gases	VOCs with ionisation potentials	< 10.6 eV
Minimum resolution	ppb isobutylene	< 50
<b>Linear range</b>	ppm isobutylene 5% deviation	200
<b>Overrange</b>	ppm isobutylene	4,000
Full stabilisation time	minutes to 100 ppb	20
Warm up time	seconds time to full operation	5
Offset voltage	mV	50 to 59
Response time	(t <sub>90</sub> ) seconds diffusion mode	< 3
Operating Life	5 years	

### Particle Matter

Airscan's **MCERTS certified** PM sensor is based on laser scattering and is an innovative contamination-resistance technology. This enables accurate measurements from first operation and throughout its lifetime.

PM<sub>2.5</sub> and PM<sub>10</sub> refer to particulate matter with particle diameter up to 2.5 microns and 10 microns, respectively, and are month the most dangerous air pollutants.

Mass concentration accuracy*	±10 µg/m <sup>3</sup> @ 0 to 100 µg/m <sup>3</sup> ±10 µg/m <sup>3</sup> @ 100 to 1000 µg/m <sup>3</sup>
Mass concentration range	1 to 1000 µg/m <sup>3</sup>
Mass concentration resolution	1 µg/m <sup>3</sup>
Particle detection size range**	Mass concentration: PM <sub>1.0</sub> , PM <sub>2.5</sub> , PM <sub>4</sub> & PM <sub>10</sub>

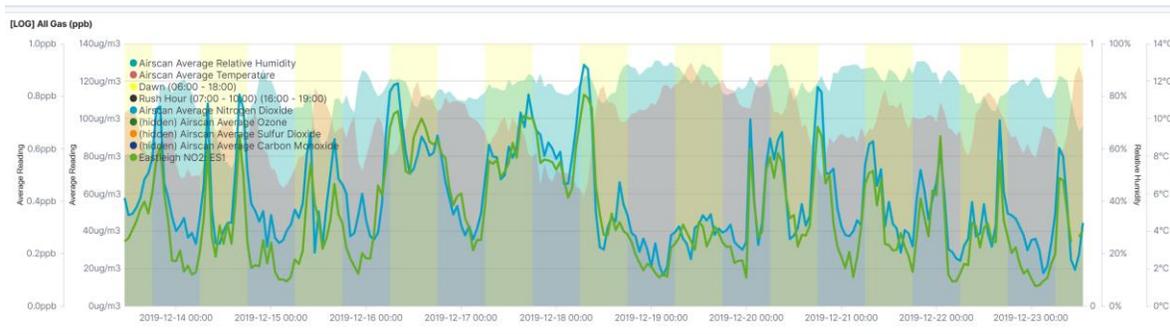
Lower Limit of detection  
Minimum sampling interval

Number concentration: PM0.5, PM1.0, PM4 & PM10  
0.3 µm  
1 sec (continuous mode)

*\*Specified for PM2.5 at 25 °C using potassium chloride salt particles and the TSI DustTrak™ DRX Aerosol Monitor 8533 as a reference.*

*\*\*PMx defines particles with a size smaller than "x" micrometers (e.g., PM2.5 = particles smaller than 2.5 µm).*

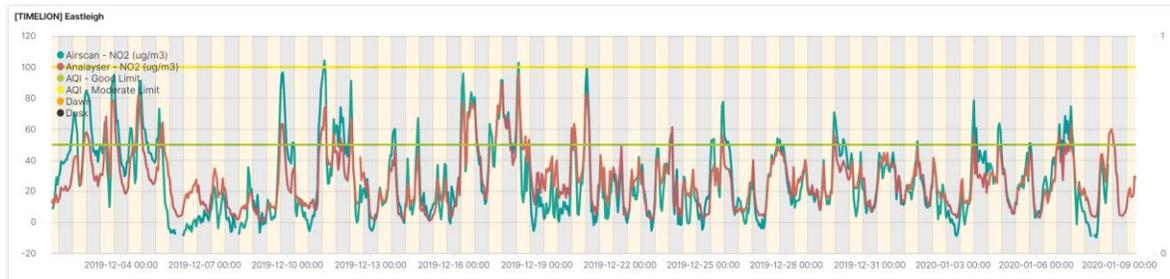
### Reference Data



### NO2 comparison reference data

Airscan ■

Static Monitoring Station, Southampton Road, Eastleigh ■ (approx. £150k investment)



### NO2 comparison reference data

Airscan ■

NO2 continuous analyzer, The Point Eastleigh ■ (approx. £20k investment)

## ACOUSTIC MONITORING - PERFORMANCE

Ruggedized IP66 enclosure

Operational temperature : -20 +80 °C

### Microphone:

Omnidirectional, Top-ported, analogue output MEMS microphone. It has high performance and reliability. Excellent RF immunity performance.

Available in a thin 3.76 mm × 2.95 mm × 1.1 mm proprietary OCLGA package.

It is SMT compatible with no sensitivity degradation.

RoHS/Halogen free compliant

Sensitivity Matching within +/-1dB – 22 dBFS Omnidirectional

SNR 59dB

Maximum sample rate 48 Khz

Signal to noise ratio 66db 20kHz bandwidth

AC 100-240V 50/60Hz input

DC 5,1V 3A output

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