# Kingston University pioneers AI-driven sensors to monitor air pollution with unprecedented accuracy



A new study led by Kingston University has revealed the potential for affordable, AI-driven air pollution sensors to transform the way air quality is monitored, making accurate and accessible data available for local areas. Published in the Sensors journal by MDPI, the research explores how integrating artificial intelligence with compact electrochemical sensors can improve the precision of air pollution measurements.

Traditional air quality monitoring systems often rely on stationary stations that are expensive, immobile, and sparsely located, which can result in data that does not reflect the actual pollution levels experienced locally. The World Health Organization estimates that air pollution contributes to seven million deaths globally each year, with children especially vulnerable due to their developing respiratory systems and higher rates of breathing.

Kingston University, with initial internal funding supplemented by Innovate UK and the UK Shared Prosperity Fund, collaborated with Technocomm Consulting Ltd—a company specialising in network communications and sensors—to develop the portable sensors known as EnviroSense. These devices, about the size of a mobile phone, offer real-time, ground-level air quality data that can be collected anywhere.

To assess the performance of these AI-enhanced sensors, the research team co-located them with high-precision instruments at the Weybourne Atmospheric Observatory on the North Norfolk coast, a site chosen for its exposure to varied pollution levels influenced by winds from heavily polluted regions including London and the Midlands. Data was gathered between May and August 2024, focusing on pollutants such as carbon monoxide (CO), carbon dioxide (CO2), and ozone (O3), with measurements taken every 30 minutes alongside weather condition monitoring.

The collected data was input into AI models which decreased measurement inaccuracies by up to 46%, demonstrating that machine learning can significantly enhance the capability of relatively simple and low-cost sensors. The improved accuracy provides communities with valuable information for monitoring air quality conditions more effectively.

Professor Jean-Christophe Nebel, Director of Kingston University’s Knowledge Exchange and Research Institute for Cyber, Engineering, and Digital Technologies, commented on the impact of the technology: "This research shows that portable AI-powered sensors can deliver data accurate enough to make a real difference. It could inform public policy, lead to local emergency responses, and ultimately improve health outcomes. Our vision is for these sensors to be deployed on buses or waste collection vehicles in every neighbourhood, providing residents with real-time, localized air quality data."

Dr Farzana Rahman, senior lecturer and principal investigator in Data Science at Kingston University, highlighted the significance of the findings: "These AI-powered sensors have revolutionised air quality monitoring, making it more accurate and accessible than ever before. This collaboration sets the stage for future breakthroughs and impactful partnerships."

Bijan Mohandes, Managing Director of Technocomm Consulting Ltd, acknowledged the essential role of teamwork in the project’s success: "The constant communication and teamwork were essential in delivering the project on schedule. This research shows that machine learning and AI have a key role to play in improving the accuracy of electrochemical sensors."

Ongoing research involves partnerships with Rey Juan Carlos University in Madrid and a university in Kuala Lumpur, Malaysia, aimed at deploying these sensors in diverse climatic conditions. This wider deployment is intended to test the sensors and AI models under varying environmental settings to further validate their effectiveness.

The Envirotech Online is reporting on this development as a notable advancement in affordable, accurate air quality monitoring technology that could enhance environmental health surveillance worldwide.

Source: [Noah Wire Services](https://www.noahwire.com)

## Bibliography

1. <https://www.mdpi.com/1424-8220/25/5/1423> - This article, titled 'Air Pollution Monitoring Using Cost-Effective Devices Enhanced by Machine Learning,' discusses a study led by Kingston University that integrates artificial intelligence with compact electrochemical sensors to improve air pollution measurement accuracy.
2. <https://www.weybourne.uea.ac.uk/> - The Weybourne Atmospheric Observatory, located on the North Norfolk coast, was used by the research team to co-locate AI-enhanced sensors with high-precision instruments for performance assessment.
3. <https://www.mdpi.com/1424-8220/25/5/1423> - The study, published in the Sensors journal by MDPI, explores how integrating artificial intelligence with compact electrochemical sensors can improve the precision of air pollution measurements.
4. <https://www.mdpi.com/1424-8220/25/5/1423> - The research demonstrates that machine learning can significantly enhance the capability of relatively simple and low-cost sensors, decreasing measurement inaccuracies by up to 46%.
5. <https://www.mdpi.com/1424-8220/25/5/1423> - The study highlights that integrating AI with compact electrochemical sensors can improve the precision of air pollution measurements, making accurate and accessible data available for local areas.
6. <https://www.mdpi.com/1424-8220/25/5/1423> - The research indicates that machine learning can significantly enhance the capability of relatively simple and low-cost sensors, decreasing measurement inaccuracies by up to 46%.
7. <https://news.google.com/rss/articles/CBMihAJBVV95cUxPRlVtYmY0VVFSVm1uUC1UTFVuMi03M19MTE8yUG85ZXZxd2JkSWN3TFhxT0E0ajBBX3MxS2x5TWhtWVFnTm5WNE1XR1NralpWSVZfdE4zZW5JUFFPcXVOekczNVhhZEpWRG5PTHdsSC1WV2RDNVRQdFIzQzFsaXpDVjJnQ2R2WWVadUNYdWI2Zzg5U2JWaS1hcl9wNDJFZFg1VWR0OTFGQTZUelQwdkRzUGREcERxZWVfM3F0NDlpRldwRTcxSkZKR1BkUDlGQndxaEUyY2F1aFdRZlpIOVRZXzc0WWozc2tvR1M2VXo0VFZwWEVzR0tFdXJPTmNMTGdWQURmMw?oc=5&hl=en-US&gl=US&ceid=US:en> - Please view link - unable to able to access data