



INFOSYS AMBIENT SENSE SOLUTION: A BREATH OF FRESH AIR IN POULTRY FARMS

Birds in a poultry farm may get infected with several types of diseases caused by viruses, bacteria, fungi and parasites. These confined spaces generate aerial pollutants that are detrimental to the respiratory system of animals as well as workers.

Safety challenges of poultry farms

Primary and opportunistic microbial pathogens may directly cause infectious and allergic diseases in farm animals. Moreover, chronic exposure to specific aerial pollutants may exacerbate multifactorial environmental diseases. Studies reveal that up to 20% of farmers and farm workers report work-related symptoms of respiratory infections, such as coughing, sputum and wheezing. Some develop asthma, others develop diseases that are described as organic dust toxic syndrome. Some pathogens can survive in ambient air for several minutes and can be distributed over long distances.

While poultry production systems have evolved to become more efficient, air pollutants are a perennial problem. Ammonia, carbon dioxide, dust, microorganisms, endotoxins - also referred to as bio-aerosols - affect animal respiratory health, and the environment.

Livestock buildings, manure storage facilities, manure spreading, and even free-range systems are major sources of gaseous pollutants such as ammonia, methane, and nitrous oxide, which contribute to soil acidification and global warming.

In poultry farms, the origin of gaseous pollutants is the breakdown of fecal matter. The volume of pollutants present depends on factors such as ventilation efficiency, feed components, and stocking density - the number of birds per square foot.

Gaseous emissions can be controlled by regulating temperature, humidity, and airflow velocity. The design stage is the right time to reduce gaseous emissions in poultry farms. Good airflow and heat transfer systems can significantly reduce the impact of these gases. In farms that are already built and in operation, conveyor systems (for caged birds) can help remove feces and reduce gaseous emissions.

While these design solutions are a feasible option, they present challenges of their own. For instance, in the case of ventilation, which helps reduce gaseous emissions in poultry farms, the designer has to strike a balance between too much and too little. Too much ventilation leads to higher temperatures in summer, and lower temperatures in winter, affecting the health of the livestock. Energy costs also escalate, as the farmers have to regulate extreme temperatures.

Introducing Ambient Sense solution from Infosys

Infosys has designed a simple yet advanced solution based on Internet of Things (IoT). Our Ambient Sense solution is designed to improve occupational health and safety, using a system of IoT sensors to monitor concentration of gases, temperature, air velocity, and humidity.

Poultry farmers install IoT-based sensors in the poultry sheds, which continuously record the values of harmful chemical agents such as ammonia, carbon dioxide, and carbon monoxide. The data

transmitted to the Infosys Ambient Sense application in real time is compared with the threshold value set for each parameter. If the recorded value at any point of time is higher than the threshold value in the Ambient Sense application, an alarm notifies the farmer. Also, email or SMS notifications are triggered for users.

The Ambient Sense application can also be integrated with exhaust systems so that in case of a breach in threshold levels, exhaust systems can be automatically activated, and harmful gases in the confined space can be eliminated.







Appropriate simulation models that consider the birds' growth can be coupled with the solution to optimize energy usage while ensuring a conducive environment for their growth.

While we used the example of poultry farms to illustrate the efficacy of the Infosys Ambient Sense solution, it can be implemented in work situations involving confined spaces and gaseous emissions.

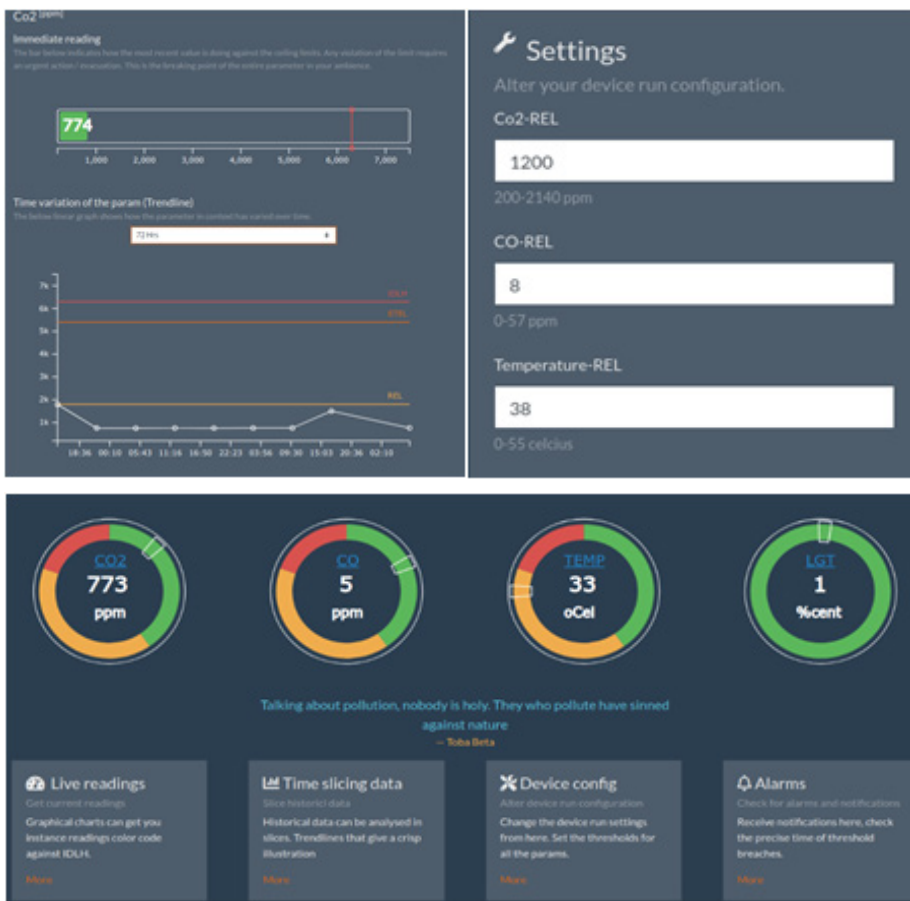
Regulatory bodies such as Occupational Safety and Health Administration (OSHA) have set permissible limits for exposure to toxic chemical agents and gases such as ammonia, nitrogen, carbon dioxide, and carbon monoxide. It is imperative for enterprises to monitor emissions and safeguard the health of workers. Using our IoT-based Ambient Sense solution, businesses can provide a safe working environment.



Features of Infosys Ambient Sense Solution

 <p>Real-time monitoring of parameters such as ammonia, carbon monoxide, carbon dioxide emissions, and temperature</p>	 <p>Configurable rules setting and exposure level calculations</p>	 <p>Alerts and notifications</p>	 <p>Graphical dashboard</p>	 <p>Emergency response preparedness</p>	 <p>Advanced analytics and visualizations</p>
---	---	---	--	--	--

Ambient Sense application screenshots



A Web application runs alongside the device always reading and analyzing current values of the confined space workplace. Graphic dashboards in the application display the trends and instance readings. The panel can be used to change the settings of the device and other sensor settings.

A splash screen displays the dial control and readings for each parameter. A huge amount of data is presented in a user-friendly way. The Ambient Sense device's hardware monitors and collects voluminous data, which is simultaneously stored in the database. This data can be utilized to perform an analysis of the ambient conditions in a particular confined space such as a poultry farm. The results can be used for analytical purposes to establish patterns. These patterns can be analyzed to evaluate how to reduce the production of harmful substances and conditions.

[Email](#) to learn more about the Infosys Ambient Sense solution.



About the Authors

Shivkumar Krishnamoorthy

Principal Consultant | Manufacturing Domain Consulting Group |
Infosys Limited

Dr. Manoj Kumar Gupta

Principal Consultant | Manufacturing Domain Consulting Group |
Infosys Limited

For more information, contact askus@infosys.com



© 2021 Infosys Limited, Bengaluru, India. All Rights Reserved. Infosys believes the information in this document is accurate as of its publication date; such information is subject to change without notice. Infosys acknowledges the proprietary rights of other companies to the trademarks, product names and such other intellectual property rights mentioned in this document. Except as expressly permitted, neither this documentation nor any part of it may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, printing, photocopying, recording or otherwise, without the prior permission of Infosys Limited and/ or any named intellectual property rights holders under this document.