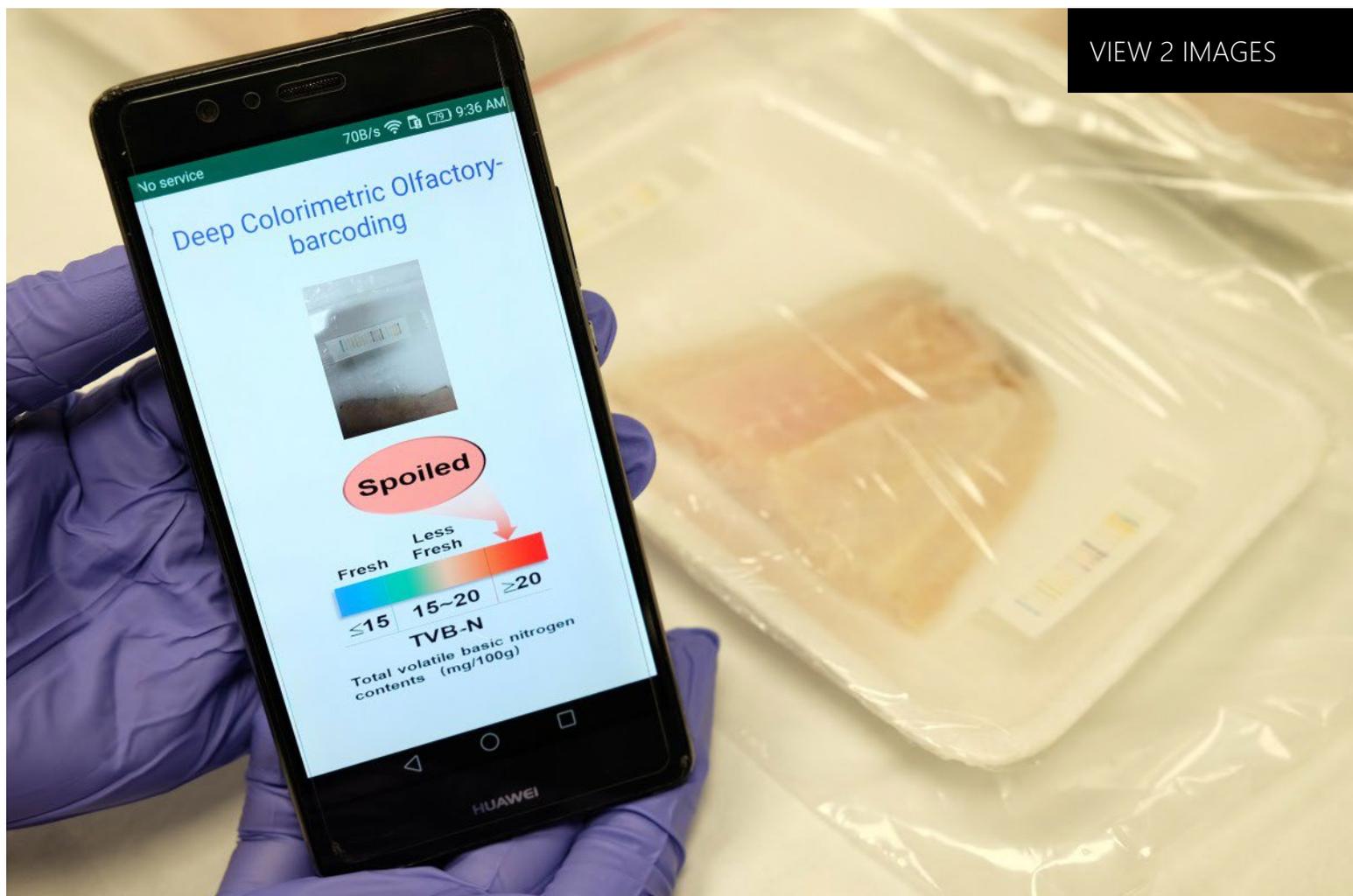


ELECTRONICS

# Electronic nose uses color-changing barcodes to reveal spoiled meat

By Nick Lavars  
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*Researchers have developed an electronic nose that can reveal spoiled meats, by analyzing unique color patterns in barcodes applied to packaging* Nanyang Technological University

More accurately knowing when our food is no longer safe to eat could help avoid a lot of wastage, and lately we're seeing how small, [discreet sensors](#) can tell us when these items begin to spoil. An international team of scientists has now put forward another solution, in the form of an electronic nose that relies on color-changing barcodes to track the freshness of different meats.

The development of the electronic nose was led by scientists at Singapore's Nanyang Technological

University, with the team focusing on the gases that are produced as meat decays. The solution is actually modeled on mammalian noses, where these types of gases bind to receptors that generate signals that are passed onto the brain, and interpreted by us as the odor of aging or rotting meat.

Instead of these receptors, the e-nose has a set of 20 bars made up of chitosan and a cellulose derivative, and which are loaded with different dyes. As the gases are produced by the rotting meat, the dyes react by changing color, creating unique patterns that can then be used as distinct signatures of the different states of the meats.

Alongside this color-changing barcode, the researchers also developed an artificial intelligence algorithm to act as the "barcode reader." This was trained on a catalog of images of different barcodes and color patterns, so the different scent fingerprints could be correlated with different levels of freshness.



*The development of the electronic nose was led by scientists at Singapore's Nanyang Technological University*  
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With the algorithm loaded onto a smartphone app and the barcodes glued to the packaging film of chicken, fish, and beef products, the scientists used their approach to assess the freshness of the different meats. The e-nose was able to detect spoiled meats correctly 100 percent of the time and fresh or less fresh meats with an accuracy of 96 to 99 percent. Overall, its accuracy is reported as 98.5 percent.

"These barcodes help consumers to save money by ensuring that they do not discard products that are still fit for consumption, which also helps the environment," says co-lead author, Professor Chen Xiaodong. "The biodegradable and non-toxic nature of the barcodes also means they could be safely applied in all parts of the food supply chain to ensure food freshness."

The team has filed a patent for the technology, and hopes to improve the system further to target other types of perishable food items.

The research was published in the journal *Advanced Materials*, while the video below offers a look at the system in action.



*NTU Singapore scientists develop AI-powered 'electronic nose' to sniff out meat freshness*

Source: [Nanyang Technological University](#)

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Nick Lavars

Nick has been writing and editing at New Atlas for over six years, where he has covered everything from distant space probes to self-driving cars to oddball animal science. He previously spent time at The Conversation, Mashable and The Santiago Times, earning a Masters degree in communications from Melbourne's RMIT University along the way.

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