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(57) Abstract :
Scent-aware intelligent devices have applications across multiple industries. For instance, an artificial nose can be used in the building maintenance sector to identify when a lavatory or office needs to be cleaned, or it can be used in the cosmetics sector to replace environmentally friendly ingredients in perfumes without affecting the scent. The hardware for this artificial nose is comprised of a microcontroller and an off-the-shelf gas sensor. The sensors are able to measure the concentrations of gases in the ambient air, including carbon monoxide (CO), nitrogen dioxide (NO2), ethyl alcohol (C2H5OH), and volatile organic compounds (VOC). The sensor is linked to a microcontroller, which reads, gathers, and feeds data from the gas sensor into the artificial intelligence model. The Artificial Nose "smells" by correlating specific scent categories (coffee, whisky. bread) with data inputs from a gas sensor about the concentration of gases (CO, NO2, etc.) in the air. This is done via a neural network. Next, the smell category and a visual cue indicating the model's level of confidence in its correlation are shown on the microcontroller screen. For every category of smell, a few minutes' worth of gas sensor readings were recorded in order to train the model. Then, each smell's "olfactory fingerprint" was identified by examining, for instance, the average, maximum, and minimum concentrations of the constituent gases over brief intervals of time (1.5 s). A fully connected neural network was then given these features as inputs in order to determine the relationship between the different categories of smells and the olfactory fingerprints. An artificial nose was created by returning the developed and trained neural network to the microcontroller.

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