**Similar Systems**

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**System 1:**

**Electronic Nose**

The motto of this E-nose is to introduce a device that can not only categorize fruits on the basis of their ripeness level but can also predict that how long will they remain in that particular stage and can also classify them. The Electronic nose is developed by using ME3C2H4 and raspberry pi 3 sensors, the ethylene gas is used to achieve the name and ripeness level of the fruits which is difficult for human being to do it manually. This nose will help the fruits to be exported to further distances. The idea was taken from Z.Zhang who constructed a sensor matrix with air sensors, different test were performed to analyze the freshness of beef product, The sensors TGS2610, TGS2600, TGS2611, TGS2620 and TGS2602 resulted show the freshness of the beef easily and accurately. Artifical Neural Network (ANN) based pattern recognition techniques are used for differentiating and classifying of electronic nose response data for different types of tea and spice. The electronic nose consists of : a container to place fruits in it, raspberry pi 3 which is a credit card size computer that has multicore, GPU, ROM, I/O, wifi ethernet and hdmi port. In addition to a 5x5 inch led screen that is fitted ontop of the container, and ME3C2H4 sensor to measure ethylene gas emitted from the fruit and temperature sensor to record temperature and humidity. ADC module is a 16-bit module used to convert ethylene sensor to convert the analog input into digital signal. In the software integration process, we maintain the datasets by using a python code in which the container is air tight having a fruit, the ethylene sensor will sense the ethylene emitted by that fruit. ADS takes the analog input from the ethylene sensor and converts into a digital signal, this signal is stored in a csv file. The Algorithm used was the knn algorithm to classify and categorize each ethylene gas emitted from the fruit.



**System 2:**

**Detecting moldy Bread using an E-Nose and the KNN classifier**

An E-nose is designed in this study to detect rotting bread. There are three components to the E-nose system. The hardware is the first section. In the hardware development process, a detector module, which was made up of sensor arrays and ADC is created. The second component is the software. development that includes preprocessing and pattern recognition MA TLAB is used to implement a recognition algorithm based on KNN. The KNN is used to categorize the bread as moldy or healthy. The final component that may be produced utilizing a USB to COM port device is the interface between software and hardware. The hardware of the designed e-nose is Odor Handling and Delivery Systems, Usually, analyzing the target gas is presented with some shortcomings. To circumvent these limitations, the delivery system employs a vacuum pump, a sample plate, and a sensor cell. The vacuum pump is used to refresh the air in the sensor cell for the baseline period as well as to pull the air sample via a sample dish. the baseline time is a component of sensor response. When the sensors are not exposed to any of the target odors, it employs reference gas to initialize the gas sensor and achieve a steady state. Furthermore, the pump might aid in the concentration of the target gas during the gas sampling procedure. Three gas sensors made by Figaro are used in this design. They are widely used to create gas arrays. sensors that rely on metal oxide semiconductors (MOS). Technology Table lists the sensors and their specifications. qualities of sensitivity A tin file is commonly used by MOS sensors. zinc oxide (ZnO), titanium dioxide (Ti02), and other materials that are made of tungsten oxide (W03) or silicon oxide (Sn02), created for a variety of uses. The gas sensors are capable of determining the gas concentration When sensors are made available. The conductivity of the sensor changes in response to the target gas. Depending on the concentration of the gas It sends the signal meeting with varying strength. The K Nearest Neighbors approach is employed in this study to categorize two distinct input bread varieties. It is both a simple and strong method for categorizing input data. This technique is a nonlinear classification technique. The technique works by estimating the distances between sample characteristics. It is necessary to assign the K parameter. If K is too high, for example, the issue will be simplified and the local knowledge will be lost. When K is small, however, the density estimate becomes too sensitive to outliers. The smallest error in the KNN classifier with k= 1 and an unlimited number of training data is never higher than twice the of the Bayesian error.

**System 3:**

**Fuzzy K- Nearest Neighbour (FkNN) Based Early Stage Fire Source Classification in Building**

The datasets used are odor signals obtained from an in-house metal oxide gas sensor-based low cost (IAQ) system consisting of oxygen (O2), the volatile organic compound (VOC), carbon dioxide (CO2), ozone (O3), nitrogen dioxide (NO2), particulate matter up to 10 micrometers in size (PM10), temperature and humidity sensors [2,20,21]. Figure 1 depicts the IAQ gas detecting array, often known as an electronic nose, employed in this study. The early fire discovery classifier was built using scents from several sources. The odor sources are made up of seven common fire sources and three common construction basic ingredients. Facts about the materials under consideration and their safety.