Food Spoilage Detection Using IoT

Link: https://www.researchgate.net/profile/Sandhya-Gogula/publication/368659794_Food_Spoilage_Detection_Using_IoT/links/63f365d719130a1a4a953e42/Food-Spoilage-Detection-Using-IoT.pdf

Summary

Since fresh food is one of the most essential elements for our living, therefore to detect the lifespan of food whether it is solid base or liquid base food, this paper's researchers conducted some experiments on several foods with fresh ones and spoiled ones at the same time. Here, they have used a MQ -4 gas sensor which basically detects the amount of methane gas. If the food is not within the range, then it will detect the solid food as rotten whereas for the liquid food, they used a pH sensor to measure the pH level. In liquid food like milk or water, if one of them is contaminated with microorganisms, then the pH level will be higher than 7, resulting in alkaline water or milk. So, we can say that the tested milk or water is spoiled.

Methodology

- First of all, they have used Arduino Uno and MQ-4 gas sensors. Now if they take a solid food like an apple, then the apple's methane level is within the range, then it will detect it as fresh. If it is higher than the level, it will detect food as spoiled.
- Secondly for detecting the liquid food items, they have used here pH level. If the pH level is acidic, then it is fresh. If it is an alkaline base, then it is already rotten.
- For taking infos, a wifi module is used and for apps, Blynk has been installed.

Components

Components list are as follows:

1. Arduino Uno
2. MQ 4 methane gas sensor
3. pH sensor
4. Power supply
5. ESP8266 WiFi module
6. Buzzer
7. LCD display
8. 12V adapter

Findings

One of the findings can be summarized as liquid food item's spoilage tests can be easily and cost effectively done by checking pH level.

Moreover, methane gas sensors can determine the solid food freshness and rottenness.

Novelty
Here, the novelty of this paper is that they have used only two types of sensors here: one is the MQ 4 methane gas sensor and the other one is the pH sensor. They can detect both solid and liquid foods freshness and rottenness at the same time in a cost effective manner.

Analysis
For checking solid food freshness, they used MQ 4, since methane gas contains 300-10000 ppm and every food has its own methane gas range. So they checked if the level is higher than the given range or not. If the level is high then food is rotten. Conversely, they measured pH level (0-14 range) for water, milk etc. If pH level is above 7, then milk or water is spoiled.

Research Gap
The authors can also include ethylene gas sensor or temperature/ humidity sensor and they could use Convolutional Neural Network for higher accuracy.

Problems Faced
While going through the paper, I didn't find any solid food name in which they conducted the entire observation.

Future Work
In the future, aside from using such sensors, othera can also combine other sensors with deep learning methods and CNN algorithms.