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# Analysis of Food Using Embedded and IOT

***Mr. S. Naveen Kumar***
*Assistant Professor*
*Department of Electronic and Communication Engineering,*
*Mohamed Sathak AJ College of Engineering, Siruseri, Chennai, Tamil Nadu, India*
***Email:*** *naveen.shank9898@gmail.com*

***ABSTRACT***

*Here I am going to determine the freshness and quality of food in small scale and large scale industries during the time of production. This is been achieved by the analysis of physical and chemical properties of food like temperature, humidity, pH values, texture of food, and gases released. Once the analysis is done the respective output which is been obtained will be uploaded to" thing speak". From thing speak we will get a notification as a massage format in twitter account saying whether the food is good or bad. For more accuracy the output can be viewed in graphical and mat- lab analysis format*

***Index Terms:*** *Food analysis, twitter, thing speak, mat-lab*

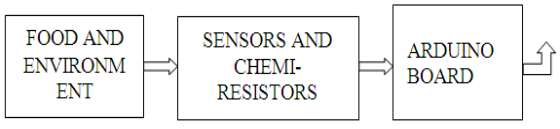
## INTRODUCTION

Food is one of the major components for the existence of man as well as for all living beings. It is difficult to think of a day without food and water. Each day we are consuming different types of food which contain a variety of ingredients and chemicals in it. But when we consider its freshness and quality we are confused whether it is edible or not. To avoid such an issue we are using a method called **food analysis using embedded and internet of things.** This method is mainly introduced in large scale and small scale industries during the time of manufacturing and packing the food. By introducing this method we can not only detect whether the food is edible or not but also to check how much food is been wasted in each unit during the time of manufacturing. This method is achieved by using sensors, cloud analysis, and twitter. Once the analysis part is done the output is uploaded to **thing speak**. And from thing speak we connect to twitter for getting notification whether the food is edible or not as message. By doing this method we can enhance the quality of food products which are available in the market.

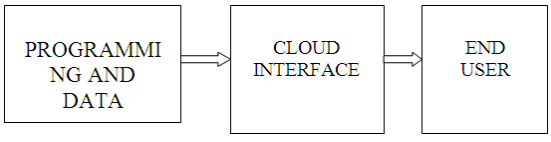
The most useful hints in this method are we can identify the freshness and quality of food which is been consumed by the people in day to day life. By this we will come to know whether the food from small scale industries and large scale industries are edible or not. This method can also identify how much food is been wasted in small scale and large scale industries during the time of manufacturing. Here the output and feedback of food analysis will be displayed in thing speak followed by twitter. For more accurate response the output can be also viewed in mat lab analysis format.

## ARCHITECTURE OF THE ANALYSIS

### Transmitter Section




### Receiving Section



The above block diagram represents the architecture of the food analysis. By developing such a block diagram like this we can not only implement the analysis in a step by step manner but also to understand the concept of project in a quick and easy way.

## GRAPHICAL AND MATLAB ANLYSIS

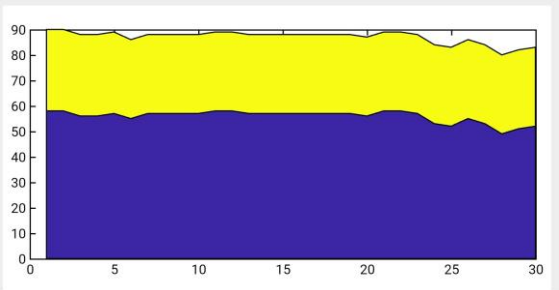



***Fig 1:*** *Matlab Analysis*

The above picture represents the mat lab analysis of the food analysis


***Fig 2:*** *Temperature Analysis*

The above picture represents the real time graphical analysis of temperature factor of the food

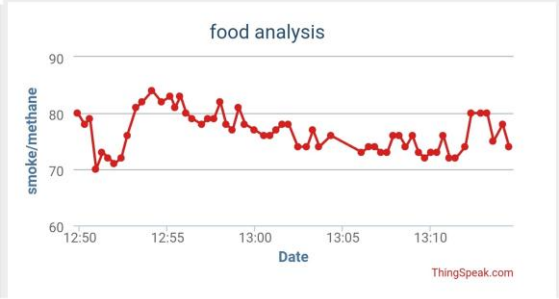



***Fig 3:*** *Smoke/Gas Analysis*

The above picture represents the graphical representation of smoke/gas which is been released from food during the time of production and manufacturing. This plays a major role in detecting the freshness and quality of food because methane gases (CH4) are one of the major gases which are released from a decayed food or from food that are not fresh.


***Fig 4:*** *Humidity Analysis*

So by analyzing this factor we can detect whether the food is fresh or not. The above picture represents the graphical representation of humidity content present in the food.

## METHODOLOGY USED FOR ANALYSIS

The above food analysis is mainly done by analyzing the physical and chemical factors of food. In the beginning stage the food will be detected by the following sensors like MQ4, DHT11 and MOISTURE SENSOR for detecting gases released, temperature/humidity, and total amount of moisture in the food respectively. After the analysis of all the factors mentioned above the respective output which is obtained will be uploaded to thing speak where we can view the output in graphical and mat lab analysis format. Once the analysis part is completed we will get notifications in twitter as a message format showing whether the respective food is edible or not. By this method we can identify the freshness and quality of food products which are supplied in the market, also we can identify the wastage of food products by counting the amount of products which are been rejected from the unit during the time

of manufacturing due to bad quality.

***FOOD USED FOR ANALYSIS***

In this food analysis, I have mainly used three types of food samples and they are packed meat, packed sweet, and packed soft drink. The above foods are been tested in two different stages. First stage of testing is made when the food samples are in edible state. The values occurred are considered to be as the reference value. The second stage of testing is made when the food samples are in rotten state or in other words when it is in decayed state. The values obtained after the testing of rotten food is compared with the reference value that is the values of edible food.

**RESULT OF ANALYSIS**

The main concept of this project was to analyze the freshness and quality of the food which are consumed in our day to day life. As a result we have analyzed the freshness and quality of food products and the analyzed output is been uploaded to cloud followed by notification as a message in twitter which reveals whether the food is edible or not and based on this analysis we can come to a conclusion about the freshness and quality of food products which are manufactured from small scale and large scale industries.

***Table 1:*** *Values of Edible Food*

| Sample Food(Ediblestate) | Humidity-Temperature | Methanegas | Moisturecontent |
|---|---|---|---|
| Packed Chicken | 78%-84%,<br>27*C-37*C | 267ppm-301ppm | 329m3-359m3 |
| Packed Sweet | 52%-59%<br>27*C-37*C | 108ppm-190ppm | 20m3-30m3 |
| Packedmilk Drink | 94%-96%<br>27*C-37*C | 192ppm-267ppm | 337m3-508m3 |

***Table 2:*** *Values of Rotten/Decayed Food*

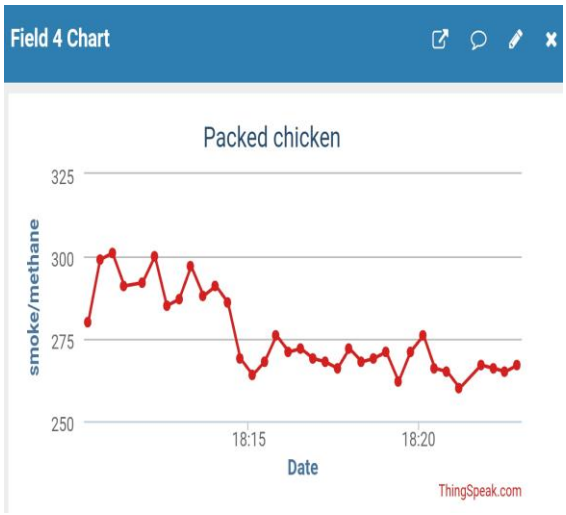
| Sample Food(Decayed) | Humidity-Temperature | Methane-Gas | Moisture-Content |
|---|---|---|---|
| Packed Chicken | 80%-95%<br>27*C-37*C | 270ppm-416ppm | 33m3-94m3 |
| Packed Sweet | 61%-65%<br>27*C-37*C | 228ppm-367ppm | 20m3-29m3 |
| Packedmilk Drink | 68%-89%<br>27*C-37*C | 181ppm-272ppm | 439m3-631m3 |

The following graphs are represents the values of moisture factors in edible packed chicken.


The following graph represents the temperature value of edible chicken

The following graph represents the humidity value of edible packed chicken.


The following graph represents the value of methane gas content in edible packed chicken




The following graph represents the humidity values of edible packed sweet


The following graph represents the temperature value of edible packed sweet


The following graph represents the methane gas value of an edible packed sweet

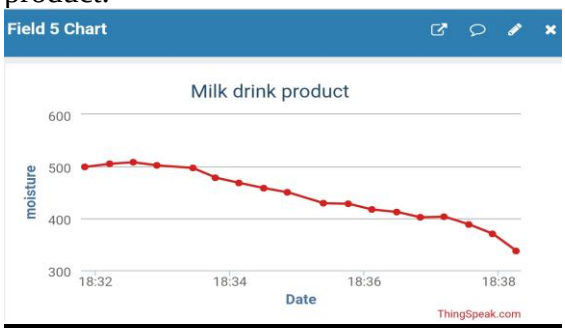

The following graph represents the moisture values of edible packed sweet.


The following graph represents the humidity value of an edible packed dairy product.

The following graph represents the range of temperature value of edible packed dairy product.


The following graph represents the range of methane gas value of edible packed dairy product.


The following graph represents the moisture value of edible packed dairy product.




The following graph represents the range of humidity value of decayed packed chicken.


The following graph represents the range of temperature value of decayed packed chicken


The following graph shows the range of methane gas value in decayed packed chicken


The below graph represents the range of moisture value in decayed packed chicken


The below graph shows the range of humidity value in a decayed packed sweet

The below graph shows the range of temperature value of decayed packed sweet.


The blow graph shows the range of methane gas value of decayed packed sweet


The below graph represents the range of moisture values of decayed packed sweet.


The below graph represents the range of humidity value in a decayed dairy product.


The following graph represents the range of temperature values of decayed dairy product.


The below graph shows the range of methane gas values in decayed packed dairy product.


The below diagram represents the range of moisture value in decayed packed dairy product.


## CONCLUSION

Thus we can conclude by proposing that the above method of analysis can detect the freshness and quality of food products which are manufactured from industries and can be implemented in small scale and in large scale industries for detecting the freshness and quality of food. In future this

method of analysis can be implemented in all food industries for the betterment of the food products which are manufactured from the industries. Even though the values may not be that accurate when compared to chemical test analysis but up to certain extent this method can be used.

**FUTURE ENHANCEMENT**

1. The proposed model can be made portable which can be carried by people to anywhere they want in order to check the freshness of their food.
2. Based on the notification received an analysis is done followed by a review system which will be implemented.

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