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A Device for Detecting the Food Freshness.

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Abstract:Food is the most vital thing for every human being living on earth and also plays an significant role in our lives. All the same many diseases are caused by the ingestion of unhealthy and rotten food. India is a developing nation consisting of 1.37 billion people. The ingestion of safe food is the most important requirement.This paper explains the use of different sensors for detecting the food quality. This device uses a temperature and humidity sensor along with pH, gas sensors. The Blynk program helps with knowing the values gathered from sensors. This sensor system can also be implemented in common households, and food consumption made easier using the Blynk application.

Index Terms: Food quality, contaminated food, pH sensor, gas sensors, temperature and humidity sensor.

I. INTRODUCTION

The food we eat is made up of various chemicals that are used in the different stages of food processing. Of example, the foods we use are processed using a combination of pesticides and fertilizers. These chemicals are detrimental to human health. Preserved food products are preserved using different preservatives that keep them fresh without spoilage of longer periods of time. Many scientists, technologists and managers in the last few years have largely contributed to finding a solution to test the quality of the food.Developing a program that will help people recognize the freshness of food or the quality of food products is necessary. The proposed system of this paper offers good quality (freshness) control in food.It is based on sensors of pH, of air, of temperature and of humidity. Gas sensors play a critical role in detecting the gases that have emerged from a food object and in the food sample they have contamination. Quality of the food element is measured based on a combination of the sensor outputs.

II. LITERATURE REVIEW

Human diseases caused by microorganisms borne by food are considered to be harmful.

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The regular usage of a single depiction is required essentially to imitate the side effects of various ailments linked to the sustenance.The manual method involves testing fruits and food products by color testing and smelling by human force but food checking is costly, time consuming, and less effective due to human errors and environmental effects.The intelligent approach provides much more details than traditional food testing systems, which are limited to weight, suitable volume for user-prepared vacuum-packed food. This builds on the IOT paradigm and is capable of developing a network of interconnected devices[1].The aim is to use bio and electrical sensors to assess the freshness of food. A smart device that can measure the freshness of household foods such as dairy products, meat and fruit. These sensors show physical and chemical interactions with chemical compounds when flowing over or in contact with sensors.The processing method for images is the use of computer algorithms to process images. To test the consistency of the fruit Omit et al. used colour, shape and texture to sort tomato fruit by color (redness), height, shape, circularity, maturity and defects[3].The analysis of the texture indicates whether the food given is in solid, liquid or semi-solid form. Texture value determined by LBP (local binary pattern) Then the regression modeling process will detect the estimated nutrient content in the food. Only the detection of nutrient in the food is done in this step[6].An electronic term for the nose used to detect food freshness by testing optical and gaseous properties of fruits. Number of different sensors for multi-sensor arrays built[4].The devices operate by increasing the mass of the piezoelectric sensor layer, the absorption of gas results in a change in the resonant frequency when exposed to a vapor[10].

III. EXISTING SYSTEM

Sensor should be physically attached to the food, or the reading error will occur. If the user chooses a food and does not add it to the device, the sensor will read at the open terminal which will result in the wrong result.
The texture analysis measures whether the food component is solid, liquid or semi-solid in shape. The obtained texture value measured by LBP (local binary pattern). The regression modeling process can only detect the approximate content of nutrients in the given food item. Only the detection of nutrients in the food item is achieved in this approach alone.

IV. PROPOSED SYSTEM

The proposed paper design, below block diagram shows the computer layout. The computer consists of an Arduino Nano microcontroller, extension board, and some electrical sensors such as pH sensors, gas sensors(MQ-3 and MQ-135).
The food to be tested is connected to the respective sensor and the user can receive notification using the BLYNK application.

The microcontroller takes sensor readings and determines outcome with a predefined algorithm.
The result is in the form of the values derived from the respective food items. There is a set of values which are defined and which the food items can not surpass in order to eat.

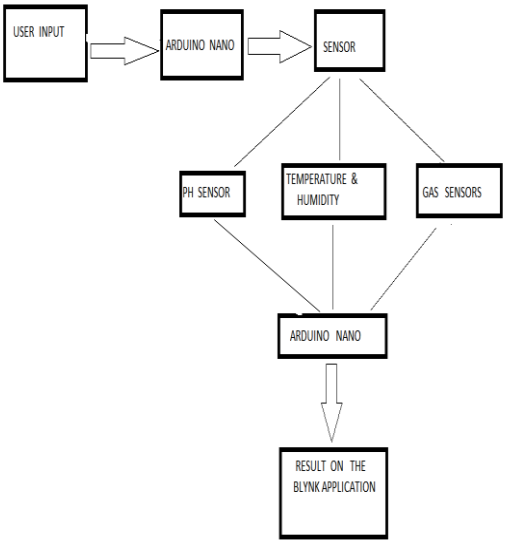

Figure 1: Block Diagram of Proposed System

V. FOOD PARAMETERS

Freshness of food is the most significant property of food products which are eaten. Different sensors identify and test the various parameters of the food products.

A. PH

The hydrogen potential (pH) is used to determine the acidity or alkalinity of a given solution. Commonly calculated solution on a scale of 0 to 14. It is very important to calculate standard pH of diary products such as milk, and yogurt.
The dairy norm pH is around 6.5-6.7. About this pH value level a pure fresh milk should be round. A pH-value increase of 0.3 reflects a doubling of acid concentration[11].
Variations in pH can affect the flavor, taste and shelf-life of dairy products as milk is the main ingredient in any form of dairy food item. For dairy products pH sensor is the best option.

B. Ethanol

Ethanol is a substance which occurs naturally also known as alcohol. Ethanol plumes may be chemically used to grow the fruits. The ripening of fruit is correlated with improvements in the quality of colour, taste, sugar and ethanol[7].
When fruits like bananas begin to mature their chemical properties with the processing of various gasses such as ethylene and small quantities of ethanol, this quantity increases over time. The production and concentration of ethanol in bananas is detected with a gas sensor.Almost all the fruits has ethanol gas which can be detected by MQ - 3 sensor.

C. Temperature & Humidity

Temperature plays an important role in determining a food item's freshness. There are few bacteria present which help food items maintain freshness. Therefore, they are stored in cool places to protect healthy bacteria and food products.

VI. RESULTS

Case 1: Fresh Milk

pH	6
MQ-3	0
MQ-135	0
Temperature	60

Table 1: Sensor Results for Case 1

Case 2 : Spoilt Milk

pH	10
MQ-3	0
MQ-135	0
Temperature	36

Table 2: Sensor Results for Case 2

Case 3 : Spoiled Banana

PH	0
MQ - 3	Gas is present.
MQ - 135	0
Temperature	25

Table 3 : Sensor Results for Case 3

VII. CONCLUSION

Food poisoning has become a major problem in society, in order to mitigate and avoid this disease, we use electrical sensors to assess the freshness of food items such as fruits and dairy products.The obtained values are shown on the BLYNK application with the implementation of pH sensor, gas sensors, and temperature & humidity sensors interfaced with the Arduino Nano. The values developed will help to test whether the quality of the food is good or poor with proper values.
The proposed framework of the one mentioned in the paper can be applied in restaurants, households and even factories of small scale. This program offers a simple and easy method for tracking food quality and also reducing possible wastage. To a certain degree, food poisoning and other diseases may be avoided.

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