FOOD SPOILLAGE DETECTION SYSTEM

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Abstract: The food quality tracking system based on the Internet of things is an integrated monitoring and management information system, which consists of intelligent hardware technology, radio frequency identification technology, food safety technology, network technology, as well as other practical high-tech techniques.
The food we consume provides nourishment and gives energy to our body which helps us to perform our day-to-day activities. A healthy and fresh diet is the most important way to keep ourselves fit.
The food items kept at room temperature undergo rapid bacterial growth and chemical changes in food. Eating unhealthy food can cause several food borne diseases which may harm our health.
This IoT based system aims to detect the quality and freshness of food using biosensor and electrical sensors. A smart system can detect the freshness of household food like dairy items, fruits, and food items

Keywords – Food spoilage detection, Mobile Application, IOT.

I. INTRODUCTION

Today, in most of the hostel mess and government school's kitchen everybody is getting affected by the food they consume.
Milk, fruits like banana and other foods used in daily life, as all of them do not offer quality since their moisture harmful gases vary from time to time.
To ensure food safety it should be monitored at every stage of the supply chain. It leads to release of a lot of gaseous pollutants.
Harmful effects of pollution include mild allergic reactions such as irritation of the throat, eyes, and nose as well as some serious problems like bronchitis, heart diseases, pneumonia, lung and aggravated asthma.
It is necessary to monitor food quality and keep it under control for a better future and healthy living for all.
When foods start decaying it produces some gases like ethanol in it. These gases increase with time. The purpose of this systems to detect early food spoilage before signs are visible.
Based on the research, the hypothesis is that, as food decay, they emit certain gases which can be detected by Arduino based sensors, and the levels of these gases will vary depending on the extent of the decay.
In this project we will monitor gas emission using MQ gas sensor.
The sensor data is also displayed on LCD interface with NodeMCU controller and also displayed on IoT device.

II. OBJECTIVES

The objective of this proposed system is to make an electronic device integrated with biosensors that can detect food spoilage.
Monitoring quality of Food using gases emitted by food.
Display all parameters on the LCD. Send information to mail by using IOT platform. The objective of this proposed system is to make an electronic device integrated with biosensors that can detect food spoilage.

III. LITERATURE SURVEY

[1] Paper 1: "EFresh – A Device to Detect Food Freshness" September 2018.
In this paper authors Naveed Shahzad, Usman Khalid used biosensor and electrical sensors to check out the freshness of food. A smart system that may sight the freshness of food like farm things, meat, and fruits. The identification and choice of hydrogen ion concentration device, moisture sensor, and the Gas sensor is used to develop a wise food freshness detector that ensures the freshness of food and tells whether or not to eat it or bin it. An android application is developed to select the type of food to be checked.
The system ensures the quality of food, whether itis good for eating or not. It does not provide the facility to complain if the device does not provide accurate results. The feedback may recover the issues related to the device.

[2] Paper 2: "Detection and classification of bacteria in common street foods using electronic nose andsupport vector machine"2017
This paper aims to design an electronic nose with gas sensors that will detect three common types of bacteria on street foods, namely Enterococcus faecalis, Escherichia coli and Staphylococcus aureus; and to classify if the said bacteria are present in the pre-cooking stage and the bacteria are still present after cooking. The electronic nose system detects the bacteria in the sample street food during the pre-cooking stage and Support Vector Machine detects the bacteria in the sample street food during the post cooking stage. This system lacks the detection of other parameters like moisture, gas level in food.

IV. METHODOLOGY

1. BLOCK DIAGRAM:
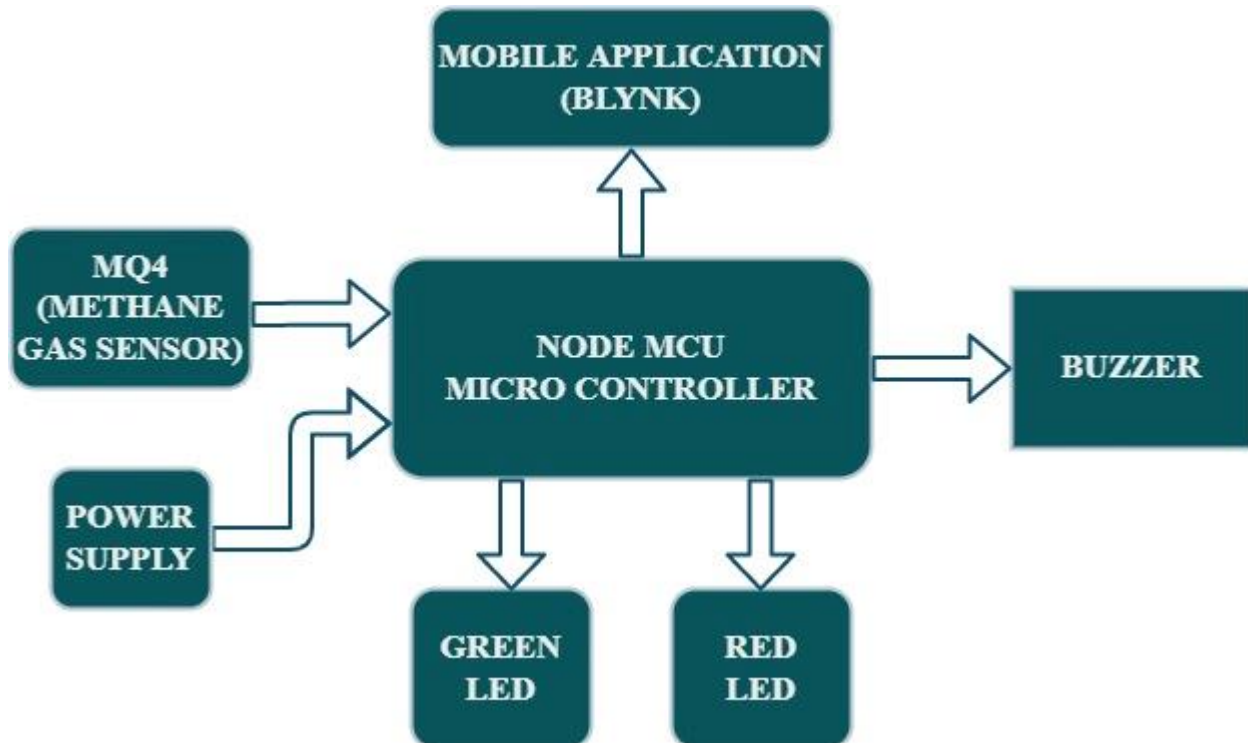
In this system we will monitor weather parameters like gas emission based on the food spoil. For this purpose, we have used MQ gas sensor. this sensor calculates emission of gasses an environment and gives digital output to the controller which is NodeMCU with inbuilt Wi-Fi.
These all sensors will connect to the Node MCU controller which will take sensors data and send a mail as gases are detected. Node MCU controller has inbuilt Wi-Fi facility to connect with internet and give access to IOT devices.
Engine driver circuitry also available for controlling the ac devices as gases are detected.

2. CIRCUIT DIAGRAM:
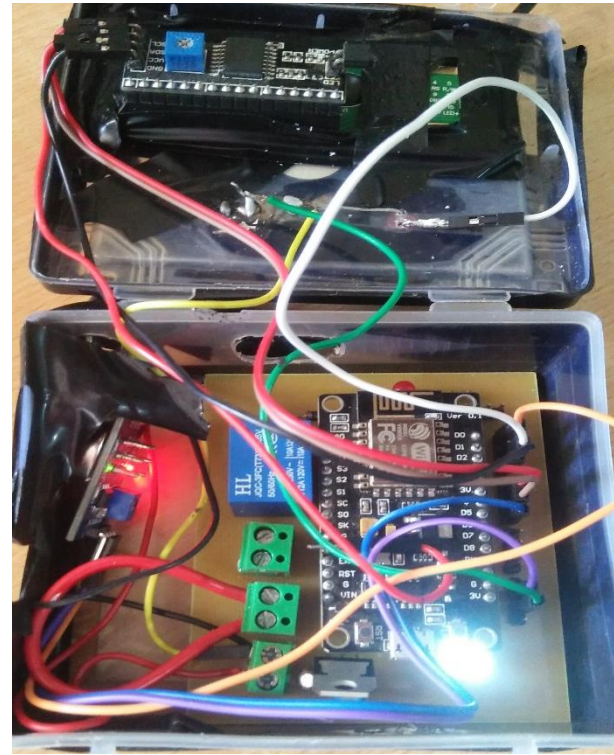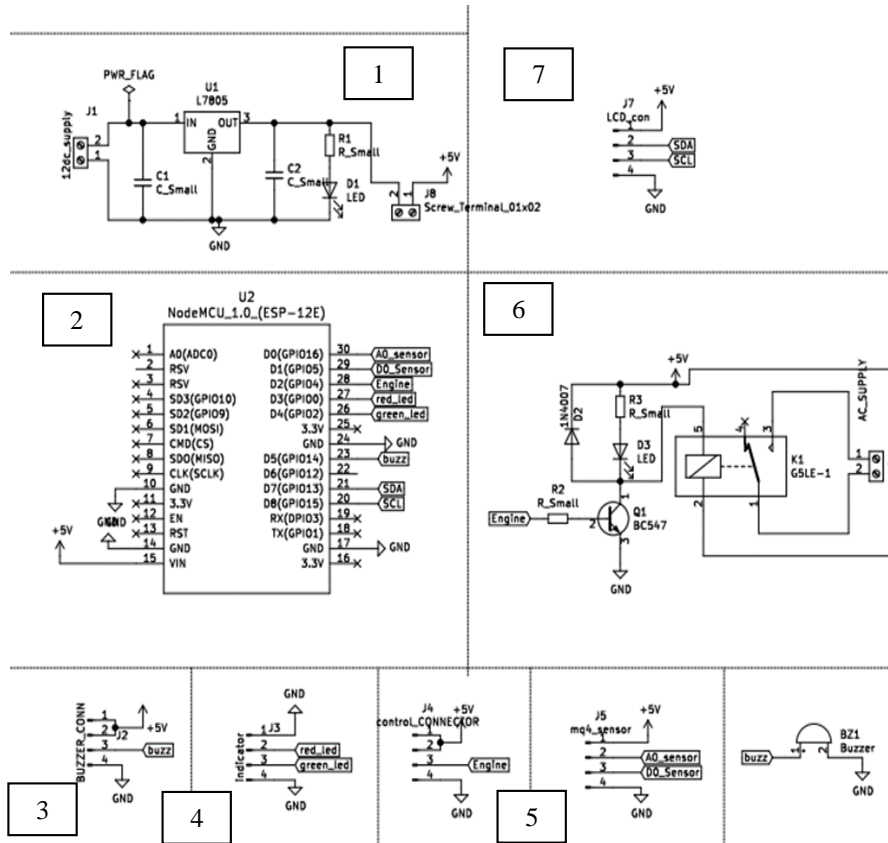
Original Circuit Diagram

1. Power Supply Circuit – From the power supply circuit we take a 12v power supply however we require only 5v power for this circuit, but we take a higher voltage because there are fluctuations in the power coming from the power supply circuit so to ensure that the voltage must be higher than the required voltage i.e., 5v we take a higher voltage power supply.
2. NodeMCU – This is a microcontroller which we are using in our circuit because it is efficient than the other microcontrollers.
3. Buzzer – We have included a buzzer in our circuit which will start buzzing if the food is spoiled or not.
4. LED's – We also have two LEDs in our circuit which will indicate that the food is spoiled or not. Green LED will indicate the food is not spoiled and the red LED will indicate the food is spoiled.
5. MQ4 Sensor – The MQ4 sensor is a methane gas sensor which we have used in the project because the food items after getting spoiled emits methane gas by which we can detect that food is spoiled or not.
6. Relay Circuit – We have added a relay circuit in this project in order to provide an extra feature for a future scope of this project.
7. LCD – We have added LCD in our circuit in order to display the output that the food is spoiled or not.

3. PCB LAYOUT:
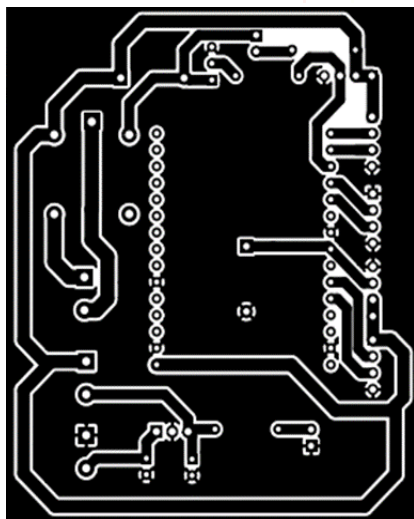
PCB Layout
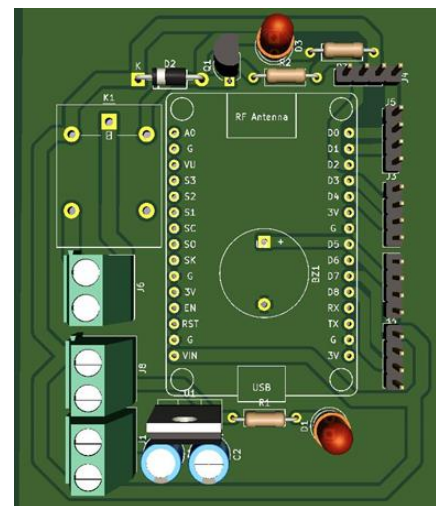
3D Visualization of PCB

V. RESULT AND CONCLUSION

Starting of the Project Circuit displayed on the LCD

Food item checked and the system gives output that it is not spoiled.

Food item checked and the system gives output that it is spoiled.

We have successfully connected all the components in the food spoil detection system and the results are accurate.

If the methane gas sensor records the volume of the gas item present in food item more than a set level it gives output "Food Spoil" and if does not exceed the set level it gives output "Food Not Spoil".

The output of sensors is successfully displayed on LCD display as shown in above diagram.

These are the readings of our health monitoring device.

VI. REFERENCES

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