



## IOT BASED FOOD SPOILAGE DETECTION SYSTEM USING ARDUINO

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### **ABSTRACT:**

In the modern era of technology and with increasing dependency on smart techniques like mobile phone, there is requirement of solving daily life tasks in a quick and easy ways. The smart technology is becoming then end of hour to take control over the different tasks at home and industries. This paper is based on food detection system using Arduino. The system proposed is based on detection and recognition algorithms. The main function of the algorithm is to automatically detect the smell and generates message through that the food is spoiled. The paper deals with the technologies that use Arduino which employs the programming and sensors. The key feature of computer vision is Arduino for reasons like marketability & law-abiding apps. And secondly after lot of research the accessibility of realistic technologies. This area of research is to find an important place among different type of researchers and scientists like computer, food & different organizations. The microcontroller panel has the capability to perform functions which include interpreting inputs and outputs and make the sensor to activate. Generally, food is stored in the refrigerator that lowers down the bacteria rate of production. Certain items which are perishable or not used for long term storage are to be detected and informed to the user. This paper is basically discussed to solve the food spoilage through sensors by continuously sensing the signals from the food and also sending the alert message to the registered mobile phone.

**Keywords:** Spoiled food detection, Arduino, MQ-3 gas sensor, DHT-11 Sensor, LCD display, Wi-Fi ESP8266, LED.

### **1. INTRODUCTION**

In modern times the technology is being developed to ease the day-to-day work. The technology is enhanced and upgraded for overall development of society in the world of globalization and urbanization. As today the health issue is one of the major reasons with effect on human life. The quality of food lies in its cleanliness and sustain for long time. The quality of the food should be checked to prevent it from spoiling under different environment conditions like temperature, humidity, vegetable/fruit characteristics, which will be helpful to check quality through different techniques. Most of the health problems leading to illness sometimes death is due to eating of unprepared or pink flesh of the animals which when rotted becomes noxious. The

sensor senses the food quality through change in its colour. There are various signal processing and pattern.

The rotted or not fit for usage food causes a major food related illness called as food poisoning, this is one of the diseases along with various other such diseases related to spoiled food. One of the main objectives of the food spoiler detector is that it will detect the gas released from the spoiled food and tell the user that the food is spoiled and take a look over food. The research scholars present days are now found in caneware of research which is related to recognition of food. The methods employed were very costly to install. The technique for detection of spoiled food is much easier using two approaches. There are different approaches for the detection of the various gases that are released from food. The proposed system is based on Arduino UNO which is a recognized prototyping board which is interfaced with different sensors The Wi-Fi modem ESP8266 which acts as a switch is interfaced with the Arduino to associate it to the web. The LCD panel will show the output from the sensor which is connected with the Arduino board.

## **2. RELATED WORK**

There are several techniques by which food spoilage can be detected like inspection of quality and monitoring using group of sensors on a plate. The other technique is using Internet of Things by measuring the features of product. There is similar technique based on IoT along with Microcontroller i.e., using some sensitive resistor based on force which detects the absence of important condiment n pantry. Then technology based on low energy Bluetooth is also there using mobile system like GSM to send the data on web. Technology based on sensors like gas sensors along with some method to transfer the information to the user is also there. Biosensors technology is also usable due to its specific nature. As mentioned in the paper perishable products monitoring & detection of its spoilage, IoT again play a lead role. pH sensors can also be employed for smart monitoring along without side integrated system to provide the necessary data about the quality of food item Another new development in this area is electronic noses which again uses some kind of gas sensors. For highly sensitive detection of viruses & bacterial growth on food radio frequency sensors like RFID is used to monitor pH changes in food wirelessly again pH sensors are used, they are operated without battery The Fig.2 shown is a Arduino Board with various type of static and dynamic memory in the form of Flash, EEPROM and SRAM. The Arduino can be interfaced with various options of internet whether short or long range.

## **3. METHODOLOGY**

The electronics of the system is an embedded system based on microcontroller like Arduino UNO which is a prototyping board. The Arduino board is interfaced with gas sensors like MQ3 to distinguish smell. The web switch which is a web modem connects the Arduino board to web net. The microcontroller board Arduino Uno along with food detection sensor MQ3 senses the gases coming out from the rotten food. The signal is transferred through a Wi-Fi device ESP8266AS. The signals are sent to the user through a server.

## A. BLOCK DIAGRAM OF THE SYSTEM

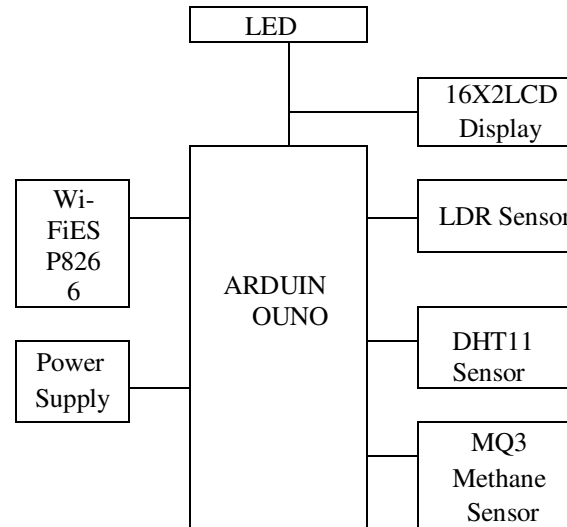


Fig.1. Monitoring Device System

Fig.1 shows a monitoring device system which displays food quality, is an embedded technology device based on a platform board Arduino UNO. The gas sensor like MQ3 is interfaced with Arduino board senses the typical gases from food. The user gets the information through the Wi-Fi modem integrated with the board. The board reads the inputs, activates the sensor which is highlighted by a RED LED, the information of the sensor is sent through the modem and is shown by the GREEN LED. The programming done on the board can control and interact with no. of sensors which can sense many parameters.

## B. ARDUINO UNO



Fig.2. Arduino Board

The Arduino is the microcontroller board easy to operate and used for developing devices that are digital, sensory circuits and devices which can interact. Using programming language generally C or C++ is used to control and interact with no. of sensors to measure different parameters. The board have different input, output pins and other pins for interfacing like LCD and Wi-Fi modem.

### **C.MQ3 GAS SENSOR**

Gas sensors offer segregation along with compactness, small consumption of power, less response time, large range of operational temperature, high proficiency, in this series MQ3 is very good gas sensor having very good sensitivity to combustible gas in wide range. It is highly sensitive to natural gas. Therefore, MQ3 gas sensor is used in a food spoilage detector to sense a methane and various gases. It has a long life and is cheaper in comparison to other sensor with simple drive circuitry with great portability shown in Fig.3.



Fig.3. MQ3 Gas Sensor

### **D.Wi-Fi Modem-ESP8266**

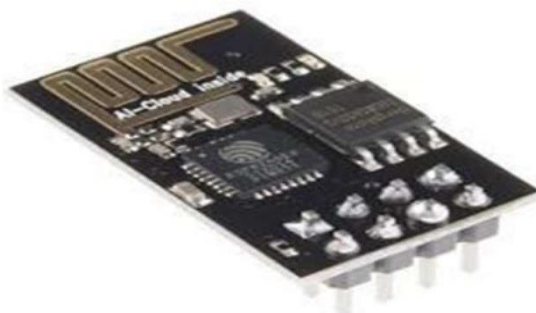


Fig.4. Wi-FiModemESP8266

Analog sources of Wi-Fi ESP 8266 module shown in Fig. No. 4 can host number of applications and is cheap in terms of cost which can make the task of connecting the Wi-Fi easy through different commands.

### E. 16x2LCDDISPLAY

An LCD is an electronic display module which uses liquid crystal to produce visible image shown in Fig.No.5. The 16 X2 LCD display is a very basic module commonly used in circuit. It translates a display 16 character per line in 2such lines. In this, LCD each character is displaced into 5x7matrixes.TheLCDdisplayisinterfacedwiththeARDUINO to flash the

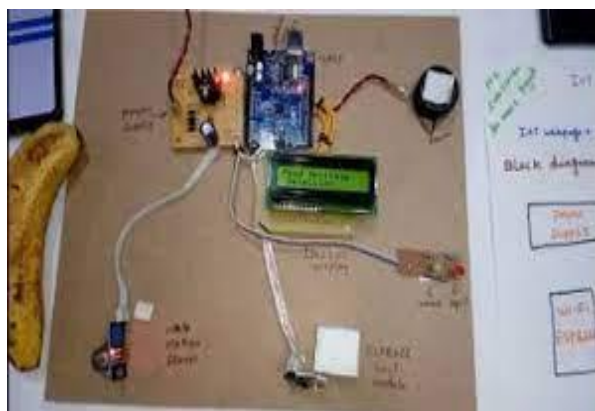


information sent by the gas sensor regarding the quality of food. In this way the user gets the information and proper monitoring is possible for different kind of food.

Fig. 5. LCD Display

## 4. RESULTS & DISCUSSION

The Arduino based gas sensors were able to sense the spoil age such as bad smell from the food. The level of emitted gas can be correlated with how much food is degraded. The system which includes embedded system along with sensors are sensitive to sense low emissions of the gases like ammonia and methane emitted due to spoilage of food article. The level of gases emitted will vary depending on the decay of food. The detection of the gases can be used to control the decay of food. The humidity sensors can be employed to sense the humidity content in the food. Various other sensors like temperature, pressure, moisture etc can also be used to detect bad virus and bacterial growth in the food.



## 5. CONCLUSION

The early detection of the gases from different food items like ammonia, methane etc. can help the gas sensor are able to detect gas emission from food items even before the presence of any visible sign of spoilage. The consumer gets the information about the food item wherein he can monitor the perishability of that food item. This will help in maintenance of health and prevents the consumer from consuming bad food. The use of technology helps in food processing industry where in they can mention the duration of perish ability of the food item on the packets of that proper control on consumption can be done. The monitoring and detection of the food items is very necessary as most of the consumers buy packed food from the malls where in date of expiry is important parameter.

## 6. FUTURE SCOPE

The scope of the proposed system can be expanded by including more products like dairy, fruits. The system can incorporate different other sensors like pressure, temperature, moisture etc. Different other techniques like nano technology, artificial neural network can be also be used for further improvement in result. These techniques can use this data for better result in future about food spoilage

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