IOT Based Food Spoilage Detection System

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ABSTRACT

In India most of the diseases caused by borne illness, resulting in more number of hospitalizations and deaths are happened. Food safety and hygiene is a major concern in order to prevent the food wastage. The quality of food needs to be monitored and it must be prevented from rotting and decaying by the atmospheric factors like temperature, humidity and dark. Therefore, it is useful to deploy quality monitoring devices at food stores. In this project a similar food quality monitoring device will be designed that will keep watch of environmental factors like temperature, humidity, alcohol contents and exposure to light. The device is built with the help of Microcontroller. The Microcontroller is interfaced with various sensors like DHT-11 to monitor temperature and humidity, gas sensors like MQ3 & MQ6 to detect the gaseous like alcohol, LPG, Butane contents and LDR to measure exposure to light. Buzzer is connected to warn the user. With the help of wi-fi module information is also available on website and LCD screen is connected to microcontroller to display information.

Keywords: Microcontroller, Gas sensor, DHT-11 Sensor, Wi-Fi module.

INTRODUCTION

Today, in most of the hostel mess and government schools' 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. The potential of hydrogen (pH) is used to specify the alkalinity or acidity of milk. Variation in pH can affect taste, flavor, shelf-life of dairy products. When foods start decaying it produces some gases like ethanol, alcohol in it. These gases increase with time. The purpose of this system is to detect early food spoilage before signs are visible. As food decay, they emit certain gases which can be detected by

sensors, and the levels of these gases will vary depending on the extent of the decay. Increased water content in food items changes its chemical composition and pH level. The measurement of parameters like pH level, moisture, gas level in food items is necessary to determine freshness and quality of food. It serves the purpose of consumer health protection by maintaining the required standard to preserve the quality food. The status of the food is not fresh all the time. The proposed system will help people to identify the freshness of food or the quality of food items. Our purpose is that the system may give better quality and freshness in food. To avoid illness, we use sensors to determine the freshness of household food items like dairy products, fruits, and other food items. An early detection system can help prevent the rotting item from affecting the remaining produce. Even in our households, we often forget about some food item stowed away in our refrigerator drawer hidden under other items, until it turns smelly and moldy, and needs to be disposed off. Having a device that detects this would be of great help in reducing such wastage.
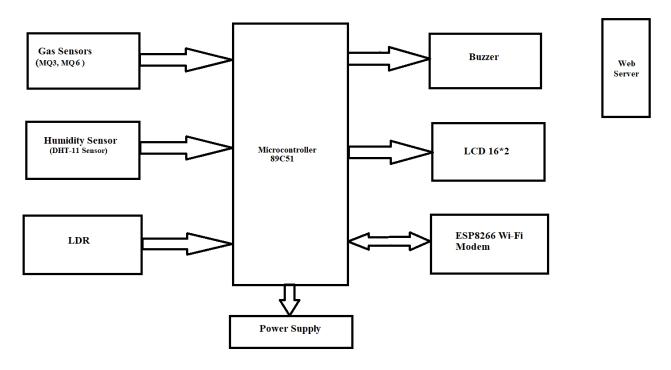
FUNCTIONAL ANALYSES

Fig. 1: Block Diagram

This Arduino based IoT device should be installed in a food store. Once it is properly installed and powered on, start reading data from the interfaced sensors – DHT-11 temperature and humidity sensor, MQ3 Sensor,

MQ6 Sensor and the LDR sensor. DHT11 Temperature and Humidity Sensor operates on 3.5 to 5.5 V supply and can read temperature between 0° C and 50° C and relative humidity between 20% and 95%. The LDR sensor is connected in a potential divider circuit and inputs a voltage at the analog input pin of the controller. The MQ3 sensor detects the emission of ethanol type of gases. If the food/fruits get spoiled, they emit the ethanol type of gases. The MQ3 sensor detects the concentration of such gases and output an analog voltage proportional to the concentration of the gas. The MQ-6 Gas sensor can detect or measure gasses like Butane and LPG or methane The module version of this sensor comes with a Digital Pin which makes this sensor to operate even without a microcontroller and that comes in handy when you are only trying to detect one particular gas. The Controller collects data from all the sensors and convert the values to the strings. Then arduino sends an activation signal to other connected devices such as LCD, Buzzer. The ESP8266 Wi-Fi module connected to the Arduino uploads the data to Server. For displaying and monitoring data uploaded to the server. In the last step many tasks has been performed such as buzzer activates simultaneously messages display on LCD and also the information is available on server.
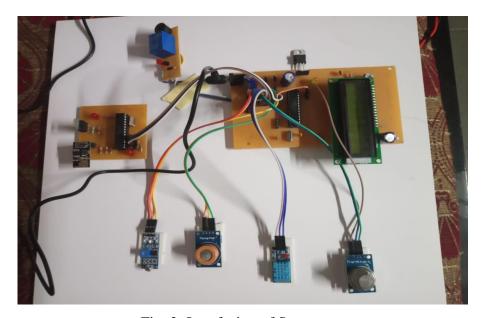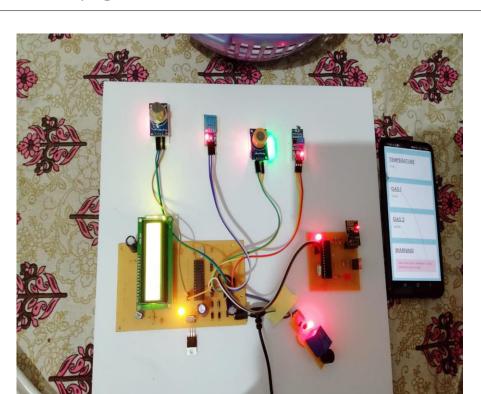
SYSTEM INTERFACE

Fig. 2: Interfacing of System

Fig.3: Result

HARDWARE AND SOFTWARE TOOLS

Hardware

1. Power Supply

2. Microcontroller

3. Gas Sensors(MQ3 & MQ6)

4. Temperature and Humidity Sensor (DHT-11Sensor)

5. LCD Display

6. Wi-Fi Module (ESP8266)

7. Buzzer

8. LDR

Software

1. Proteus for PCB designing
2. Keil compiler microcontroller embedded c programming
3. Flash magic Web server HTML, PHP.

OBTAINED RESULTS

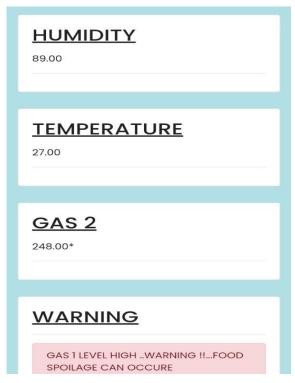Fig4. Result on the Web Page

CONCULSION AND PERSPECTIVES

Food poisoning has been the source of innumerable diseases, to reduce and avoid illness, we use biosensors and electrical sensors that determine the freshness of household food items like dairy items, fruits, and foods. Detecting naturally emitted gases such as Ethanol, Alcohol as food decay can be used to detect food spoilage. The sensors can detect gas emissions and other important constituents like humidity from food items even before the presence of any visible signs of spoilage. Using sensors to detect the presence of these values among foods can help detect food spoilage early and prevent the consumption of spoiled food. These techniques can be further developed to include other types of gas sensors and foods to increase the sensitivity of such detection methods. This system consists of a hardware device and a web application that checks the quality and freshness of food.

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