E FRESH- DETECTION OF FOOD FRESHNESS

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ABSTRACT

Food safety and hygiene is a vital concern so as to prevent the food wastage. The Quality of the foodstuff needed to be surveilled and it must be prevented from perished by the atmospheric factors like temperature, humidity etc. Hence, it is useful to establish a quality monitoring devices at food stores. These quality monitoring devices keep a watch on the environmental factor that speed up decay of the foodstuff. Later on, the environmental factors can be subdued like by refrigeration, vacuum storage etc. The device is built on using an Arduino UNO, a prototyping board. The Arduino board is interfaced with sensors like a MQ-3 sensor to detect gas odour content, a moisture sensor and a pH sensor. This is an IoT device which will send the measured sensor datas to an IoT platform. The ESP8266 Wi-Fi Modem is interfaced with the Arduino which is then connected to the internet via a Wi-Fi router. The sensor data is also displayed on a LCD display which is then interfaced with the Arduino UNO. The IoT platform is used for logging and monitoring all the sensor data to an embedded spot.

Keywords: *Arduino UNO, ESP8266 Wi-Fi Module, IoT device ,MQ 3 Gas sensor, pH sensor, Soil moisture sensor.*

1. INTRODUCTION

The internet of things (IOT) helps people to live and work smarter by gaining a complete control over their lives. IoT also enables companies to automate processes and reduce the labor costs by cutting down on waste and improves the service delivery, making a cost cutting for manufacturing and delivering goods, as well as for offering a lucidity into customer agreement.

This paper is organized as follows. Section-II describes in detail about food safety and hygiene. Section-III provides a report on the market study of the topic undertaken. Section-IV provides the various methodologies used in the approach for food safety. Section-V profound the proposed architecture for the assisting system with details of sensors that are to be used and the architectural design of the proposed food safety measure. Section-VI furnishes the conclusion got from the study which is carried on as well as the future work that could be done.

2. FOOD SAFETY & HYGIENE

The food, we consume should provide nourishment and provide energy to our body, which gives us the ability to do daily activities and help improves our health in direct as well as indirect ways. The food items kept at room temperature undergo a rapid bacterial growth and also chemical changes take place in the food that we consume. Taking unhealthy food leads to bad health, and can cause different food borne diseases like diarrhea, food poisoning etc.

Food poisoning is the reason for many diseases. In order to reduce those illness we use bio sensors and electrical sensors to determine the spoilage of fruits and vegetables. Freshness in fruits and vegetables is essential for consumers. While considering there are fruits that emit high levels of ethylene gas with respect to others and there are vegetables that are especially sensitive to ethylene gas. Therefore, keeping fruits and vegetables fresh for a long time is not always possible, in order to protect our health, we must consume fresh fruits and vegetables, which often cannot be determined at first sight. So, to reduce and avoid illness we have decided to develop an electronic system that is capable of indicating the state of maturation of a fruits or vegetables with use of certain sensors to determine the spoilage of fruits and vegetables. In addition, this project could be useful in the design of similar systems within other food fields. Our project model is based upon the dataset we are using. As we gather more data, various extensions can be added as well as prediction of lasting of fruits and vegetables based on the food vendor we bought from.

A smart system which can detect the novelty of household foods like vegetables, juices, dairy items, meat and fruits helps in the identification and selection of a proper pH sensor, Moisture sensor, and Gas sensor ensures to develop a smart food freshness detector for the freshness of food and tells whether to eat it or bin it.

3. MARKET STUDY

The food, we consume can be affected by contamination that may occur due to improper storage or chemical changes that take place within the food. There are several viruses and bacteria that can cause food contamination and leads to numerous food borne diseases, for example Norovirus a very contagious virus is caused by the contaminated food or water. Statistics says that about 351,000 people die due to food poisoning globally every year. Globally some countries struggle on daily basis for food, due to improper preservation of foods and usage of chemicals by artificially for increasing the time span of food which causes illness in people. It is necessary to develop a system that can help people to identify the freshness of food or quality of the food items.

4. LITERATURE SURVEY

Many researchers have come up with various speculations related to detection, diagnosing and monitoring food safety and hygiene. In paper[1]the authors have proposed a system to give the good quality management in food based on electrical, and biosensors signals. In paper [2] the authors have used here two main types of freshness sensors that have been invented, which are direct sensor and indirect sensor. For the direct sensor, it senses the freshness of food directly by indicating the freshness level using ripeness, spoilage and microbial indicator. In paper [3] the authors propose an oxygen and co2 concentration monitoring system for Freshness management which is based on radio frequency identification. In paper[4] the authors have aimed at designing a programmable digital electronic platform, equipped with gas sensors and wireless networks for the development of a low-cost and rapid electronic prototype to monitor and record the levels of volatiles and exchange of oxygen and Co2 of a fruit and estimate a relationship between the gases in order to find an automated way to the determinate the level of food spoilage.

In paper [5] the author aimed at detecting spoiled food using appropriate sensors and monitoring gases released by the particular food item. A micro controller that senses this, triggers an alert using internet of things, so that appropriate action can be taken. To expand the accuracy of detection, instead of relying on value of one sensor, the cumulative value of both oxygen and ammonia sensors are arrived for decision. In paper [6] the authors piloted heterogeneous IoT devices, cloud services, and an Android application. To keep track of food quantity they have obtained UV Sensor which gives us the occupancy of the box in which the food is kept from which food quantity and quality can be calculated. A MQ4 gas sensor is to detect methane gas in the atmosphere which tells the quality of the food. In paper [7] they used a non-invasive technique using machine learning (ML) to monitor variations of MC in fruits using the terahertz (THz) waves with Swissto12 MCK in the frequency range of 0.75 THz to 1.1 THz. They have used, multi-domain features which are extracted from time- frequency, and time-frequency domains, and applied three ML algorithms such as support vector machine (SVM), k nearest neighbor (KNN) and Decision Tree (D-Tree) for the accurate assessment of MC in both apple and mango slices.

5. METHODOLOGY

An IoT ecosystem consists of web-enabled smart device system that use embedded systems, such as processors, sensors and communication hardware, to collect, send and act on data they have acquired from their environments. IoT devices share the sensor data they have collected by connecting to an IoT gateway or other edge device where data is either sent to the cloud to be analyzed or analyzed locally. At times, these devices communicate with each other and act on the information they obtained from each. The devices do most of the work without human intervention, yet people can interact with the devices, for instance, to set up them, give them instructions or to access the data. The connectivity, networking and communication protocols used with these web-enabled devices largely depend upon the specific IoT applications deployed.

6. PROPOSED ARCHITECTURE

The proposed system incorporates both hardware and software implementation. The hardware implementation consists of the components such as Arduino ,Gas Sensor, Humidity Sensor. The coding for Arduino is written using Arduino IDE and it is done. This system, it only measures the value we cannot directly identify the wastage of food by means of humidity and gas In this case, the user is not aware of the wastage of the food. In the proposed system we are using a MQ3 series gas sensor to detect the emitting gases from spoiled vegetables and fruits. The system uses an ARDUINO UNO embedded hardware which connects the nodemcu-ESP8266 for data transfer. A LCD monitor is used to continuously display the monitored values. The sensors are connected to the arduino board along with nodemcu and powered to detect any emission from the spoiled fruits and vegetables. This proposed system is designed keeping in mind a healthy future .

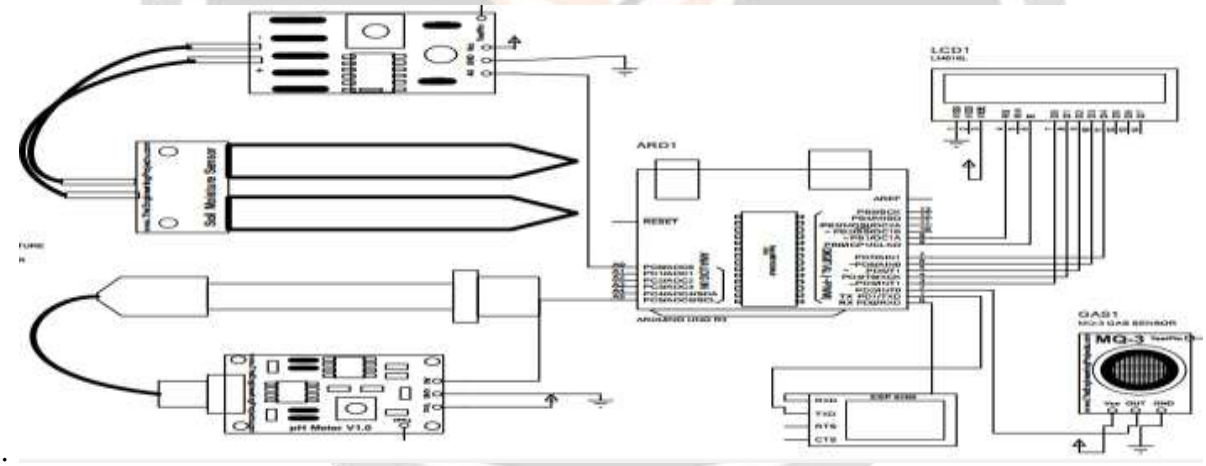

Figure 1:Block Diagram of Proposed solution

7. CONCLUSION & FUTURE SCOPE

Our study provides an insight to increase the quality of life, through the usage of intelligent sensor systems to warn the individuals when a food expires, or when certain properties of the food packaging are changed. In this project, we presented a portable system for monitoring vacuum packed foods. The reference parameters measured in the empty container were almost found to be constant

In future works, an additional experimental data must be collected in order to improve the system performance, and the detection of system under development will be tested for refrigerated vacuum-packed foods. This system will be miniaturized and will help elderly and disabled persons by alarming them if the food starts spoiling. An option for connecting the Smartphone with the monitoring system will further simplifies the process of monitoring the state of stored food and hereby food spoilage.

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