Automatic Food Spoilage Detection

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ABSTRACT: In the past deaconries, the development of adaptable sensors has been studied with the aim of extending inventive devices with requisition in different machinery scopes, like food diligence. One of the biggest health issues is rotten food. This paper has established a mixed technology capable of providing genuine information about the consistency of food products during their storage time. Smart bowls use various types of sensors to track the consistency and protection of food items by documenting the progression of parameters such as the quantity of micro-organism agents, gases, temperature, humidity and storage time to achieve this objective. This technology focuses primarily on the design of a bowl that can recognize the spoiled food in front of the human nose and describe it. The MQ4 methane sensor that is used to detect the presence of toxic gas acetone and ethanol in the spoiled food is the core of the technology. The introduction of these sensors into food detection technology has paved the way for smart food detection.

Keywords: Intelligent Food Detection; Smart Bowl; Gas Detection; Sensor Calibration; Arduino, Controller.

INTRODUCTION

To grow strong and safe, all living things need food. It is an important and necessary material that contains essential proteins, carbohydrates, fats, and other nutrients used for life, development, and vital processes in the body of an organism and to provide energy for function. The body's immersion and implementation of food is important for dieting and is expedited by absorption. Plants are the main source of food that, by photosynthesis, transforms solar energy to food. Animals which feed on plants generally constitute food sources of supply for other animals [1]. Food types primarily have three functions, such as social function, physiological function and psychological function [2].

Social function: This position is directly related to the purpose and the process of eating with family members, friends, and so on. Here, some food is served by relatives, friends and others and we also expect some form of food to be served. A significant aspect of festivals, meetings and parties known as social events is the sharing of food.

Psychological function: People not only eat food to relieve hunger in the psychological feature, but one gets satisfaction and it is a way to convey emotions such as love, affection, frustration, and so on.

Physiological function: Physiological food is primarily food that provides energy, growth, control and also protects against disease.

As Food is one of the major sources of energy for the living beings, the food quality and safety perform the highest demand throughout history. The technologies such as the Internet of things (IOT) originate an area of implausible influence, potential, and growth, with Cisco Inc. predicting to have 50 billion connected devices by 2020. However, most of these IOT devices are easy to notch and compromise [3]. Usually, these IOT base devices are restricted in calculate, storage, and transmission capacity, so they are more susceptible to attacks than other endpoint devices such as smartphones, tablets, or computers [4]. It is a technology that connects anything at anywhere and anytime. By utilizing the IOT in the food detection technology, it will helpthe individual to improve the life quality by detecting the condition of the food and live by allocating the data obtained from the application. Presently, the application of IoT technology in food detection application is still in the embryonic stage and anextendable distance for enhancements. The food spoilage, hygiene and safety is important part to prevent the food from wastage and keep oneself safe from diseases.The food quality must be regulated and also preventfrom spoiling, decomposing and trouncing the nature factors such as spoilage, darkness, humidity and temperature. So, by arranging the quality monitoring devices at food stores the health can be maintained and the wastage can be minimized. These factor of feature inspection devices identify on the nature factors that are proficient of generating food spoilage, decomposition and trouncing[5].

In the early time the food can be protecting by storing the food in the refrigerator and prevent from getting spoiled or decomposed.The spoilage and decomposition of food occur in the process of composition but the major problem arise due to inefficient food handling practices andinapplicableatmospheric conditions during the food storage and transportation from one place to another. There are different possibilities by which food poisoning can be identified such as if the food gets over ripen then a gas start erecting from the food, the color of the food start changing, humidity and temperature changes. So that when the detecting system which is capable of detecting the over ripen, darkness, humidity and temperature difference during the food storage and transportation is the major factor of monitoring system[6].

In the present time almost everyone is getting affected by foods they consume daily, this is not because of the junk food but the preserved vegetables cause harm to the human bodies.When the food is being stored their nutrient value, oxygen, temperature, and moisture parameter changes from time to time this change in the quality of food helps to monitor the food. Nowadays almost all the human beings pay attention towards the information given or provided in the packets to detect the expiry data of the food which is the major problem arise due to blindly believing on the provided data and risking one's health. To provide safety food, at every stage of supply chain this paper has developed a bowl involving monitoring and detection unit. This device or the bowl provide protection to the user health by maintaining the required atmospheric conditions that are necessary for maintaining the quality of food.

The investigation and accomplishment of regular measurement of food is required to detect the changes occurred in the food. Then the data will be shared to the user smart phone through Wi-Fi module. The primary job of the detecting, analyzing, monitoring and controlling the systems is to monitor each individual activity of the food different electronic sensors are utilized for monitoring the food.To control the process an Arduino microcontroller is used which control and collect data then this data will be compared further and analyze with the previous collected data. If the calculated results found to be different from the desired set values, then the microcontroller control the desired quality from getting spoiled or contaminated. The smart food detecting system aimed to detect and control the food items and preventit from getting spoiled[7].

REVIEW OF LITERATURE

In this prior art author Per Pinstrup-Andersen had proposed food security where the nutritional security is the major goal of interest to estimatecombination of access to food along with clean water and good sanitation. In this paper the author mentioned about the food security which means the process to identify the accurate diet requirement. The concept of food security in this paper has extensively utilized at household level to maintain the security of food. The household food security is limited to indicate the food security of each individual because of poor sanitation and unclean water in the countries. So it is very difficult to individually monitor the health and nutrition of each and every individual. Food security is a valuable concept in this literature reviewto estimates household food security in combination with individual anthropometric estimates all human beings.

As rotten food is one of the serious problem of health the author Nihad Benabdellah et. al. had proposed an application where an electric nose is utilized to detect the smell in the spoiled meet before by using TGS822 gas sensor.These sensors detect the toxic gas such as Acetone and Ethanol present in the spoiled meat. Here the electric nose is installed in the refrigerator where the reorganization component overlap with one another to detect the quality of the meet before human nose[8].

In this paper Prof. Kadam P. R et. al. had presented a model to detect the spoilage in the raw milk. From the early time a lot more methods have been developed to detect the spoilage of milk. The studies help to identify the bacteria present is the raw milk which are harmful for human health. So to detect the bacteria with real time application this paper had proposed system which monitor the quality of milk used by the people or distributed for the making the dairy products. This paper comprises different sensors connected to

the Arduino board, then the data collected by the system is send to the user through an android app to identify the quality of milk one is getting. This system comprises different sensors such as pH level Indicators, detecting bacteria by using electric method, gas sensor to detect the gases present in the raw milk, Magneto elastic sensors for remote query detection, a Wi-Fi module for real time application and a control the entire mechanism. This system helps in surveying the raw milk and detect spoilage of milk.

The system results very poor detection and does not creates a need to develop the new tool which will work real time for checking the quality of milk[9]. So with the proposed system in this paper this problem can be resolved.In this research paper a bowl comprises a fool spoilage detection mechanism which comprises a proximity sensor, capacity sensor, and a MQ4 methane sensor, Wi-Fi module, alarm, LEDs, a microcontroller and an LCD display. When the power supply and the internet access is given to the system then the food spoilage detection mechanism gets activated. However, when the person come near to the device then the proximity sensor detects the incoming of the person. Once the proximity sensor detected the incoming of the person then the sensor send data to microcontroller. The microcontroller receives the comment from the proximity sensor and open the bowl lid, allowing the person to deposit the food without any contact with the lid. After food deposition a capacity sensor sense the filling of the bowl and send data to the controller. This capacity sensor basically installed to maintain the limit of storing food inside the bowl of the food is kept in the bowl a capacity sensor attached to the device will detect the fill level of the device. A mechanical opening actuated via a senor (proximity sensor) is provided to open up in the presence of person allowing the person to deposit food without any contact with the lid. Quality of the food and send data to the user.In order to monitor the fill level of the device.

CONCLUSION

The device discussed in this research paper deals with a technique for food detection that detects the quality of food in real time. In the bowl, which comprises a variety of techniques where a proximity sensor is installed at the outer portion of the bowl to detect the incoming individual to fill the food, is installed to check the consistency of food control tools as soon as the incoming detected bowl lid is opened for filling. The capacity sensor tests the bowl limit until the user fills the bowl and tells the user to fill in the container that restricted set food. After filling the container, the mounted sensors such as the PH sensor, the humidity sensor and the MQ4 methane gas sensor, where the PH sensor checks the PH value of the food, the humidity sensor checks the darkness of the food, and the MQ4 sensor checks the gas emitted from the food after spoilage, begin to check the quality of the food. In real-time applications, this device also includes an android application where the user can get the quality of food data and information. The device mounted in the bowl is cost-effective, compact and prevents individuals and prevent people from getting infected from the unhealthy food.

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