Quality Transportation and Preservation of Food using Smart Plate

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ABSTRACT

Food is to be preserved with good quality while served and consumed. Quality of food for its taste and flavour is based on PH level, moisture content, Alcohol content, Temperature and Humidity. Food is now cooked and served in the hotels, homes and also transported to consumer places. In between, the time of cooking and consuming, it needs to be preserved. The proposed system is developed to maintain the quality of food meanwhile. Consumption of stale food taken by human leads ill health and extensive wastage of food. In India, the majority of the population struggles for their daily basic food needs for living. Efficient preservation of existing food resources is critical. The great amount of money spent on diagnosis treatment of diseases is also a cause for concern. Researchers work hard to tackle the issue of food poisoning due to stalled ones and reduce the damage to unwary consumers has given rise to innovative and productive devices. The use of electrical sensors to determine the staleness of food has proved to be a boon to consumers of packaged foods. The proposed module consist of a flat plate consisting of variety of sensors like PH Level sensor, Food moisture content detecting sensor, Gas sensor and MQ3 sensor . This plate can be placed in any utensil and a keypad/selection panel is used to select the type of food item. These sensors are connected to arduino, GSM, Mobile and LCD display to know the status of the food.

Keywords : Sensors, Arduino, GSM

I. INTODUCTION

Smart plate is a conventional plate connected with many sensors that are all activated depending on the food item. This plate can be fixed in any utility and a switching panel can be used to select the type of food item. The consecutive functions can be developed and implemented into this smart device with the interfacing and implantation with mobile phones. A mobile app can be developed specifically to receive the sensor data from the Smart Plate to generate advance warnings regarding the status of the quality of food item. A Smart Plate is developed with integrated sensors that detect food quality and display the degree of freshness of food items. The sensors identify the parameters for quality detection. A database of acceptable parameter values which indicates safety of food. By interfacing the sensors with a microcontroller the proposed system is developed as a user friendly display to indicate food quality.

II. PROPOSED SYSTEM

The concept of new system is to accurately display the freshness level of the food so that consumers are well aware of the quality of food. The Food spoilage detector provides a direct and convenient means to monitor the moisture content in food. The sensor

plate is able to detect spoilage of common household items like diary, meats and fried items. Smart plate for the detection of food quality is developed to ensure quality of food used by the consumers and improve their health.

In this system the food is initially placed on the smart plate manually. Then the power supply is provided. The step down transformer reduces the available voltage to 12V. Then it passes through a bridge rectifier. The regulator provides 5V and 12V supply which is supplied to other components. The sensors detecting the food quality are Ph sensor, Gas sensor, Moisture sensor and Ethanol sensor that are placed beneath the plate. The microcontroller is used to process the signals received by the sensors. The LCD display is used to display the status of the sensor levels. After the detection of the sensors levels, the GSM module is activated. GSM will process a text message and sends the information of the detected sensor levels to the particular mobile number that is stored in the program. The text message also contains the measured information by the sensor and indicates the qualitty. This detection is continuous and repeated until the power switch is turned off. The above process is executed for different food items when it is being placed in the smart plate.
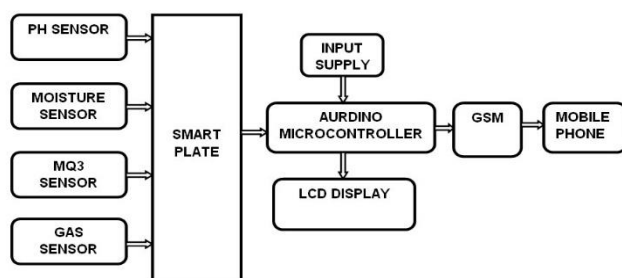

Fig 1. Block Diagram

The block diagram consists of Microcontroller, Sensor Plate, Keyboard /Selector switch is used to select the different foods to be chosen, GSM Module is used to connect cellular device to the microcontroller. LCD display is used to display the status of food output. Food spoilage detector is a smart device interfaced with microcontroller. It has Gas sensor and moisture sensor. Gas sensor determines the freshness of the food. The moisture sensor determines the moisture content in the food. The energy individual body needs in order to stay healthy and alive is directly very much related to the freshness of the food intake. Individual human beings differ depending on their body needs to stay balanced. It balances the nutrients as vitamins and minerals that individual body needs, can provide an extra boost for energy and calorie burning needs.

II. CIRCUIT DESCRIPTION

A power supply unit is designed to deliver 5V and 12 V to microcontroller and sensor units. An Arduino UNO developer board is interfaced with moisture, gas, alcohol sensor, GSM Module and LCD display unit. The circuit is simulated for expected result and developed.
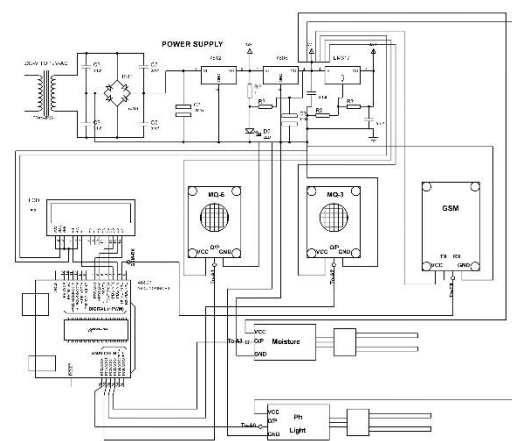

Fig 2. Overall Circuit Diagram

III. OUTPUT AND RESULT

Standard Levels For Each Sensor:
1. **PH Sensor :** 0 To 14 = 1 To 200 Units

2. **Moisture Sensor** : 1% To 100% = 1 To 200 Units
3. **Gas Sensor :** 1% To 100% = 1 To 10 Units
4. **Ethanol Sensor :** 1% to 100% = 1 to 100 units

The above results are taken for fresh food items. The level varying for more than 30% indicates stale food or unhealthy food for human consumption.

Hardware Modules:

Fig 3. Food Testing Display of LCD

Fig 4. Alcohol and Moisture Value of Milk

Fig 5. PH And Gas Value of Milk

Fig 6. Displaying Message Sending

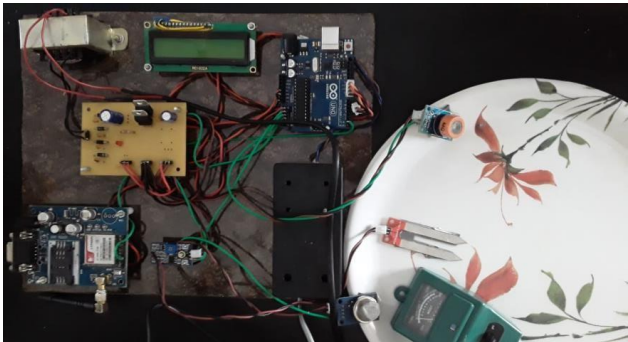**Fig 7.** Message Received In Mobile

Fig 8. Smart Plate For The Detection of Food Quality

Below table shows the output measured in sensors in terms of units.

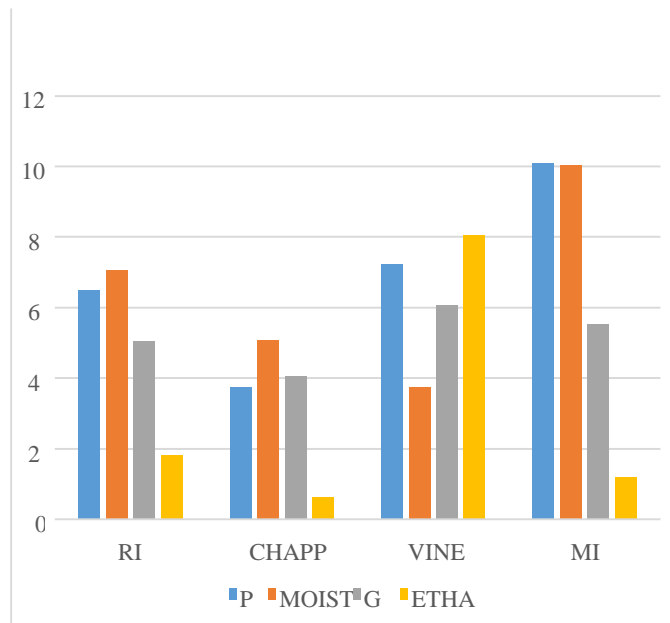| SENSOR LEVELS(Units)	RICE	CHAPPATHI	VINEGAR	MILK
PH SENSOR	64.86	100.95	80.23	100.65
MOISTUE SENSOR	70.52	99.3	37.30	100.35
GAS SENSOR	3.65	2.62	4.25	2.95
ETHANOL SENSOR	18.16	5.07	80.23	11.74

Fig 9. Sensor Value for Different Food Items

IV. CONCLUSION

This proposed system focuses on transportation and preservation of the good quality food by using smart methods and current technology. The assurance of quality by automatic method. The model has its roots on a preservation of food that allows people to lead a healthier life. The platform uses the sensors to check the basic qualities of a consumable food and ensures the improvement in health. This prototype is economical and is mainly used in hospitals to monitor the calorie and nutrient content. It can also be used on a regular basis by consumers to monitor the health .It can be used in nutrition centers for more accurate calculation of the nutrition content. The display system accurately displays the calorie of the food so that the consumers can be assured of the amount of food consume. The Food spoilage detector provides a direct and convenient means to monitor the freshness in food. The sensor plate is able to detect the gas and moisture content of common household items like diary, meats and fried items.

V. REFERENCES

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