DETECTION OF BACTERIAL CONTAMINATION AND PH QUANTITY USING DIGITALIZATION STRATEGY

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Abstract—Food is essential for all the human being. In the food we are gained the more number of energy to our body. But now days, Lot of chemical substances that are added in the food. That makes human being to be unhealthy person. Children are also affected due to unhealthy food. In our proposal, we used to find the quality of food using the pH sensor. The pH sensors are used to find the pH value of the food and also find the bacterial contamination of the food. This project is used for the government to find the quality of food in the restaurant and display their result in the server and also check the quality of food and display the output pH value in the message using GSM. In additional, we can also share the location of the restaurant.

1. INTRODUCTION

According to the health care department nearly 1 million children are affected by the food disease because of unhealthy food intake by the children. Even from the growing stage of the seed many injection and chemical are sprayed to them. Now days, we are in taking the food with more acidity level. In this paper, we used to find the quality of food using the pH sensor. The pH sensor is used to find the acidity and basic value of the food. In the previous existing it will not find the bacterial contamination. We proposed with the bacterial contamination present in the food are also be find out. Now we mostly used to take the outside food and the hotel foods in that more number of poisonous contamination are present because of these food even the children of 5 years are also affected by cancer, diabetes etc.,. In the existing system, they are only the raw food and they are finding only the one variety of food. In food industry, the quality control operations based on the sensory analysis are restricted to the availability of the experts, which implies relatively high economic costs, a certain degree of subjectivity associated with the sensory fatigue, and, in addition of the arduous organizational task. These restrictions impose that the quality control are reduced to certain lots. As an alternative approach, the machine learning techniques along with instrumental measures appear as an intelligent solution to obtain a reliable estimate of the sensory parameters of the food products.

2. RELATED WORK

Temperature indicators (TTI) which provides thermal history of the product during storage time, distribution and also enabling the consumer or the manufacturer to assess the product status. For instance, Monitor Mark™ a TTI sensor developed by 3M™ (3M™, Maplewood, MN, USA) was designed to monitor thermal exposure for meat, fish, and dairy products during storage and transportation below 20 °C. Numerical experiments are conducted to illustrate the overall procedure and validate the approximated Bacterial infection in foods. Some systems enable remote monitoring via radio-frequency identification (RFID) [1]. An RFID sensor for the detection of Escherichia coli (E. coli) and Salmonella in packaged foods was designed by Flex Alert [2].
technology is based on antitoxins immobilized on flexible RFID tags incorporated within packaging. “on-package” pH indicators that change color when food decays as a result of pH changes associated with the release of volatile amines generated during meat or fish spoilage. This Smart Food monitoring system will incorporate a set of sensors which will include pressure sensors, weight sensors, temperature sensors, etc., For the purpose of governing various parameters of raw food, Smart food monitoring is a unit which governs control over various parameters causing decay or rotting of food materials, therefore ensuring appropriate quality of food during various atmospheric changes. This unit also keeps the user notified about the quality and the quantity changes in the unit using the Internet of Things technology.

3. SYSTEM DESIGN

PH level can be monitored using pH level. Key pad is used to set the reference pH level. When pH level exists the reference pH level, pH level of the food can be identified poison level. Pic 16f877a microcontroller is the heart of this unit. PIC16F877A microcontroller receives the pH level using signal conditioning unit. When it detects the poison level, transmitter unit transmits the indication to the receiver side via rf transmitter [13] using ht 12e Encoder.

![BLOCK DIAGRAM TRANSMITTER SIDE](image)

**Fig.1: Transmitter Block diagram**

4. HARDWARE REQUIREMENTS

A. **PH SENSOR:**

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The o/p of this amplifier uses cro or dmm (preferred), next we have to convert the electrode o/p to a scale of 0->14. one method used in the photo stat is that o/p of lf 442 will be from -1.5 (for 14 ph) to +1.5 (for 0). 0->7ph now asimple summing amplifier is used and 2 is added to the o/p of lf to the receiver side.
B. KEY PAD:

The Key pad is used to set the normal pH level. When it exists the pH level, the food which is to be checked contains the poison.

C. HT12E ENCODER

HT12E is an encoder integrated circuit of 212 series of encoders. They are paired with 212 series of decoders for use in remote control system applications[3]. It is mainly used in interfacing RF and infrared circuits. The chosen pair of encoder/decoder should have same number of addresses and data format.

D. LCD

LCD (liquid crystal display) is the technology used for displays in notebook and other smaller computers. Like light-emitting diode (LED) and gas-plasma technologies, LCDs allow displays to be much thinner than cathode ray tube (CRT) technology[4].

LCD’s also are used as numerical indicators, especially in digital watches where their much smaller current needs than LED displays (microamperes compared with mill amperes) prolong battery life. Liquid crystals are organic (carbon) compounds, which exhibit both solid and liquid properties. A ‘cell’ with transparent metallic conductors, called electrodes, on opposite daces, containing a liquid crystal, and on which light falls, goes ‘dark’ when a voltage is applied across the electrodes[5]. The effect is due to molecular rearrangement within the liquid crystal.
The LCD display used in this project consists of 2 rows. Each row consists of maximum 16 characters. So using this display only maximum of 32 characters can be displayed. The LCD’s are lightweight with only a few millimeters thickness. Since the LCD’s consume less power, they are compatible with low power electronic circuits, and can be powered for long durations. The LCD’s don’t generate light and so light is needed to read the display.

**E. POWER SUPPLY:**

This circuit is worn to renovate the AC to DC. It restrains of step down transformer, bridge rectifier, ripple filter, voltage regulator and line filter. Rationale of transformer is to step down the 230 VAC to 15VAC. This AC voltage is auxiliary rectified using bridge rectifier, the productivity of bridge rectifier is pulsating DC with small AC ripples. This AC ripples are then filtered using 1000uF shunt capacitor. Because the capacitor grounds AC signal and evade the DC, so the output across the shunt capacitor is pure DC. This DC voltage is unfettered, because change in primary of the transformer will change this DC voltage. So it needs to regulate the voltage. Here we use series voltage regulator is used to regulate the voltage. In case, if we are using the add-on cards..., modify the program accordingly.

We can skip the max to rest part, modify the program to display the scale. Now while using the adc a resolution factor is set, account for that also in the software. These are for a simple pH meter to display the pH value leave the electrodes for initial period. Simulate the electrode voltage s and carry on. Try out the ckt given in the net (we don’t know how the same works). Without compensation any pH meter it will give out wrong readings only. We can purchase the same. But it will be company-soldered pcb.enquire and if We could get the handmade ones, buy the same, which is the best method.

**F. HT12D:**

![Fig.4: Power supply regulator](image)

The HT 12D ICs are series of CMOS LSIs for remote control system applications. These ICs are paired with each other. For proper operation a pair of encoder/decoder with the same number of address and data format should be selected[6]. The Decoder receive the serial address and data from its corresponding decoder, transmitted by a carrier using an RF transmission medium and gives output to the output pins after processing the data.
HT12D has a transmission enable pin which is active low. When a trigger signal is received on TE pin, the programmed addresses/data are transmitted together with the header bits via an RF or an infrared transmission medium. HT12E begins a 4-word transmission cycle upon receipt of a transmission enable. This cycle is repeated as long as TE is kept low. As soon as TE returns to high, the encoder output completes its final cycle and then stops.

G. SCHEMATIC DIAGRAM:

![Schematic Diagram](image)

5. SYSTEM IMPLEMENTATION
   A. CIRCUIT DESCRIPTION
   Above is the quite simple schematic. The LCD panel's Enable and Register Select is connected to the Control Port. The Control Port is an open collector / open drain output. While most Parallel Ports have internal pull-up resistors, there is a few which don't.[7] Therefore by incorporating the two 10K external pull up resistors, the circuit is more portable for a wider range of computers, some of which may have no internal pull up resistors.

   We make no effort to place the Data bus into reverse direction. Therefore we hard wire the R/W line of the LCD panel, into write mode. This will cause no bus conflicts on the data lines. As a result we cannot read back the LCD's internal Busy Flag which tells us if the LCD has accepted and finished
processing the last instruction. This problem is overcome by inserting known delays into our program.

The 10k Potentiometer controls the contrast of the LCD panel. Nothing fancy here. As with all the examples, I've left the power supply out. We can use a bench power supply set to 5v or use a onboard +5 regulators. Remember a few de-coupling capacitors, especially if we have trouble with the circuit working properly.

B. RF Receiver 433Mhz ASK (PLL) Features:

- The circuit shape of is PLL.
- On-Chip VCO with integrated PLL using crystal oscillator reference.
- Integrated IF and data filters.
- Receiver Frequency: 433.92 MHZ
- Typical sensitivity: -105dBm
- Supply Current: 2.5mA
- IF Frequency: 500KHz
- Low power consumption
- Operation voltage: 5 Volts

This is a PLL based ASK Hybrid 433Mhz RF receiver module and is ideal for short-range wireless control applications where quality is a primary concern. The receiver module requires no external RF components except for the antenna. The super-regenerative design exhibits exceptional sensitivity at a very low cost. IDMA scheme [11, 12] is deployed for fast and efficient data transmission.

C. FEATURES OF LCD DISPLAY:

- 16 Characters x 2 Lines
- 5 x 7 Dots with Cursor
- Built in Controller
- +5v Power Supply (Also Available for +3V)

Liquid crystal displays (LCDs) have materials which combine the properties of both liquids and crystals. Rather than having a melting point, they have a temperature range within which the molecules are almost as mobile as they would be in a liquid, but are grouped together in an ordered form similar to a crystal.[8]

D. pH value:

pH value is nothing but measure the range of acidity or alkalinity of water soluble substance. The abbreviation of pH is potential of hydrogen. pH value starts from minimum number 1 to maximum number 14 in which 7 is neutral[9]. In these, values from 1 to 7 considered as acidic and values
from 7 to 14 considered as alkalinity. It will be in logarithmic scale in which two adjacent values may be increases or decreases by a factor 10.

**E. FINDING PH VALUE:**

```c
#include <stdio.h>
#include <conio.h>
#include <string>
#include <cstring>
#include <cmath>
#include <cstdlib>

int inputphlevel();
int measurablephlevel(int PHLEVEL);
int main()
{
    int phlevel = 0; //stores the pH Level
    printf("Please enter the pH Level: ");
    // read in the value....
    scanf("%d\n", &phlevel);
    int PHLEVEL = measurablephlevel(phlevel);
    cout.setf(ios::fixed); // set up numeric output for real numbers...
    cout.precision(4);
    return 0;
}

int measurablephlevel(int PHLEVEL)
{
    if (PHLEVEL == 0.0 && 3.0)
    {
        printf("You're solution is Very Acidic\n");
    } else if (PHLEVEL == 3.0 && 7.0)
    {
        printf("Your solution is Acidic\n");
    } else if (PHLEVEL == 7.0)
    {
        printf("Your solution is Neutral\n");
    } else if (PHLEVEL == 7.0)
    {
        printf("Your solution is Neutral\n");
    }
} else if (PHLEVEL == 3.0 && 7.0)
{
    printf("Your solution is Acidic\n");
}
```


else if (PHLEVEL == 7.0 && 12.0) {
    printf("You're solution is Alkaline");
}
else if (PHLEVEL == 12.0 && 14.0); {
    printf("You're solution is Very Alkaline");
}
return PHLEVEL;

6. PERFORMANCE ANALYSIS
The Location will be trace by using GSM which can be represented in figure 6.1

![Fig.7: Tracking Location](image)

The general formula for pH is pH = -log[H+]. In these, pH is the negative base 10 logarithm ("log" on a calculator) of the hydrogen ion concentration of a solution. For calculation, take the log of the hydrogen ion concentration and make reverse the sign to get the answer. The testing report of pH value for water is shown in figure 6.2.
Fig. 8: Testing report of pH value

| FOOD          | NORMAL PH VALUE | MEASURED PH VALUE | BACTERIAL CONTAMINATION |
|---------------|-----------------|-------------------|-------------------------|
| Apple         | 3               | 3.7               | Optimum                 |
| tomato sauce  | 5               | 7                 | High                    |
| Egg white     | 7               | 8                 | Optimum                 |
| Milk          | 6               | 5                 | Low                     |
| Beef          | 6               | 11                | High                    |
| Tuna fish     | 6               | 6                 | Optimum                 |
| Vinegar       | 3               | 3                 | Optimum                 |
| Swiss Gruyere cheese | 7     | 2.5               | Low                     |

The above table shows the pH value of various food items and using this data, we can identify the bacterial growth and also understood the bacterial contamination in this food. In future Hadoop tool suite can be embedded for large dataset processing [10].
The above figure 6.2 shows the pH value comparison of various food items. In these, we have to identify the range of normal pH value and measurable pH value for several food items[10]. Using these, we have to manage the food quality based on pH quantity.

7. CONCLUSION

This project is useful for all the people to check their pH level in food. It’s mainly focused in government food sectors. The quality of food is displayed in the server based on pH value. Using these value, people can neglect the hotel which is containing a more number of acidity values. Make our life to be healthy by eating the healthy food. From the message also we can monitor our food and share the location if the food are contain the more number of acidity value.

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