

Milk Adulteration using IOT and Machine Learning

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Abstract: *Adulteration is extremely basic today and the most normally adulterated nourishment item is milk. The most widely recognized explanation behind adulteration is the utilization by producers of undeclared materials that are less expensive than the right and pronounced ones. Adulteration brings down the nature of nourishment and now and then, harmful synthetic substances are likewise added which can be dangerous to health. Adulteration of products either in liquid or solid form can harm or pose serious health risk issues to the consumer. The present investigation was arranged with the primary goal of recognizing purchasing practices of homemakers and their degree of awareness identified with chosen food items. Being considerate of the health & betterment of the society we have planned a project which will allow the customer to know about the level of purity of product which they are buying and being aware of it in future.*

Keywords: Milk adulteration ESP32 pH sensor

I. INTRODUCTION

A very large proportion of infant mortality and some chronic diseases have been reported since several years because of peoples are using impure milk, and there many diseases, particularly summer diarrhea, cholera and food infections such as typhoid and food poisoning, are very common and these diseases can be prevented only when a sufficient care is taken to secure the milk supply. The easiest way to adulterate milk is by water dilution. Therefore, if only a pure water used to adulterate the pure milk, it does no harm except to defraud the consumer except diluting the milk; but if it is unclean water, it can be fatal. Now a day one kind of milk is very common adulterated milk comes in the market called as synthetic milk. It is an artificial milk made-up of urea, detergent, and a cheap vegetableoil. And then this large amount of synthetic milk is blended with a small amount of Natural milk. If we take this kind of highly adulterated milk then consumers health will we at a great risk.

II. LITERATURE SURVEY

In the Department of Public Health and Epidemiology, College of veterinary science, Proddatur. town, Kadapa, Andhra Pradesh a study was reported, Fifty samples of raw milk were found to be adulterated with highest percentage of salt and sugar that is 54% and 40% respectively and did not confirmed to the legal standards of FSSAI . Nirwal et al. (2013) collected 100 samples from different localities of Dehradun. Out of which only two milk samples were found to be pure and rest was adulterated with high amount of glucose i.e. 80%, of the skimmed contains 58% of milk powder, 51% of salt and 35% of urea. 32% of the result of milk samples was found to be safe for consumption and follow the act and the rest of the 68% failed to follow the law. Study concluded that the most common adulterant added in milk is water that not only reduces the nutritional value but alsospread various water-borne illnesses. Testing of milk Adulteration was done on 50 samples obtained in sterilized screwcappedglass bottles to avoid external contamination were from Godaulia and Pandeypur of Uttar Pradesh (Varanasi) India. The extent of Adulteration in these milk samples with NaCl, neutralizers and NH₂CONH₂ were 80%, 28% and 60% respectively. The preservative used increases the shelf life of the milk. Same testing was done in Tandojam, Hyderabad with 20 samples among which 40% of the milk sample were found to be adulterated followed by 30% with starch and 25% with urea. The Adulterants had strong potential to degrade the qualities and physico-chemical characteristics of milk .

A 2007 report in the journal of American Heart Association found that consumption of vanaspati elevates cholesterol level in the body causing diabetes and coronary ailments. A national survey conducted shows that nearly 70% of nations the milk is adulterated with neutralizers and detergent, but water again is the major contaminant found in milk

III. PROBLEM STATEMENT

The Deterioration of Milk is a socio economic issue especially in the developing nations the act of addition of various substances to the food products in order to increase its quantity results in the loss of its actual quality of the food items and to makes it unfit for consumption. The adulterated food product fails to meet the legal standard.

IV. PROPOSED SYSTEM

As our project is proposed that to detect milk adulteration we used different types of sensors like pH meter, TDS sensor, Temperature sensor and MQ135 sensor to detect air quality of milk all the sensors are interfaced with ESP32 and results are shown on LCD display and self-designed mobile app.

V. DESIGN AND METHODOLOGY

This project is implemented to detect the impurities in milk such as salt, urea, detergent, water etc. As soon as these materials are added into milk pH of milk affect that is its pH value either increases or decreases to detect the pH a pH sensor is used which gives analog output, the same output is given to the analog pin of ESP32 which interfaced with microcontroller as shown in block diagram, by applying some mathematical operations the pH of milk is obtained which is shown on LCD displays similarly other parameter electrical conductivity is measure by using TDS sensor and temperature sensor which is also displayed on LCD the another parameter air quality which affect as soon as chemical added in milk due to chemical reaction different types of gases such as ammonia carbon di-oxide are evaporated from milk to detect these gases we used here a gas sensor MQ135 which is connected to the analog pin of microcontroller and result is shown on LCD.

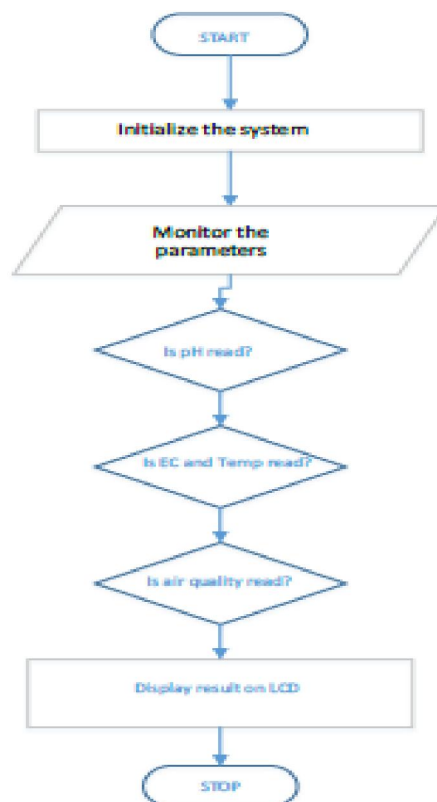


Fig 1.Flowchart of the System

A buzzer and indicating led is also used. If the parameters of milk are not in edible range then buzzer in blows and red led will glow if parameters are in edible range then it is indicated by green led and the same results are also displayed on LCD. To display all these parameter on internet we made our system as local host using inbuilt Wi-Fi module and using self-designed mobile app using open source MIT app inventor. As soon as mobile is connected with the local host all the parameter and result is displayed on mobile app

VI. SOFTWARE COMPONENTS

Atmel studio for microcontroller programing also used can bus library from GitHub.
Kicad-6 PCB designing software is used for PCB design
MIT app inventor online platform for mobile app designing

VI. IMPEMETATION

The steps involved in assembling all the devices and implementing the project:

Step 1: Configuring the Programmable Devices: The module we are using is ESP32 which is interfaced with pH module, TDS module, Temperature sensor, Gas sensor MQ135 and LCD. A keypad is interfaced to give command to the system

Step 2: Code is loaded into microcontroller using Arduino IDE 2.0.4 different types of libraries are used to handle the module used in the system

Step 3: A 5V adapter is used to power up the system as soon as system powered up welcome message is displayed on LCD

Step 4: Press key 1 on the keypad it will take some time to test the different parameters such as pH, EC, temperature and air quality are when reading process will get completed result will be shown on display

Step 5: If all the parameters are in edible range then green led will glow to indicate milk is edible if all the parameters are not in edible range then red led will glow with buzzer beep to indicated milk is notedible

VII. SYSTEMARCHITECTURE

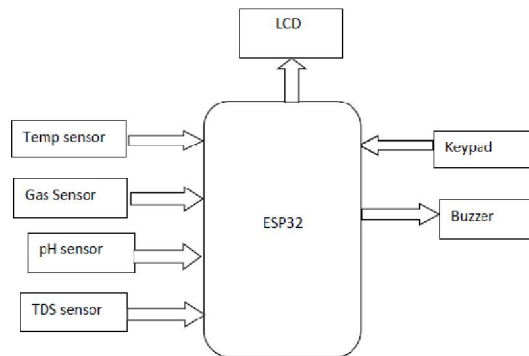


Fig 3 .Block diagram

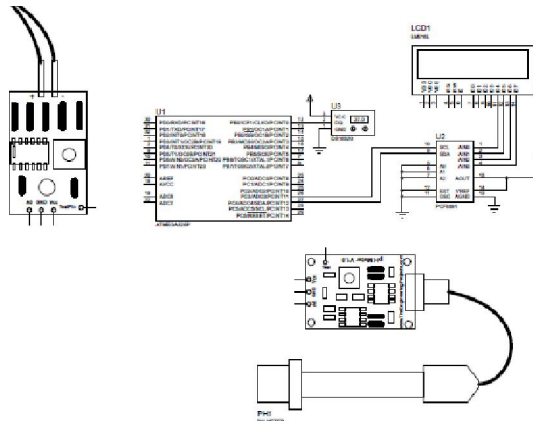


Fig 2. Circuit diagram

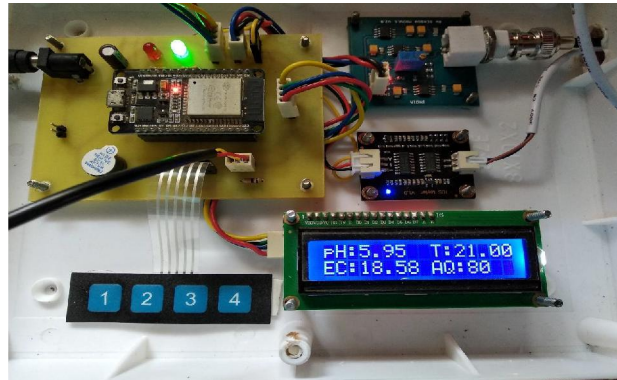
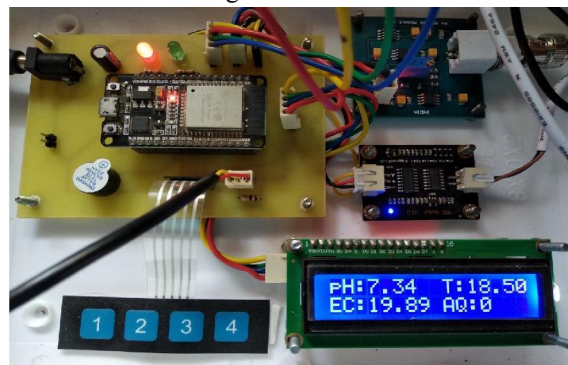


Fig 4. Hardware



VIII. ADVANTAGES

- It is fast take time up to 20-30 second.
- Robustness speed and flexibility
- As it is interfaced with IOT platform result can be shown on mobile and internet

IX. CONCLUSION

In this application ESP32 and different types of sensor such as pH sensor, TDS sensor and Temperature sensor are used to calculate the quality of milk it will display result on LCD and on self developed Mobile app using open source MIT app inventor, inbuilt Wi-Fi module of ESP32 is used to make itself as local host and it can be connected to many mobiles at the same time.

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