

DETECTION OF FOOD ADULTERATION USING ARDUINO IDE

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Abstract—In Order to take care of correct hygiene and safe provide of food merchandise the food quality, ought to be checked and monitored often. Folks add adulterants in food merchandise, to quench the thirst of greed and find a lot of financial edges by merchandising the low-quality food at higher worth. There's no compromise on human health thence food adulteration observance system will be accustomed observe the presence of adulterants in food merchandise. This technique is ruled by Arduino that controls the employment of sensors within the system. The recorded information is transferred to the show LCD digital display alphanumeric display module and therefore the result is displayed. With the employment of this technique, consumption of poor-quality food will be avoided. Mostly, the simplicity of the system will facilitate everybody (consumers, food inspectors, search homeowners, etc) to use food adulteration observance system.

Keywords — Food, Adulteration, Turmeric, Chili, Dielectric method.

INTRODUCTION

A. Background

Food is a energy source in our life. Most of the public pay a large amount for quantity on food. The act of on purpose dishonorable the standard of food available is either with the mixture or substitution of inferior substances is named adulteration. Adulteration is Associate in Nursing inclusion of another product or materials to a food so as to extend the amount of the food products in an exceedingly raw kind or a readymade, which can end in the loss of real quality of food Products.

B. Ingredients To Be Identify

i) Turmeric Powder

Turmeric is a spice powder made from the *Curcuma longa* plant root. It has been used as a dye, food coloring, and in Indian traditional medicine. Turmeric is another name for Indian saffron



Figure (B.1.1)

ii)Chilli Powder

Chilli powder was made from chopped and powdered fruits of more than one type of chili, often mixed with other spices. It's a spice that adds pungency and flavor to a variety of dishes. The pronunciation is commonly "chili" in American English; "chilli" is consistently used in British English.



Figure (B.2.1)

C. Adulterants Used

Metanil Yellow has mostly used in turmeric powder and arhar dal products adulterant material in India, despite the fact that it is an unapproved food dye.

- Chemical formula - $C_{18}H_{15}N_3NaO_3S$

Sudan dyes are banned from being used in food. The contamination of chilli powder has caused widespread concern, as it could have genotoxic and carcinogenic effects.

D. Aim Of The Work

- i) To design, construct and achieve a food product adulteration detector kit.
- ii) To provide adulterant free food products to the community.

E. Problem Statement

Food defilement is a social malevolent and serious issue of each general public. The hindrances of Food Adulteration are more cash for a food item of lower quality and a few types of corruption are harmful to wellbeing.

The Purpose of doing food adulteration are:

1. To increase the quantity of food products for sale low cost to the customers
2. Increased demand for food products for rapidly growing population countries.
3. To make more profit from food items by producing poor quality.

Consuming Metanil yellow and Sudan dyes adulterated food products are harmful effects on human health.

RELATED WORK

[1]As of late, the issue of food verification has acquired consideration, particularly halal validation, in view of instances of pork debasement in meat. Numerous investigations have created fast recognition for defiled meat. Nonetheless, these investigations are not yet to reasonable and practical techniques and equipment's and a quicker examination measure. In this specific circumstance, The Optimized E-Nose System(OENS) for all the more precisely pork debasement in meat. This system has benefits, for example, legitimate commotion sifting, a streamlined sensor cluster, and upgraded support vector machine (SVM) boundaries. Commotion sifting is completed by cross-approval with various mother wavelets, i.e.The sensor cluster was advanced by measurement decrease utilizing head segment investigation (PCA). A calculation is proposed for the enhancement of the SVM boundaries.The characterized test results to an exactly 98.10% utilizing the enhanced help machine. In this way, Optimized Electric Nose system identify the pork adulterations.[2]Manure is a organic material used in agriculture in India, being the third biggest maker and shopper of manures, devours almost 40 million tons of compost materials, identical to more than 18 million tons of supplement, comprising of an assortment of nitrogenous, phosphatic, potassic and complex composts, obliging almost 106 million cultivating families. Corruption of composts includes the act of adding incidental material to a standard manure to bring down its quality. It is defence in numerous provinces of India and ranchers and enduring extraordinary misfortunes. As per tests did by Soil Research Development Institute (SRDI), almost 40% of all manures utilized by ranchers are defiled, as announced in a main Bangla every day. Blending of destructive compound substances debases ripeness of the land and causes genuine medical problems for people. Additionally, by applying such sullied manures, ranchers are cheated and creation endures. Despite the fact that the division of farming expansion alongside different organizations routinely test composts accessible on the lookout.[3]The red chilli quality is characterized by its pungency & colour.Here using hyperspectral camera for determine the Sudan dye and oil were presented in red chilli powder depends on the wavelength to observe the given samples to detect adulterants in red chilli. This result shows 97.86% correctly classified pure red chilli, adulterated with oil and adulterated in Sudan.[4]The concept of this paper was to investigate rice adulteration identification by THz spectroscopy. Five variety of rice samples were collected with different mixing ratios, absorption spectra was extracted from the samples, and extract the properties applied by PCA. The technology could quickly and effectively detect adulteration in rice. [5]The main think for survival is food for people, and meat is one of the most favourite food consumed by Non-Vegitarians. Therefore, a quality level of the food is main important for while consuming. There have been some cases of meat adulteration that can harm to consumers. Adulteration can lead to bacterial contamination, where the presence of bacteria in food is difficult to find without any equipment. Solution for this problem was Create a Applications to detect and classification of bacteria in food while applying machine learning algorithms to build predictive models to detect the presence of bacteria in such food items. A web application is built with package to a separate application that will display the bacteria is detected.[6]In this milk testing devise detect only five adulterants(Sodium Hydroxide, Sodium Bicarbonate, Ammonium sulfate and Sodium Chloride) mixed in milk with different fat content between (1.5% to 20%). The sensors particularly to determine the fat content in milk based on microcontroller[7]A way to detecting honey adulteration using electronic tongue sensors to measure the honey syrup depends on the properties of pure honey and adulterated. Mostly brown rice syrup was used for honey adulteration. The aim of this thesis is very quick and accurate work in packaging sector to provide information on such an important characteristic

honey adulteration[8]This study on this article was designed and conducted with the aim of determining the adulteration in chilli powder, turmeric powder, and coriander powder (these are main spices used in Indian kitchens). Several samples of the named spices were collected from de Vellore. Branded and unbranded samples were selected for the study to determine the degree of adulteration and the qualitative difference between them. The tests were conducted through chemical analysis of most products and visual inspection of some products. After testing, products that contained adulterants were identified in branded and non-branded foods. This study aims to raise public awareness of the important issue of food adulteration and various simple methods of detecting food adulteration in chilli, coriander & turmeric in physically & chemically [9]In this paper explained real time measurement of liquid samples. Using hybrid magnetoelastic wireless sensor to determine the adulteration in olive oil. Because in production area fruit oil or other kind of oil was mixed with Olive oil for getting more profits. Hybrid sensor are particularly programmed for determine the other kind oils were presented in olive oil in real time production sector. [10] In this article explained the dielectric method was determined the Olive oil adulteration. In this method, the system developed to sending dielectric voltage and then certain level of voltage received that sample will be adulterated. Adulterations are based on sunflower oil and rapeseed mixed in olive oil. [11]Turmeric is a main ingredient in tradition dish. Mostly Metanil yellow was mixed with turmeric powder in adulterated products. The FT-Raman and FT-IR spectroscopy to evaluate the spectral peak level of the turmeric powder to identify the metanil yellow in sample and it can be used to detect the chemical content in Turmeric using FT raman and FT IR spectroscopy. [12] To identify the dielectric property in corn seeds by using coaxial capacitor to measure. Dielectric properties of cord seeds and Humidity and moisture level to determine the adulteration in corn seeds.[13] In this article author taken 56 honey samples and to test between authentic honey and adulterated honey using Raman spectroscopy method to determine the honey adulteration an overall accuracy of 96% and adulterated honey accuracy of 90%. The proposed method can be seen as simple and quick to provide continuous concentration for detecting honey adulteration. Line information. [14]A quick strategy for deciding the dampness substance of milk powder by microwave sensor is explored. Alignment models of milk powder dampness content are set up utilizing the direct least squares technique. The outcomes anticipated by the microwave procedure are contrasted and that dictated by standard gauging technique. It shows that the maximal estimation deviation was 0.2%, in view of the microwave strategy, which gives a powerful instrument to deciding the dampness substance of milk powder in the dairy preparing industry.[15] Some variety of cantaloupe, water melon and honeydew melon was harvested particular size of the fruit for determine the dielectric measurements and humidity and solid soluble content. Determine the overall frequency range between (200MHz – 20GHz) in dielectric properties of the sample fruits based on moisture content of the there tissues and compare the frequency dependence of dielectric loss and constant of the fruit to identify the quality level the given sample fruits

OBJECTIVES

To design, construct and achieve a food product adulteration detector kit.

- Detect the metanil yellow and sudan dye which was presented on food products
- To provide adulterant free food products to the community people

METHODOLOGY

F. Arduino Nano

The Arduino board is planned so that it is extremely simple for amateurs to begin with microcontrollers. This board particularly is breadboard amicable is not difficult to deal with the associations. How about we start with driving the Board.

Microcontroller: ATmega328P

G. Photo Electric Sensor

Tcs3200 chip is meant to uncover the color of mild incident on that. it's an array of photodiode (a matrix of 8x8, so a complete 64 sensors). These photodiodes are included with 4 variety of filters. 16 sensor have red separate out over them thus can measure best the element of crimson within the incident light

H. Development Board

This Printed circuit board is useful to connect the more number of sensors and equally distribute the output power and Gnd from the Arduino nano

I. Lcd Display

Liquid-crystal display (LCD) 16x2 was used to display the output from the microcontroller. The first row of the can be print the output from the photo electric sensors, another can be print the dielectric properties of the red chilli powder.

J. Dielectric Method

A dielectric material is one which could be a bad conductor of electricity, however can assist electrostatic fields. due to this if the material is exposed to an out of doors electric powered area, the substance becomes polarized. this allows it to stay electric powered charge, making it a terrible conductor, however a wonderful garage medium. Dielectric materials are slice into kinds based on their state – solid, liquid, or fuel. Every type has differing dielectric residences and, due to its country, distinct programs.

K. Jumper Wires

Connect the components and transfer the analog and digital, input and output through the circuit

L. Power Adapter

It converts 230V to 12V to the Arduino board

M. Software

Software performs effective scheduling and contemporizing of events. The only software we use here is Arduino sketch.

i) Arduino Sketch

The Sketch is free or open-source Arduino software (IDE) makes it easy to work with Arduino boards and it runs on windows and other OS also. This software can be used with any micro controller based Arduino board. It is used to write instruction and dump it into the memory of Arduino board to make interfacing and synchronizing the data to microcontroller.

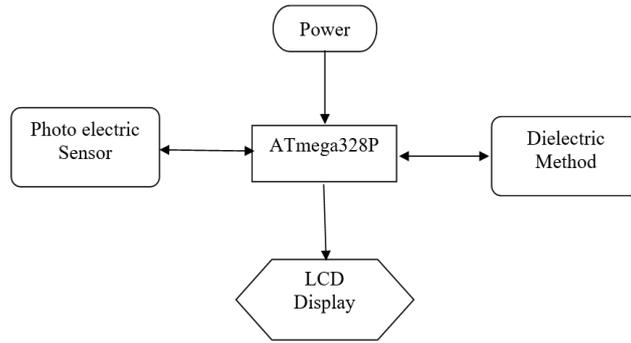


Fig 1: Block Diagram

OBSERVATION

The system was successfully implemented and tested and able identify the adulterated food products

ii) Turmeric Powder

S.No	Sample	Mixed	Result to be displayed
1	Sample 1	Turmeric powder without Metanil yellow	Unadulterated
2	Sample 2	Turmeric powder with Metanil yellow	Adulterated

iii) CHILLI POWDER

S. No	Sample	Mixed	Sending Frequency (0 – 200 MHz)	Receiving Frequency (130 – 150 MHz)	Results to be displayed

1	Sample 1	Pure	180MHz	134MHz	Un-adulterated
2	Sample 2	Sudan Dye	180MHz	105MHz	Adulterated

CONCLUSION

This experiment was performed to identify the Metanil yellow and Sudan dye were mixed with food products. Metanil yellow is a bright yellow colour its was used in turmeric powder to increase the quantity and colour quality of the product. Metanil yellow was affect the human health. In this project we are used photo electric sensors to captured the Metanil yellow in Adulterated turmeric powder. Then dielectric method to determine the chilli powder adulteration by sending the impedance frequency range up to 300Mhz then receiving the frequency range between (130-150 Mhz) to identify the unadulterated chilli powder if it is not in the frequency range that sample was adulterated while oil and Sudan dye presented on chilli powder.

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