IOT BASED MILK ADULTERATION DETECTION AND IDENTIFICATION OF A1 AND A2 TYPE

Project Reference No.: *47S_BE_0596*

College ***:*** Maharaja Institute Of Technology Thandavapura,Mysuru
Branch ***:*** *Department of Computer Science and Engineering*
Guide(s) ***:*** *Prof. Ashwini P*
Student(S) ***:*** Ms. Preethi K. D.
Mr. Karthik G. T.
Ms. R.Vaishnavi
Ms. Tejas K.

Keywords:

Arduino, pH sensor, Temperature sensor, LCD, TDS sensor, 4*4 Hexa keypad

Introduction:

Milk adulteration poses a significant threat to public health, compromising the quality and safety of dairy products. Traditional methods of detecting milk adulteration are often time-consuming, costly, and less reliable, necessitating the development of innovative solutions. An IoT-based milk adulteration detection system addresses these challenges by integrating advanced sensors, real-time data analytics, and wireless communication technologies. This system continuously monitors critical parameters such as pH, temperature, and conductivity to detect contaminants swiftly and accurately. Additionally, it employs genetic testing modules to distinguish between A1 and A2 milk types, catering to consumer preferences and health considerations. The use of a microcontroller, such as the ARDUINO UNO18F4520, ensures efficient data acquisition and processing, while cloud integration facilitates centralized data storage and analysis. A user-friendly dashboard and alert system provide stakeholders with real-time insights and notifications, enhancing decision-making and response times. This innovative approach not only bolsters consumer trust by ensuring milk quality but also supports regulatory compliance and strengthens the integrity of the dairy supply chain. By offering a scalable and adaptable solution, the IoT-based system is poised to revolutionize milk safety standards, contributing to improved public health outcomes and increased confidence in dairy products worldwide.

Objectives:

The objective of integrating intrusion detection mechanisms into smart irrigation systems is to enhance security and reliability in agricultural water management. By monitoring and responding to unauthorized access attempts or anomalous behaviours, the system aims to safeguard critical infrastructure and resources.

Methodology:

The goal of this study is to identify any contaminants in milk, such as urea, salt, water, detergent, etc. The addition of these materials to milk causes a change in pH, which can be detected using a pH sensor that produces an analog output. This analog output is then sent to the ESP32's analog pin, which interfaces with the microcontroller. After performing certain mathematical operations, the pH of the milk is determined and displayed on LCD displays. Similar to temperature and TDS sensors, electrical conductivity is measured for additional parameters, and the results are shown on an LCD.

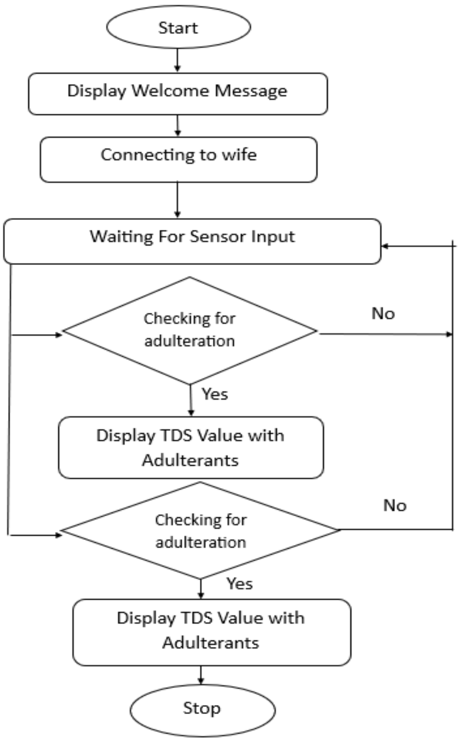


Fig : System Architecture

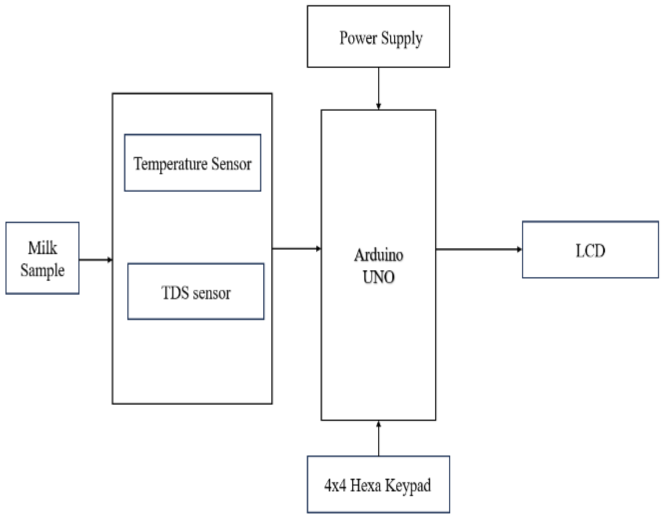
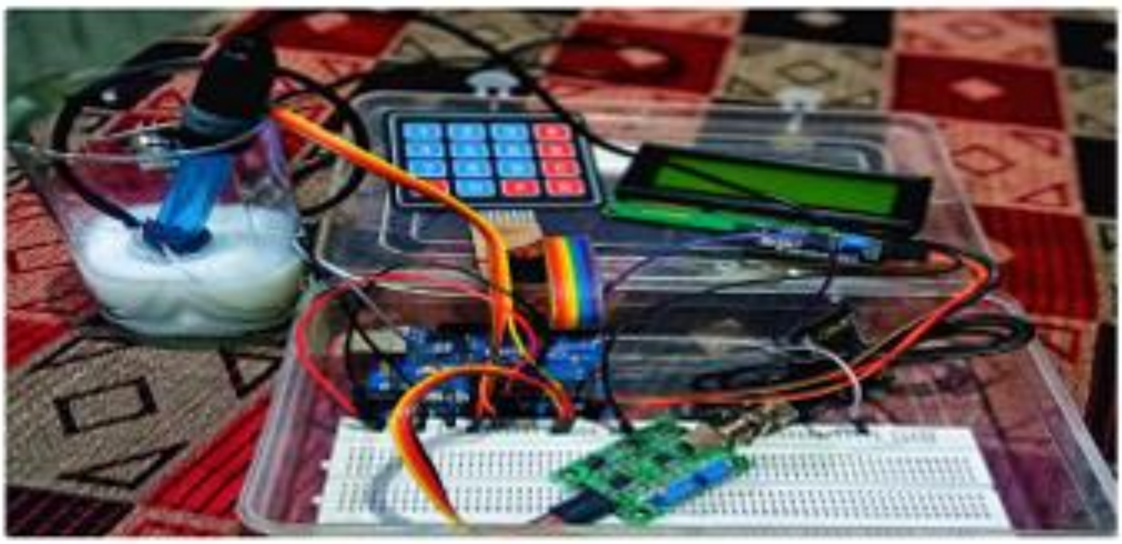


Fig : A schematic design for milk adulteration detection

Proposed IoT based device for milk adulteration detection consists of several major components, namely, the DS18B20 liquid temperature sensor; TDS Sensor; 20 × 4 alphanumeric LCD screen; 5V Power Supply; Arduino Mega 2560 microcontroller; and a 4 × 4 hex keypad are shown in fig1. Schematics of the overall system can be visualized.

Conclusion:

The result of implementing an IoT-based milk adulteration detection system with A1 and A2 milk identification is a robust, real-time solution that significantly enhances the safety and quality of dairy products. By leveraging interconnected sensors and intelligent algorithms, the system provides accurate and rapid detection of milk adulteration, identifying common contaminants and ensuring that the milk meets safety standards. Additionally, the system differentiates between A1 and A2 milk types, offering valuable information for health-conscious consumers and producers. Real-time data transmission to a cloud server enables continuous monitoring and centralized analysis, while a user-friendly dashboard and alert system provide immediate feedback and notifications to stakeholders. This comprehensive approach not only reduces health risks associated with adulterated milk but also increases consumer trust, supports regulatory compliance, and enhances the overall integrity of the dairy supply chain. The scalable and adaptable nature of the system allows it to be implemented in both small and large dairy operations, contributing to better public health outcomes and increased confidence in dairy products worldwide.



Scope for future work:

The future work scope of the IoT-based milk adulteration detection system with A1 and A2 milk identification is vast and promising. Building on its current capabilities, future developments can focus on enhancing sensor accuracy and expanding the range of detectable adulterants, thereby increasing the system's robustness and reliability. Integrating advanced machine learning algorithms can further improve the precision of adulteration detection and classification of milk types. Additionally, expanding the system's connectivity through the adoption of emerging IoT standards and technologies like 5G can enhance real-time data transmission and processing capabilities. Another significant area of development is the integration with blockchain technology to ensure immutable and transparent tracking of milk quality data throughout the supply chain, fostering greater trust and traceability. The system can also evolve to include automated compliance reporting, making it easier for producers to adhere to regulatory standards. Furthermore, scaling the system for global deployment, including adaptations for different types of milk and regional adulteration practices, can make this technology accessible to a wider market. Continuous user feedback and iterative enhancements will ensure that the system remains at the forefront of dairy safety innovation, ultimately contributing to global public health and consumer confidence in dairy products.