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Milk Quality Analysis and Grading using IoT

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Abstract: This paper presents the design and implementation of a smart milk quality analysis and grading system using IoT technology. Traditional methods of milk testing are time-consuming, laborintensive, and prone to human error, often lacking real-time monitoring and digital record-keeping. To address these challenges, the proposed system integrates multiple sensors—including pH, temperature, gas, alcohol, TDS (fat detection), and load cells—with a PIC18F4520 microcontroller and an IoT communication module (SIM800) for automated, real-time assessment of milk quality. The system leverages an optical method involving LEDs and LDRs to evaluate fat content based on light scattering properties, and it uses an electronic tongue (conductivity sensor) for advanced quality recognition. The collected data is displayed on an LCD screen and transmitted to an IoT platform for remote access, enhancing transparency and traceability in the dairy supply chain. This approach not only improves the accuracy and efficiency of milk grading but also reduces the dependency on manual processes, making it especially beneficial for rural dairy operations. Experimental results confirm the system's capability to reliably monitor critical milk parameters, and future improvements aim to enhance its accuracy and scalability for wider adoption in the dairy industry.

Keywords: Milk Quality Analysis, IoT, PIC Microcontroller, Sensor Integration, Dairy Automation



