Development of IoT platform for online milk quality and cow health and welfare monitoring

Group II,

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Introduction

Taking care of cows and ensuring their good health is very important in dairy farming. Healthy cows produce better-quality milk, which is safe for people to drink. Many farmers face challenges in maintaining the quality of milk and keeping cows disease-free.

One of the most common diseases affecting dairy cows is **mastitis**. This disease causes inflammation in the udder and affects the milk quality. If not detected early, it can lead to milk spoilage, loss of production, and economic problems for farmers.

Currently, most farmers test milk quality manually. This means that they take a sample of milk and check it in a laboratory. This process takes time, and mistakes can happen. Also, some diseases go unnoticed until they become serious. To solve this issue, we need a system that can monitor milk quality and cow health automatically.

Problem Statement

The traditional way of checking milk quality has several issues:

- It is **slow** and **time-consuming**.
- It can have **human errors** that lead to incorrect results.
- Some problems, like bacterial infections, are **not detected early**, leading to spoiled milk.
- Farmers **lose money** due to wasted milk and unhealthy cows.

To improve dairy farming, we need an automated system that continuously monitors milk quality and cow health in **real-time**. This system should provide quick results and help farmers take immediate action to prevent milk spoilage and cow diseases.

Proposed Solution

We propose developing an **Internet of Things (IoT)-based system** that will use sensors to check milk quality and cow health **automatically**. These sensors will be attached to milking machines to collect real-time data. The system will measure important factors such as:

- **Milk composition** (fat, protein, lactose levels)
- **Temperature** (to ensure proper milk storage)
- **pH levels** (to detect milk freshness)
- **Somatic cell count** (to identify infections like mastitis)

The collected data will be sent to a central system, where it will be analyzed. Farmers will receive updates through a **mobile app** or a **computer dashboard**, allowing them to take quick action if any issues are detected.

Technology Stack

To build this system, we will use the following technologies:

- **Backend (Server Side):** Python with Django Framework
- **Database:** MySQL or MongoDB (to store milk and cow health data)

- **IoT Sensors:** Arduino Uno, pH sensors, temperature sensors
- **Communication Protocol:** MQTT / HTTP API (to send data from sensors to the system)

Sensors & Actuators Used

The system will include multiple sensors to ensure proper monitoring:

- **Arduino Uno**
  Arduino is an open-source electronics prototyping platform based on flexible, easy-to-use hardware and software. It's intended for artists, designers, hobbyists, and anyone interested in creating interactive objects or environments

- **pH Sensor:** It measures the acidity level of milk to ensure it is fresh and safe to consume.

- **Temperature Sensor:** It monitors milk temperature to ensure it is stored properly and remains fresh.

These sensors will be placed in the milking equipment and will send real-time data to the system for analysis.

6. Implementation Plan

The project will be developed in different phases:

1. **Research and Sensor Selection:** Identify and choose the best sensors for the system.
2. **Backend Development:** Build the server using Django and set up the database.
3. **Sensor Integration:** Connect the sensors to the system and ensure they work correctly.
4. **Testing and Data Analysis:** Check if the system correctly detects milk quality issues and cow diseases.
5. **Deployment and Evaluation:** Install the system on dairy farms and monitor its performance.

Expected Outcomes

By developing this system, we expect the following benefits:

- **Early Disease Detection:** Farmers can identify mastitis and other diseases quickly, preventing further health problems.
- **Better Milk Quality:** The system ensures that only **safe and high-quality milk** reaches the market.
- **Reduced Milk Wastage:** Quick detection of contamination prevents milk from being wasted.
- **Improved Farm Efficiency:** Automating milk quality checks saves time and reduces human errors.

Conclusion

The **IoT-based milk quality and cow health monitoring system** will bring a major improvement in dairy farming. By using smart sensors and real-time analysis, farmers can take better care of their cows and ensure milk safety. This system will help reduce milk wastage, increase profits, and improve overall farm management.

With this technology, dairy farmers will have an **easy-to-use and reliable** method to monitor milk quality, ensuring that people get safe and high-quality milk.

Refference:

https://nyerekatech.com/?s=Mettler+Toledo+InLab+738+ISM&product_cat=0&post_type=product

https://www.faranux.com/product/arduino-uno/