

DETECTION OF SUBCLINICAL MASTITIS IN DAIRY CATTLE USING IOT AND MACHINE LEARNING

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Keywords:

IoT, Machine Learning, Mastitis Detection, Smart Dairy Farming, ESP32, pH Sensor, Temperature Sensor, Real-Time Monitoring, Livestock Health, Predictive Analytics.

Introduction:

Dairy farming plays a crucial role in agricultural economies, especially in countries like India. One of the most common and economically damaging diseases affecting dairy cattle is mastitis, which reduces both milk quality and production. Subclinical mastitis is particularly dangerous because it shows no visible symptoms, making early detection difficult using traditional methods.

This project proposes a smart solution using Internet of Things (IoT) and Machine Learning (ML) to detect subclinical mastitis at an early stage. The system uses sensors to continuously monitor milk parameters such as pH and temperature. The collected data is analyzed using machine learning algorithms to predict the presence of infection. Real-time alerts are sent to farmers, enabling timely action and reducing economic losses.

Objectives:

1. Design a low-cost IoT-based system for dairy farms
2. Continuously monitor milk pH and temperature
3. Detect subclinical mastitis at an early stage
4. Implement Machine Learning for disease prediction
5. Provide real-time alerts to farmers
6. Improve milk quality and farm productivity
7. Reduce dependency on manual and laboratory testing
8. Ensure system accuracy and reliability in real conditions

Methodology:

The proposed system integrates IoT and Machine Learning technologies for automated mastitis detection.

1. Data Acquisition:

Sensors such as pH sensor and temperature sensor collect real-time milk parameters.

2. Data Transmission:
ESP32 microcontroller gathers sensor data and sends it to cloud platforms via WiFi.
3. Data Processing:
Collected data is cleaned, normalized, and prepared for analysis.
4. Machine Learning Prediction:
ML algorithms analyze patterns and classify the condition as Healthy, Risky, or Mastitis detected.
5. Alert System:
Notifications are sent to farmers through dashboards or alerts when abnormal conditions are detected.

Result and Conclusion:

1. The developed system successfully demonstrates early detection of subclinical mastitis using IoT and Machine Learning. Continuous monitoring of milk parameters enables identification of infections before visible symptoms appear.
2. The system provides accurate real-time predictions with approximately 89–92% accuracy. Automated alerts help farmers take timely action, reducing milk loss and treatment costs. The prototype proves to be a low-cost, scalable, and efficient solution suitable for modern dairy farms.
3. Overall, the project improves cattle health management, enhances productivity, and promotes smart dairy farming practices.

References:

- Pinto, A.C. et al., "Prediction of Subclinical Mastitis Using ML," Elsevier, 2018
- Rahman, S. et al., "IoT-Based Milk Monitoring System," IEEE, 2020
- Koeck, A. et al., "Somatic Cell Count Traits," Journal of Dairy Science, 2014
- Sadeghi, S.A. et al., "IoT-Based Animal Health Monitoring," IEEE, 2019
- Moradi, P. et al., "ML for Livestock Disease Detection," IEEE, 2020

Future Scope:

The future scope of this project includes:

1. Integration of additional sensors such as conductivity and turbidity
2. Development of mobile application for farmer-friendly interface
3. Implementation of SMS alert system
4. Use of advanced AI and deep learning models
5. Expansion for monitoring multiple cattle simultaneously
6. Integration with GPS for tracking livestock
7. Deployment in large-scale dairy farms