www.ijbar.org
ISSN 2249-3352 (P) 2278-0505 (E)
Cosmos Impact Factor-5.86
https://zenodo.org/records/14631013

TRACKING AND MONITORING CATTLE S HEALTH USING WIRELESS SENSOR NETWORKS DOMAINS WSN)

Dr.RakeshKolluri[1],M.Sravanthi[2],N.Sriya[3],P.Praveena[4]

[1]AssociateProfessor,Dept.ofECE,MallaReddyEngineeringCollegeforWomens,Hyderabad,
[234]ResearchStudent,Dept.ofECE,MallaReddyEngineeringCollegeforWomens,Hyderabad

Abstract: *Maintaining the health of dairy cows is essential to raising the production of dairy products worldwide. Due to the numerous health problems that cows face, the unpredictability of disease outbreaks, and the high cost of producing new animals, dairy farmers are beginning to lose faith in the industry. To increase milk production, producers must thus employ effective technological methods for monitoring the health of their cows. This research examined many automated wireless sensor-based dairy cow health monitoring systems. The primary goal of smart surveillance systems based on wireless sensor networks (WSNs) in agricultural optimization is to continuously monitor the health of dairy cows. For interested farmers to keep an eye on their cattle's whereabouts throughout the day from many locations, this monitoring device needs to be deployed in both local and remote agricultural areas. A database would hold the information gathered by the automated system. Farmers can then use farm automation to acquire data so they can implement efficient farm management practices. Moreover, WSN is a low-cost tool designed specifically to detect diseases in dairy cows. This technological advancement in agricultural automation would help increase output by lowering the need for human intervention. This page provides an overview of all livestock tracking methods along with a summary of the problems and difficulties they face*

Keywords: DairydevelopmentSmartsurveillanceWirelesssensornetworksautomationZigbee

I. INTRODUCTION

A key factor in the economic development of developed countries like India has been dairy farms. The manufacturing of dairy products benefits the world's food industry. The world's most populous nation, India, produces the most milk annually. For the longest time, milk has been thought to be the most profitable of all the available dairy products. It is estimated that the Indian market for dairy goods, specifically milk, will be valued at Rs. 2,000 billion. Many milk processing plants are now being built in various locations. In the last forty years, India's annual milk production has nearly quadrupled, from 21 million tonnes in 1968 to 108 million tonnes in 2008–2009.

India produced 146.3 million tons of milk in 2014–2015, according to the country's Agricultural Ministry's section responsible for animal husbandry, fishery, and dairy development [1] – [5]. Every two years, the market for value- added milk products including probiotic drinks, cheese, and Indian yogurt doubles. It has been emphasized that to meet the current demand for milk products, processing milk products must be self-sufficient. One of the most common diseases that kill animals is foot and mouth disease (FMD), which has a major financial impact on many wealthy countries [6]– [10]. In addition to basil FMD, there have also been outbreaks of anthrax, black quarter, bovine mastitis, and infected bovine feces in household pets.

It is imperative to introduce farm science equipment for dairy animal health monitoring to tackle these diseases and reduce production expenses. The sensors' two main objectives would be to collect disease data and lower the cost of long-term health insurance for animal milk. Body temperature is calculated by farm optimization using wireless sensor networks (WSN), which is essential for diagnosing animal illness. Transducers are used in wireless transmissions to directly detect abrupt changes in an animal's body temperature. This study covers the wireless animal body temperature monitoring technique, which develops computational technologies to continuously estimate animal health information, in addition to the operation of WSN

www.ijbar.org
ISSN 2249-3352 (P) 2278-0505 (E)
Cosmos Impact Factor-5.86
https://zenodo.org/records/14631013

Measurements of the physiological state of animals and the costs associated with infrastructure support the expansion of knowledge aimed at improving the well-being and productivity of cattle. Among the key elements of farm automation systems are cattle monitoring, body conformation evaluation, and effective physiological factor monitoring. The most information possible is ensured by data from mathematical models, intelligence libraries, and sensors. Conversely, farmers must invest more time and resources in continual observation. Due to several inevitable animal care problems, farmers are unable to maintain constant eye surveillance.

To help rural populations, a clever approach to livestock healthcare apps needs to be developed [11] – [15]. Consequently, improved agricultural farming technologies are being combined with state-of-the-art information systems for assessing animal behavior and tracking biological reactions. The processes, analysis, and monitoring that are frequently included in the cow health monitoring kits that are provided help livestock owners predict illnesses that lead to outbreaks. These methods will check the health of any cattle and give the owner and veterinarian information. Consequently, the electronic livestock production business is one of the fastest growing. The suggested study focuses on minimizing infectious diseases including mastitis, ketosis, and milk ferries by employing WSNs to monitor animal welfare. [16]–[20].

The purpose of this project is to develop a system that will allow farmers to monitor any decline in the health of their cattle by comparing the animal's actual health indicators to the typical reference safe values. An Arduino Uno, Arduino Nano, Xbee board, and other sensor devices for documenting cow physiological conditions were used to build such a device for real-time use. The features of cows' body humidity, heat, heart rate, and introspection are covered on this page [21–25]. The web-based cow health tracking system offers precise and significant health criteria for the cattle; these criteria are especially helpful in tracking the health status of the cattle and identifying any alterations in behavior or health issues. As mentioned earlier, there are benefits and drawbacks to the practice.

Zigbee network modules One calf can only be watched at a time, the system becomes cumbersome, the Zigbee module's capability is limited, and farmers might not be able to afford the expense of lab view. A visual computer language framework's design and development environment is called Lab View [26]–[29]. Right now, it's unknown where the animals are. Due to a lack of capability, users of the existing system are unable to locate cattle on the property. It is imperative to monitor the whereabouts of the bovine in case the farm is very big and it becomes unwell. This is because the bovine will be unable to relocate from its current place.

Farmers have no idea when one of their animals becomes ill. Numerous ailments have targeted the livestock. Farmers don't know their cattle are sick, and they don't get informed when anything unexpected happens to them. Cattle cannot be handled by farmers at the appropriate moment as a result, intensifying the sickness. It takes a very long time to finish. The current setup is ineffective. It takes longer for farmers to examine the animal in person than it does to use an automated device to assess whether it is ill.

II. PROPOSED ARCHITECTURE

Numerous devices for taking body temperature through the ear or through a bolus have been described. The inner ear is the least invasive and most accurate method for monitoring body temperature because it runs parallel to the earmark. The FeverTag, a tympanic temperature probe device, is one of the sensor-based instruments used to measure the temperature of cattle. When the temperature rises above 103.6 °F, this type of probe, which is attached to the ears and is situated in the bottom middle ear, flashes an alert. The CorTemp bolus is an additional gadget technique for taking body temperature. Signals are weakened by moisture, which causes data loss when wireless components communicate. The amount of humidity collected on the farm can be utilized to calculate the depletion of signal intensity. Moreover, the temperature data collected during the day serves as a benchmark for the heat of the cows. The correlation between body temperature and pulse rate was also confirmed using the CorTemp bolus.

Animal health monitoring systems (AHMS) have been developed using Zigbee communication because it is a low-cost, highly accurate, self-configuring, and energy-efficient communication technology. Applications for Zigbee communication are widely recognized and include telemedicine services, smart buildings, smart farms, smart vignettes, environment monitoring, and other industrial applications. Zigbee module operates in the 2.4 GHz band; nevertheless, it uses UART for serial data transmission and reception. X-CTU software is used to set up the Zigbee module [1].

www.ijbar.org
https://zenodo.org/records/14631013 ISSN 2249-3352 (P) 2278-0505 (E)
Cosmos Impact Factor-5.86

With this method, a microphone is used to identify the beginning of each pulse and the time interval between pulses is translated into a heartbeat. Polar pulse belts are frequently used to track an animal's heart rhythm; electrodes in the belt identify the animal's heart's direction. The cow's nostril is punctured, and a thermocouple is inserted to track the animal's breathing. As the cow exhales, the thermistor's output increases proportionately to the surrounding temperature. Count the number of times per minute that the temperature rises and falls to determine the respiration rate. Triangulation is one of the most widely used techniques for tracking wireless communications. This technique uses the time difference between signal delivery at three separate antennas to determine a point's position. Global positioning systems currently use data from multiple satellites to determine location. Early signs of bovine sickness include a decrease in red blood cells and an abnormal heart rate. Transmissive pulse oximeters are used to monitor these vital signs in animals.

However, a diffused pulse oximeter is utilized to calculate these vital signs in cattle. With a maximum broadcast capacity of 67 mW and a maximum transmission range of two miles, the XBee computer is a widely used wireless transmitter. Since XBees are tiny—roughly the size of a penny—they can be conveniently integrated into an ear label.

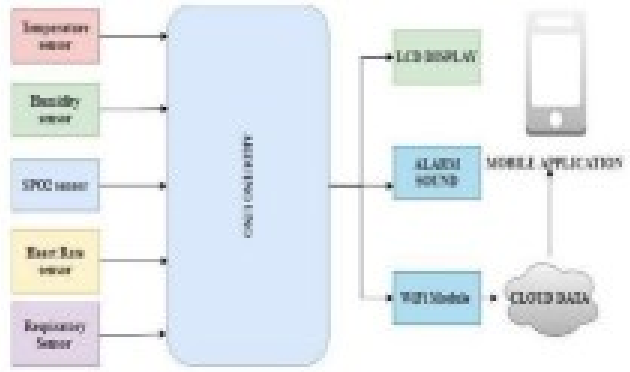

Fig 1: Block diagram of the proposed system

It was agreed that all WSN data would be supplied over a wireless link and attached to a specific area in order to avoid any disruption to the buffalos' everyday routines. The primary goal of WSN-based intelligence surveillance systems in farm optimization is to continuously check on the welfare of dairy cows.

This monitoring device should be deployed at both physical and virtual farm sites so that interested farmers can monitor the movements of their animals from many locations throughout the day. The automated device may produce data that is all saved in a folder. The information gathered by farm automation can subsequently be utilized to apply appropriate farm management strategies. Another free program is WSN, which was developed mainly to diagnose ailments in agricultural animals.

III. TECHNOLOGY

Wireless Sensor Nodes:
Small, low-power sensors are attached to cattle for data collection. IoT
Gateway:
Device to collect sensor data and transmit it to the cloud or central server Remote
Monitoring:
Mobile or web interface for farmers to monitor cattle health remotely. Data
Analytics:
Algorithms to detect health issues and anomalies in cattle behavior or vital signs. Alert
System:

Index in Cosmos
Dec 2024, Volume 14, ISSUE 4
UGC Approved Journal

Notificationsforfarmersorveterinariansincaseofabnormalhealthconditions.

IV. ADVANTAGES

- Real-Time Monitoring.
- RemoteAccessibility.
- Improved Animal Welfare.
- ReducedLaborCosts.
- EarlyDiseaseDetection.
- Optimized Breeding Programs.
- Increased Productivity.
- Cost-effective management.
- Environmental Monitoring.

V. APPLICATIONS

- Livestock Management.
- HealthMonitoring.
- Reproductive Health Management.
- Nutrition Management.
- Environmental Monitoring.
- Disease Surveillance.
- Stress Detection.
- Asset Tracking.

VI. CONCLUSION

Cattle management techniques and the problems they create are covered in this study. Farmers still have to overcome several obstacles even with the development of numerous cow health monitoring technologies. WSN can therefore be used to track cow health to identify illnesses and stop them from spreading. WSNs provide scalable network topologies without requiring a wired network. Numerous researchers are present, keeping an eye on things and gathering data in different ways. Apart from that, it appears that several businesses are creating and marketing tracking devices. This is a quickly developing field where passive monitoring systems are being replaced with more sophisticated ones. The recommended algorithm will probably be applied in a farming experiment, while there's a chance that its workings will be investigated further in a related field. Additionally, the possibility of using robots to assist a person in identifying cattle that aren't feeding or drinking adequately exists. Furthermore, the routers may run on solar power, which would increase the system's ecological friendliness.

REFERENCES

[1] Chawla, N. Chawla, Y. Pant, and P. Kandhari, Milk and dairy products in India–production, consumption and exports. Bhopal, India: Hindustan Studies & Services Ltd., 2009.

[2] J. Yick, B. Mukherjee, and D. Ghosal, "Wireless sensor network survey," Computer Networks, vol. 52, no. 12, pp. 2292–2330, 2008, doi: 10.1016/j.comnet.2008.04.002.

[3] Kiani, F., 2018. Animal behavior management by energy-efficient wireless sensor networks. Computers and electronics in agriculture, 151, pp.478-484.

[4] Canadian Journal of Veterinary Research, vol. 66, no. 2, pp. 122–124, 2002.

[5] E. S. Nadimi, R. N. Jørgensen, V. B. -Vidal, and S. Christensen, "Monitoring and classifying animal behavior using ZigBee-based mobile ad hoc wireless sensor networks and artificial neural networks," Computers and Electronics in Agriculture, vol. 82, pp. 44–54, 2012, doi: 10.1016/j.compag.2011.12.008.

[6] In2016, Yang, C.J.; Ahmed, S.T.; Mun, H.S.; Islam, M.M.; Yoe, H.

[7] Using a ZigBee-based wireless acceleration sensor with received signal strength indication, researchers are tracking the health of experimentally infected weaned piglets to detect any symptoms of sickness. Journal of Animal Sciences in Asia-Australia, 29(1), p. 149.

[8] 2015 saw the development of an efficient biosensor-based cow health monitoring system by Park, M.C., and Ha, O.K. Science & Technology, 117, 180–185.

[9] Kwong, K.H., Wu, T.T., Goh, H.G., Stephen, B., Gilroy, M., Michie, and Andonovic, I., 2009. Wireless sensor networks in agriculture: Cattle monitoring for farming industries. Piers Online, 5(1), pp. 31-35.

[10] A. B. Lukonge, R. S. Sinde, and S. D. Kaijage, "Review of cattle monitoring system using wireless network," International Journal of Engineering Anf Computer Science, vol. 3, no. 5, pp. 5819–5823, 2014.

[11] S. Joshi and S. Gokhale, "Status of mastitis as an emerging disease in improved and periurban dairy farms in India," Annals of the New York Academy of Sciences, vol. 1081, no. 1, pp. 74–83, 2006, doi: 10.1196/annals.1373.007.

[12] Y. S. Joo, S. H. An, O. K. Kim, J. Lubroth, and J. H. Sur, "Foot-and- mouth disease eradication efforts in the Republic of Korea,"

[13] Dukki Kim1, Hyun Yoe, "Cow Monitoring System based on Event using Wireless Sensor Network", Advanced Science and Technology Letters Vol.95 (CIA 2015), pp.173-176