

# A Review on Cattle Health Monitoring in Wireless Sensor Networks (WSN)

<sup>1</sup>Kavya Priya M L, <sup>2</sup>Bhat Geetalaxmi Jayaram

<sup>1</sup>PG Student, <sup>2</sup>Associate Professor  
NIE, Mysuru, India  
Department of ISE,

**Abstract-** Wireless Sensor Networks (WSN) has got applications in various fields employed in commercial, industrial, environmental, home, military and health care. Animal Health Monitoring is one such application in WSN. By using this, cattle health can be monitored in real time based on some parameters with different types of sensors. This paper describes about various sensors that are used in wireless sensor network to monitor the cattle health in order to prevent the harmful diseases that can cause severe effects in Farming.

**Keywords-** wireless sensor networks; accelerometer sensor; zigbee.

## I. INTRODUCTION

Wireless Sensor Network is known as infrastructure less network which can be self-configured and can contain thousands of sensor nodes in it. WSN can be used to monitor the environmental conditions such as temperature, motions, pollutants, pressure, sound, vibration, humidity etc. It can also be used to monitor the physical conditions such as body temperature, heart rate, movement of the body.

Technology is playing a significant role in health care systems. It is playing a vital role in modern farming. Electronic livestock farming is the biggest area where much development has been done in past few years. An animal health monitoring system is one which is used to monitor the physiological parameters such as body temperature, surrounding temperature like environment, heart rate, rumination, body movement.

In recent years, livestock farmers are facing much problems related to cattle's health. Variation caused in temperature may affect the cattle's health leading to various diseases like foot mouth disease, mad cow disease which can be easily spread into human beings. Variation caused in heart rate leads to myocardial disease lymphosarcoma, Tachyarrhythmias, tachycardia in sinus rhythm disease in cattle.

Thus, a system should be there which can monitor the cattle's health related parameters. So that prevention of diseases can be done and also a good health can be maintained.

## II. TYPES OF SENSORS

There are different types of sensors in wireless sensors network , that are as follows:

- Temperature sensor
- Humidity sensor
- Heart rate sensor
- Accelerometer sensor

### A. Temperature sensor

Temperature sensor is one which senses the temperature and measure it. It can be used for both environment and body of any animal. For the normal working of any system, temperature should be in constant state. If there is any variation in it, it shows an ill health occurred and also causes certain severity in cattle's health. Temperature sensor is used to monitor the temperature of cattle. Similarly, other temperature sensor is used to determine the environmental temperature surrounding the cattle. Body will work correctly at only specific temperature. Normal body temperature of cattle ranges in 101.5 °F (38.6 °C). various temperature sensors are thermistors, LM35 which is an IC temperature sensor.

### B. Humidity sensor

It is also known as Hygrometer. Water present in air is nothing but humidity. The quantity of water vapour present in air really affects the human's health as well as cattle's health. Since metabolism and various behaviour is affected by humidity, it should be properly monitored. Humidity sensor is used to determine the change occurred in environmental conditions. Relative humidity should be in between 30% to 70%. Various humidity sensors are there. AM1001 is an analog humidity sensor.

### C. Heart rate sensor

Heart rate is one of the important parameter when the health is monitored. It indicates stress and irritation occurred upon any animal body. Variation occurred in heart normally shows stress, anticipation, movement, exertion and various diseases. Normal heart rate ranges between 48-84 beats per minute in cattle. There are many heart rate sensors such as Polar spot tester (PST), PC-3147.

### III. RESEARCH GAPS AND ISSUES

In [1], proposed a system for Zigbee Based Health Monitoring and Feedback System in Animal Health Care. In recently, wireless sensor networks are used to structure Remote care system in many researches. Wireless sensor networks application for physiological signals communication transmission has many technologies. Such as the ZigBee, used for physiological signal transmission. Although ZigBee has lower power consumption. Hence, ZigBee is used for 24 hours monitor of communication transmission systems. ZigBee provides higher network flexibility and a larger number of nodes, and a better transmission range with low power consumption. Large number of nodes enables the expansion of such systems. Recently, ZigBee based wireless networks were check in various applications. The proposed Animal monitoring system would be beneficial for medical practitioners to do proper and treatment also it would be useful for health care providers to improve disease management.

In [2], proposed Smart Health Monitoring System for animals. Clinical techniques for monitoring livestock health are insufficient, as they provide only sporadic information and required too much resource investment in terms of time and veterinary expertise. The animal health monitoring system that is allocating hardware which will mount on the animal body, at present there are no such systems which will provide on current status of the animal. At present to detect the health status of animal we required to wait for veterinary expertise which take long time for its arrival. This system will not only improves the individual animal health, but it also identifies and prevents widespread of diseases, whether it originated from natural causes or biological attacks. Such a system would help in early diagnosis of diseases. It consists of different sensors like, temperature, heart rate, rumination, humidity. For the implementation of sensor module, they have used zigbee device and arduino microcontroller.

In [3], have focused on the polar sport tester for cattle health rate measurement. According to (Hopster, Janzekovic, Aerts) the change of heart rate can be relevant parameter, when studying the response of animals to stress. This is in correlation with findings in human beings. Successful grazing in developed agriculture caused for automated and efficient monitoring and control of the animal. In India every village farmer faced the cattle health problem around the world because of the rise in air temperature. such as the heart rate is the major problem of cattle health monitoring system.

### IV. REVIEW AND ANALYSIS

Table 1 Review the literature of cattle health monitoring using different sensors based on parameters.

**TABLE 1. LITERATURE REVIEW**

Authors	Methods	Implications
Rajshree S. Thakre, Prof. Vidya Bodhe , [1]	Zigbee based health monitoring	Zigbee has low power consumption with better transmission range. Proposed system is beneficial for medical practitioners to do the treatment.
Anushka Patil, Chetana Pawar et al, [2]	Smart health monitoring system using arduino microcontroller	System is mounted on animal body to get current status. As waiting for veterinary expertise requires long time for arrival, present system improves animal's health.
M. Janzekovic, P. Vindis, [3]	Health monitoring using Polar sport tester for cattle heart rate	Since heart rate reflects stress. It is important to monitor that correctly. it is done using polar sport tester.
Anuj Kumar and G. P. Hancker, [4]	Animal Health monitoring based on IEEE 802.15.4	System uses IEEE 802.15.4 for low cost requirement, fast response and low power consumption.

B. C. Baker, [5]	Health monitoring using Thermistor	Variation in temperature leads to diseases. As thermometer can't be used to measure the temperature of cattle, this system uses thermistor to monitor the temperature of cattle.
Anuj Kumar and Gerhard P. Hancke, [6]	Zigbee based animal health monitoring system	System gives idea to detect various parameters concerned with animal health. Thereby making easy to diagnose various diseases as well as helping farmers to do proper livestock management.
J. I. Huircanet al.,[7]	Zigbee based WSN for cattle monitoring	Bluetooth is the upgraded version of zigbee. Which covers large network for low power wireless LAN's. the LQI-based algorithm is used for cattle health monitoring application.
I. Korhonen, J. Parkka, and M. van Gils,[8]	Health monitoring	System with technical requirements for health monitoring system that is based on the wearable sensors and ambient sensors are discussed.
E. Lindgren, [9]	Validation of rumination measurement equipment and its role in dairy cow	Focused on measuring the stress response in cattle in order to estimate the stress by using RuminAct system.

## V. CONCLUSION

A literature review about cattle health monitoring using various sensors in wireless sensor network is presented in this paper. In this survey, various sensors that are used to monitor the cattle's health is studied based on several research papers. Usually veterinary expertise diagnose the cattle's health manually which requires so much time. Different sensors are used to sense the data related to cattle's health and then outputs of all these sensors are processed by a microcontroller. Using any transmission module, data sent by microcontroller will be received and sent to any PC. A caretaker or any expertise can able to understand the status about cattle's health.

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