

Monitoring and Tracking of Cattle Using IoT

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Abstract. The scale of maintaining the dairy worldwide had changed with a move towards larger, more intensive, profit-driven enterprises, primarily due to market pressures. Productive cattle health monitoring can help the farmers as well as the landlords who can regularly monitor the poor health condition of their cattle and intimate the unavailability of veterinary. The main focus of our project is to avoid the condition of emergency, reduce cost, labour inputs while increasing farm productivity and also help in diagnosis of cattle's diseases in the early stage.

Keywords. Monitoring, tracking, IoT.

1. Introduction

Now-a-days features is not only decided by the overall environment and security of the ending product but also by the animal's welfare's status by which is produced [1]. When we develop the animal's health on time it will not affect the quality of product, pathology and safety. The financial and common activities of human culture is very important in developing countries like India where many people depend on livestock-based activities [2]. The unavailability of veterinarians in rural areas makes the farmers to meet the condition of emergency. But such a move can demand the life of cattle and also can lead to death. Daily ranchers produce greatest staple sustenance in the world i.e. milk. The quality and security of milk and its results are completely related to provisions of sanitization and atmosphere [3]. Good sanitization does help to increase the quality and importance of the product and basically establish accomplishment or failure of a dairy ranch. In primitive days skilled ranchers use to observe their cattle for several hours because to understand their health complications but at the present stage the observation is reduced.

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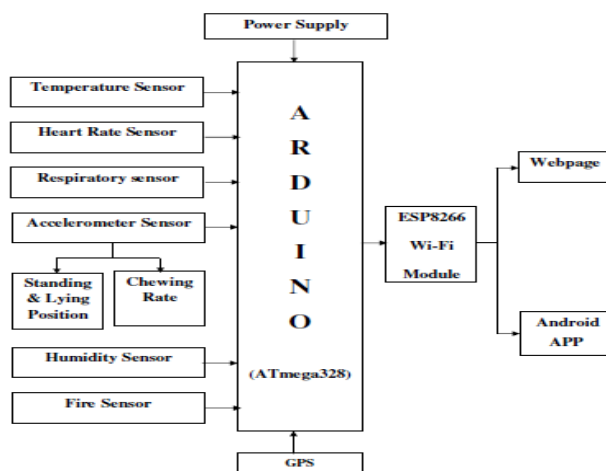


Figure 1. Hardware setup of proposed systems

2. Existing system

In some cases, we are under difficulties to monitor more cattle in a huge farm. So, here we used cattle collar with some parameters to monitor the health and movement of the cattle [4]. The various types of sensors such as temperature sensor, heart beat sensor, respiration sensor, accelerometer sensor, humidity sensor, fire sensor, GPS and Wi-Fi are being attached to the cattle.

2.1 Normal levels

The normal levels of each parameter for the cattle is fitted up. For example, body temperature of cattle is 38.5°C to 39.5°C, heart beat rate of cattle is 48 to 84 beats per minute, respiration rate of cattle is 26 to 50 breaths per minute [5]. The environmental changes also important like humidity and heat. When crosses the normal level the information is transmitted through the Wi-Fi to the web page. So, the treatment can be given at a early time. By this process we can overcome the drawbacks [6]. It is more important to maintain the cattle because cattle are more sensitive so that they are easily infected. By this we can maintain more cattle at a time in huge farm also, when owner is at long distance can also know about the condition of the cattle [7].

The collar is fitted to the cattle and the cattle are allowed to graze in the field. The sensors monitor the normal condition of all parameters. If any deviation occurred in the cattle then it observes which parameter is at deviation and sends message to the Arduino UNO [8-9] as analog signal from there it is transmitted to the Wi-Fi module from the module the message is displayed in the web page as digital parameters. So, with a clear detection we can approach the veterinarian at the earliest time. So, by this we can treat the cattle, can maintain the sanitation and results in giving a quality milk to the consumers.

3. Proposed system

The connection between the farmer and the cow was lost, when the manual procedure to collect milk was replaced by the milk pumping technology. In olden days, there were no special veterinarians. The farmers used to know the condition of the cow

regularly by touching the udder of the cow. When pumping machines helped them to extract milk, they started to unrealised the fact of traditional method. Hence the connectivity is regained with the help of our collar, which will intimate the landlord as well as the farmer and prevents the condition of emergency. The application has a user interface which enables the farmer about the cattle. The parameters such as temperature, heartbeat, humidity, standing or lying position and also its accurate location with the help of easily available non-invasive sensors. The farmer can not only enter the details of a cattle but also he can add the entire count of his farm animals like cow, goat, pig, turkey, etc by enabling collar for each animal.

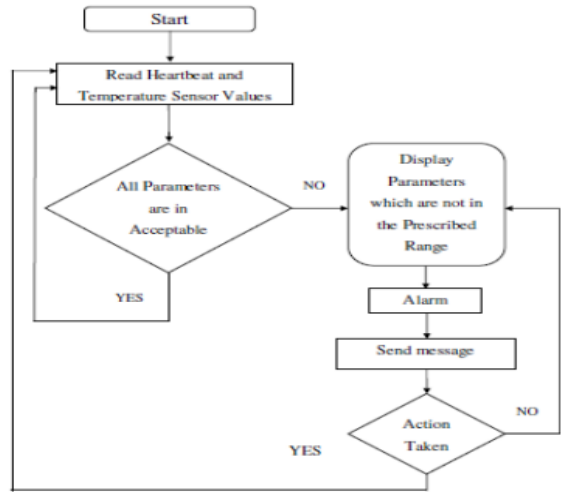


Figure 2. Flow chart of proposed system

3.1. The condition of emergency

3.1.1 Location of the cattle is not monitored

Tracking of cattle is more important, in some cases the cattle may got affected by disease. Those periods they can't move and get strucked in a huge farm, at that time tracking plays major role. But the existing system does not provide those features.

3.1.2 Famers are unaware when the cattle are affected by diseases

When the famer carelessly missed to notice the abnormal change of the cattle. This may lead to the sever health issues for the cattle.

3.1.3 Time consuming

The existing system is time consuming. As the farmer have to check whether the cattle were affected by any sort of diseases, which require more time.

4. Technological Stack

For IoHT wireless sensor network will become major technology. So, to monitor cattle health five sensors are used i.e. Temperature, respiration, humidity, heart beat

and accelerometer (for chewing and standing & lying position). Then the values are viewed in the web page and android app. In this project we are going to give the brief introduction to all such system with their advantages and disadvantages to summarize a best system for cattle health monitoring.

5. Block diagram of Proposed System

It is explained that the various types of sensors such as temperature sensor, heart beat sensor, respiration sensor, accelerometer sensor, humidity sensor, fire sensor, GPS and Wi-Fi are being attached to the collar.

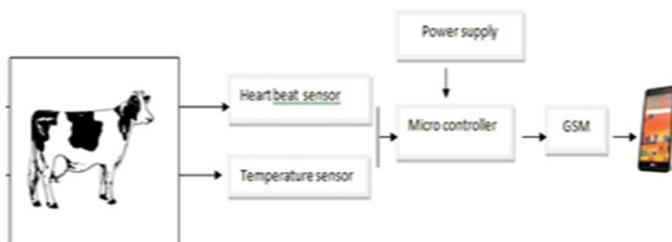


Figure 3. Block diagram of Proposed System

The environmental temperature and humidity also play a major role which affects the intake and milk production of the cattle. The DHT11 sensor which measures both humidity and temperature. Through ESP 8266 Wi-Fi module the sensor values have been transmitted to the internet, where the data has been displayed in the webpage. By the real time monitoring app, the parameters are monitored in mobile. This app sends the values for farmer, doctor and the landlords, which is more helpful in monitoring the health of the cattle.

5.1. Desired level of each sensor

5.1.1 Temperature sensor

LM35 is used for temperature sensor. The normal range is 38.5-39.5°C. When temperature decreases from normal range are milk fever, poisoning, indigestion etc. When the temperature is more than 41°C, the diseases which would occur are anthrax, influenza and foot & mouth disease.

5.1.2 Heart beat sensor

The normal range of heart beat range for adult is 48-84 beats per minute. When beat goes beyond this limit it indicates stress or animal anxiety.

5.1.3 Respiration sensor

Respiration rate of cattle is 26 and 50 breaths per minute. When the respiration rate of cattle increases it represents stress or pain or weakness or may be a sign of respiratory disease. Cattle panting at above 100 breaths per minute are under severe heat stress.

5.1.4 Acceleration sensor

The ADXL337 uses a single structure for sensing the X&Y axes. As a result, the two axes sense directions are highly orthogonal with little cross-axis sensitivity. The power supply can be of the range between 1.8 - 3.6V. The two sensors are used for finding the position (standing and lying position) and chewing rate of the cattle from the analog output which is got. 15

5.1.5 Humidity sensor

It will have 3 to 5V power supply. It helps to monitor both, the moisture and air temperature of the farm. It works well for 20-80% humidity readings with 5% accuracy and 0-50°C temperature readings $\pm 2^{\circ}\text{C}$ accuracy. Since the humidity and air temperature affects the cattle's health it is required to be monitored.

5.1.6 Sensor description

In our project we are typically measuring five parameters temperature, heart rate, respiration rate, chewing rate, standing and lying position of cattle along with atmospheric parameters such as temperature, humidity and fire alert.

5.2 Application sensor

The parameter monitored and outputs are displayed in the application in four steps.



Figure 4. Display of home screen



Figure 5. App after getting values



Figure 6. App before getting values



Figure 7. Notification of the parameters sent To the veterinarian through SMS.

References

- [1] Leena Narayan, Dr. T. Muthumanickam and Dr. A. Nagappan. Animal Health Monitoring System using Raspberry Pi and Wireless Sensor. International Journal of Scientific Research and Education (IJSRE), Volume 3 Issue 5, May 2015.
- [2] Anselemi B. Lukonge, Dr. Shubi Kaijage and Ramadhani S. Sinde. Review of Cattle Monitoring System using Wireless Network. International Journal of Engineering and Computer Science (IJECS), Volume 3, Issue 5, May 2014. L. Nag I. R. Schmitz, S. Warren, T. S. Hildreth, H. Erickson and D. Andresen, Wearable Sensor System for Wireless State-of-Health Determining in Cattle.
- [3] S. Monicka, C. Suganya, S. Nithya Bharathi and A. P. Sindhu. A Ubiquitous Based System for Health Care Monitoring. International Journal of Scientific Research Engineering and Technology IJSRET, ISSN 2278-0882, Volume 3, Issue 5, July 2014.
- [4] Lenka S. Kand Mohapatra A. G. A Novel Approach of Cattle Health Monitoring System Based on Wireless Sensor Network for Early Detection of Disease. Journal of Grid and Distributed Computing ISSN: 2249-7056 & E-ISSN: 2249-7064, Volume 2, Issue 1, 2012, pp. 15-19.
- [5] Khatal Sachin Saheb Rao "GPS/GSM Based Animal Tracking and Health Monitoring System", International Journal of Engineering Education and Technology (IJEET), ISSN 2320-883X, Volume 3, Issue 2, April 2015.
- [6] E. S. Nadimi, R. N. Jorgensen, V. Blanes and Vidal, S. Christensen. A Monitoring and Classifying Animal Behavior using ZigBee-Based mobile Adhoc Wireless Sensor Networks and Artificial Neural Networks. 7 June 2011.
- [7] A Hybrid Petri Net Approach for Polyethylene Terephthalate Bottle Manufacturing System B Muthu raj, V Mahesh, R Senthil - Journal of Computational and Theoretical Nanoscience, 2016
- [8] Simulation of Three Tank System Using Hybrid Petri Net for Batch Process Dr. R. Senthil B. Muthu raj, Dr. V. Mahesh 2015/11/2 International Journal of Applied Engineering Research 4789-4798 Research India Publications.
- [9] Pratiksha W. Digarse, Sanjaykumar L. Patil. Arduino UNO and GSM based wireless health monitoring system for patients, 2017 International Conference on Intelligent Computing and Control Systems (ICICCS), 2017