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Advance Cattle Health Monitoring System Using Arduino and IOT

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ABSTRACT:now a day's human can't imagine their life without technology. Surrounding us diverse technologies are helping people to live their lifestyles with more luxury. The era has modified and developed many projects such as Advanced Cattle health Monitoring System using Arduino and IOT. In the Wireless Sensor Based cattle health monitoring system, critical parameters affecting cattle health which includes body temperature, respiration, humidity, heart beat and rumination are continuously monitored. In this framework, Arduino UNO microcontroller is utilized to sense the various activities of animals like body temperature, respiration, humidity, heart beat and rumination. ESP8266 Wi-Fi module is used as transceiver. The i-Chart app is used to display the graph.

KEYWORDS: Arduino UNO, Sensors, IOT, ESP8266 Wi-Fi module.

I.INTRODUCTION

Now a day's food features is not only decided by the overall environment and security of the ending product but also by the animal's welfares status by which the food is produced. When we will develop the animal's health on that time it will affect the quality of product, pathology and safety [7]. The financial and common activities of human culture is very important in developing countries where many people depends on livestock based activities and this livestock production will stay for many years.

Dairy ranchers produces 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. Good sanitization does help to increase the quality and importance of the product and basically establish accomplishment or failure of a dairy ranch [8]. At this stage security of cattle health and safety is important for providing extreme quality milk. In the 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.

Dairy cattle's are homoeothermic and necessary to maintain continuous body temperature, respiration, humidity, heart beat and rumination. The regular temperature of cow is 38.5-39.5^{o}C. When the temperature is below 38.5-39.5^{o}C the diseases arises are indigestion, milk infection etc. and when the temperature is above 41^{o}C the diseases arises are influenza and anthrax. When the temperature of the animal is very high on that time it may die. Humidity can reduce heat exchange and have enervating impact on the cattle. When the stress will be more on that time milk quality will reduce. So using this technique we can help dairy ranchers to improve milk profit, quality and it will reduce the infection stress on the dairy herd and provide great level of animal security.

A wireless sensor network (WSN) is a system obtained by a huge amount of sensor nodes [9] where every node is armed with a sensor to identify physical sensations such as temperature, stress, light etc. The sensor node is key part of a WSN. The sensor node contain hardware part which includes four sections: power and power administration unit, a microcontroller, a sensor and wireless transceiver. The sensor is the link of a wireless sensor network node which will give the atmosphere and tool status. The sensors are used to collect and transmit the signs [10], such as sensations, light and natural signs and then transfer it to the microcontroller. In this paper Arduino UNO receives the content from the sensor and development the content accordingly. The ESP 8266 Wi-Fi module will transfer the content, so that the physical accomplishment of interaction can be achieved. For IOT wireless sensor network will become major technology. So to monitor cattle health five sensors are used i.e. body temperature, respiration, humidity, heart beat and rumination.

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Gartner research defines that IOT i.e. Internet of Things is the system of sensible object that enclose embedded tool to interact and sense the objects or the outside atmosphere .IOT i.e. Internet of Things determine which substances are efficiently communicate with other substances. Hospitals can observe, store and adjust pacemakers extended distance and analyses the patient details. This paper deals with the cattle diary which measure body temperature, respiration, humidity, heart beat and rumination and values are stored in web server.

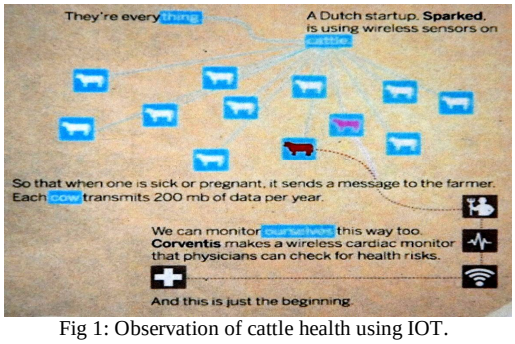

Fig 1: Observation of cattle health using IOT.

II.LITERATURE SURVEY

Dairy ranching is a segment of agriculture [3] and is used to produce milk. New Zealand is leading nation in distributing dairy products where India is the greatest milk yielding country in the earth. Dairy production is a main section of food industry and it used everywhere in the world. The advance cattle observing system includes the substructure, hardware, software and show substantial measurements. This system will efficiently observe the health of each and every cattle, and it will give every health information to the owner as well as to the doctor. So this system will provide tremendous advantage to the cattle industry.

In this paper Advanced Cattle Health Monitoring System will sense the various activities of animals such as body temperature sensor, respiration sensor, humidity sensor, heart beat and rumination sensor. In the previous [1] days people use to examine their cattle for many hours to understand their health problem. They use to measure cattle body temperature using Thermometer [6].

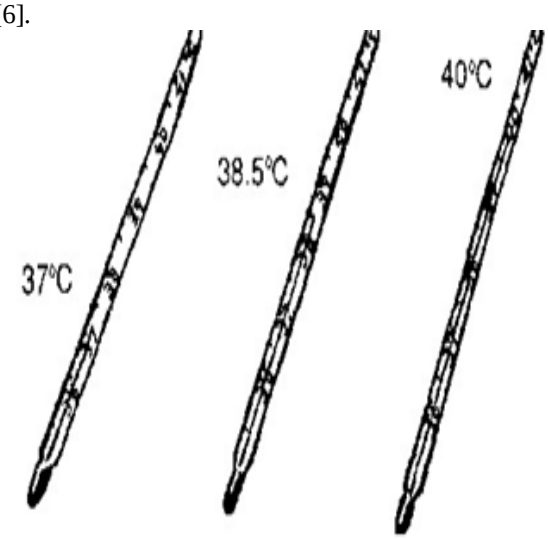

Fig 2: Body Temperature measurement in olden days using Thermometer.

But now a days sensors are used. In the earlier days when the animal was suffering from diseases people use to take that animal to the doctor for dignoses but sometimes doctors will not be available in hospitals so using this advance monitoring system we can sense the various activities of animals like body temperature, respiration , humidity etc. and we can send the animal health graph to the doctor mobile using ESP8266 WIFI module. This WIFI modules send the signals through the IOT technology. So by observing this graphs doctor can tell about the animal health.

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III.PROPOSED WORK

The Advanced cattle health monitoring system is divided in to three main units as shown in the Figure 2 that interrelate with each other to provide actual period observing, processing and recording. They are data gaining unit, Data administering unit and Data interact unit.

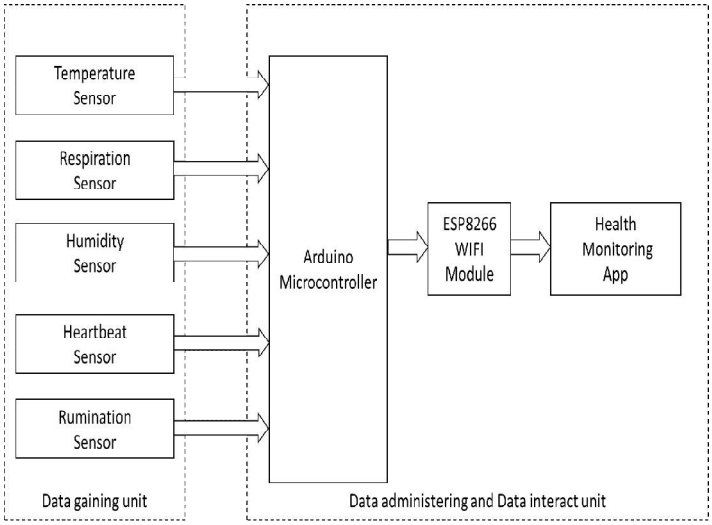

Fig 3: Overview of Proposed work.

Data gaining unit mainly consist of body temperature sensor, respiration sensor, humidity sensor, heart beat and rumination sensor with interfacing to Arduino UNO. The data gaining unit obtain the data and makes it accessible for the data administering and data interact unit.

The sensors are allowed for simple and general automatic measurement of numerous health factors. Such health sensors will be mounted on the cattle body, which continuously observe the body issues of the cattle like body temperature, respiration, humidity etc. and delivers output in the type of electrical signs. These signs are then compared to a standard limit of normal values set as the starting point in the data administering unit.

The data administering and interact unit [4] consists of a Arduino UNO with enough memory to transform the signs arriving from the data gaining unit through sensors into a ESP8266 WIFI module for communication and then the signals are given to the I Chart app for examining and displaying the data. The main function of this unit is when the animal will suffer from disease people use to take that animal to the doctor for dignoses but sometimes doctors will not be available in hospitals so using this advance monitoring system we can sense the various activities of animals like body temperature, respiration , humidity etc. and we can send the animal health graph to the doctor mobile using ESP8266 WIFI module. So by observing this graphs doctor can tell about the animal health.

IV.MODULE

The Sensors such as body temperature sensor, respiration sensor, humidity sensor, heart beat and rumination sensor are used in the advanced cattle health monitoring system [6]. These sensors are connected to the Arduino UNO.

A. Body temperature Sensor

This sensor is used to sense the body temperature of the cattle [2] Numbers of infections are accompanied when the body temperature of the cattle changes. So it is essential to measure body temperature. LM 35 is used as a body temperature sensor. The usual cattle temperature is 38.5-39.5^{o}C.The diseases related with body temperature lower than normal are milk fever, poisoning,indigestion etc. between 36-38.5^{o}C. When the temperature is more than 41^{o}C on that time diseases occurs are anthrax, influenza and foot and mouth disease.

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B. Respiration Sensor

Respiration rate of cattle is 26 and 50 breaths per minute. When the respiration rate of cattle increases it represent stress or pain or weakness or may be a sign of respiratory disease. If cattle get too hot they may pant to increase heat loss through evaporation. Cattle panting at above 100 breaths per minute are under severe heat stress.

C. Humidity Sensor

Humidity sensor is used to determine stress level of the animal. When the humidity is between 1-72% (No stress), 72-79% (Mild stress), 80-90% (Moderate stress), 91-99% (severe stress). DHT 11 is used as a humidity sensor.

D. Heart Beat Sensor

The adult cow has a heart Beat of between 48 and 84 beats per minute. And this sensor will give stress as well as animal anxiety.

E. Rumination Sensor

Rumination is a valuable part of the process by which cattle digests the food. Rumination period is mainly determined by the amount of food consumed together with the ration composition mainly fibre substance and particle size. A reduction in rumination is a clear sign of health problem. Which will affect the milk production. The cattle normally Ruminates is around 450-500 times per day.

F. Health monitoring app

The I chart app is used to monitor the parameters which describes the graph of cattle health on mobile such as body temperature sensor, respiration sensor, humidity sensor, heart beat and rumination sensor etc. so by monitoring this graph doctor can tell about the cattle health.

G. Arduino UNO

The Arduino UNO micro controllers are flexible and readily available for a wide variety of applications. The Arduino UNO microcontroller cost is low. Now a days instead of PIC microcontroller Arduino UNO is used. The Arduino UNO is used because of their flexibility, simple programming, and low cost, huge collection of application data and large availability of open source developer tool. The signals arriving from the sensors are sent to the ESP8266 WIFI module through Arduino and from WIFI module to health monitoring app.

Fig 4: Arduino UNO.

H. ESP8266 WIFI module

The ESP8266 WIFI module or only ESP-01 module approaches a complete and self-controlled Wi-Fi interacting solution. The ESP8266 Wi-Fi module are low cost, small and maintain Wi-Fi connection and encryption in client mode and access point mode. Wi-Fi module communication is done through simple serial RX and TX lines using “AT” i.e. attention type commands and data.

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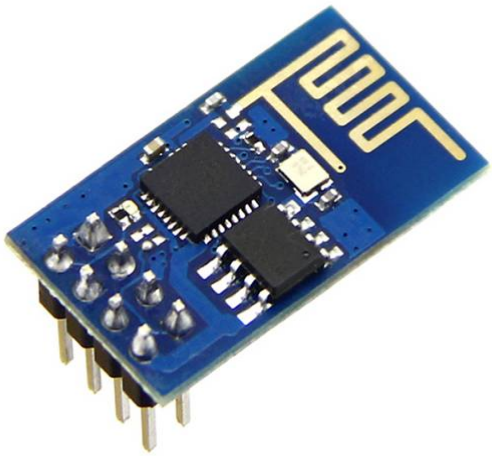

Fig 5: ESP8266 WIFI module.

Some AT commands are:

- AT (Attention command).
- AT+CWMODE - (To check mode).
- AT+CWLAP - (To check access point).
- AT+CIOBAUD - (Baud rate).
- AT+CWQAP - (To quit or erase AP).
- AT+CIFSR - (To get station IP address)

V. EXPERIMENTAL RESULTS

After connecting the sensors on the cattle's body it will give the body temperature, respiration, humidity, heart Beat and rumination graph. Using this graphs we can observe the body issues of the cattle and we can detect by which disease cattle's are suffering. The screenshots of graphs are shown below.

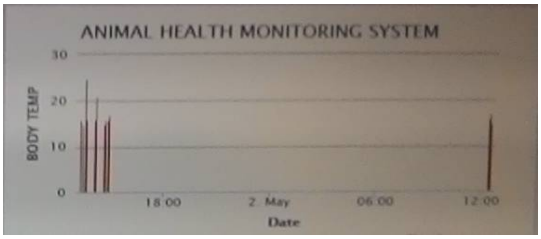

Fig 6: Body Temperature Graph

In the fig 6, it shows the graph of Body Temperature. Using this graph doctor can detect the body temperature of the cattle and by which diseases the cattle is suffering.

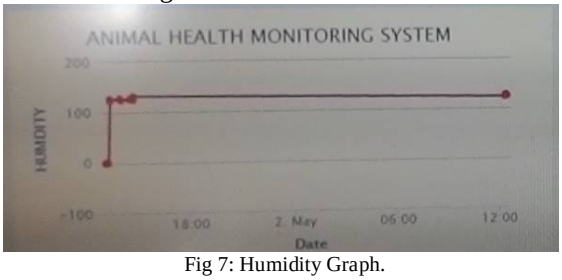

Fig 7: Humidity Graph.

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In the fig 7, it shows the graph of Humidity. Using this graph doctor can detect the Humidity of the cattle and by which diseases the cattle is suffering.

VI.CONCLUSION

In this paper we have developed advanced cattle health monitoring system for cows. Here sensors are used for detecting various health parameters of the cow such as body temperature, humidity and respiration etc. The sensors are interfaced with Arduino UNO and then it will display the graph on the I chart app through ESP8266 Wi-Fi module. This advanced cattle health monitoring system can replace this manual process for recognizing the various diseases. This system is very much helpful for farmers and also for doctors because it is accurate than manual observation.

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