SMART BOVINE HEALTH MONITORING SYSTEM WITH IOT-BASED CATTLE TRACKING

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Abstract — Every year, a significant number of cattle die due to diseases and go missing, which is a major concern for farmers. To address this issue, we propose a continuous health monitoring system that tracks cattle location and monitors their health status. The system utilizes a temperature sensor attached to the cattle to monitor their body temperature and a GPS module to track their real-time location and movement. The temperature data is recorded and uploaded to the cloud, and in case of any sudden temperature or location changes, the owner is alerted through a message. The collected data can be accessed by the owner through a mobile application, and the system aims to enhance cattle health monitoring and decrease mortality rates.

INTRODUCTION

India's agricultural industry is a vital contributor to the economy, accounting for approximately 13.7% of the annual GDP. The country's agricultural heritage has earned it the nickname "land of the golden soil." Nevertheless, there have been reports of challenges affecting the sector in recent times, potentially impacting its productivity and expansion.

Animal husbandry is a practice that involves the selective breeding and raising of livestock. For many farmers, animal husbandry is a primary source of income. Animals provide a variety of high-nutrition food products, making their care and attention critical. In response to the high demand for food, animals are commercially bred, and milch animals such as cows, buffaloes, and goats are particularly valuable for their production of protein-rich dairy products

The agriculture industry is facing several challenges, including demographic shifts, food waste, and limited natural resources. Reports indicate that an estimated 800 million people worldwide suffer from hunger, and projections suggest that around 650 million individuals will remain undernourished by 2030. Meeting the growing demand for food will require a 70% increase in food production by 2050. To tackle this challenge, it is essential to introduce modern technologies such as sensors, devices, robots, and information technology to replace conventional farming methods and improve efficiency and productivity.

LITERATURE SURVEY

[1] P. Kibambe Mashoko NKWARI et.al paper was published in IIMC titled as **"Cattle health monitoring system using wireless sensor networks in order to prevent cattle rustling".** A wireless sensor node was designed to sense the position and speed of cattle in the allocated range. The CTMP (CONTINUOUS TIME MARKOV PROCESS) is applied to identify the movement pattern of an individual animal in order to find the probability that the animal will be at boundary position.

[2] Isak shabani et.al paper was published in MPDI titled as **"Design of a cattle health monitoring system using microservices and IOT devices"** in the year 2022**.** The system can be operated by the microservices. These microservices can be implemented by using the Light GBM machine learning algorithm to predict the health of the cattle and informs the owners about the health of each cattle in real time. It is possible to predict the percentage value of each head of cattle in the moment.

[3] Md. Rony et.al paper was published in IEEE titled as **"Cattle External disease classification using deep learning techniques".** Traditional conventional neural networks are the most used architecture in the state of art of image processing and computer vision field. The proposed model referred to early detect the most common external diseases using several CNN architectures like conventional deep CNN, Inception-V3, and VGC-16 in the field of deep learning.

PROBLEM DEFINITION

There is a huge demand for dairy products in this present scenario. Farmers are increasingly turning to animal husbandry, particularly dairy production, as an alternative source of income during off-seasons when crop production is limited. However, illnesses and deaths among milk and beef cattle have resulted in a steady decline in their population. This, in turn, has led to an increase in the market price of calves, putting farmers under immense pressure to manage their livestock effectively. Sickness and death among animals can cause significant financial losses and disrupt their operations. To decrease the death rate immediate health monitoring is required at the initial stage by considering various parameters. There are many parameters to monitor the health.

EXISTING SYSTEM

The system used for health monitoring is the fixed monitoring system, which can be detected only when the cattle is in shed. In the existing system, cattle need to be in shed for regular monitoring, where either the owner has to move physically for a health check, which may not be possible to monitor their conditions continuously. It is not possible when the cattle are out of the hospital. Thus, any critical situation cannot be identified easily unless the owner checks the cattle's health at that moment. This may be a strain for the owner who have to take care of a group of cattle. The system will not be in contact with the cattle.
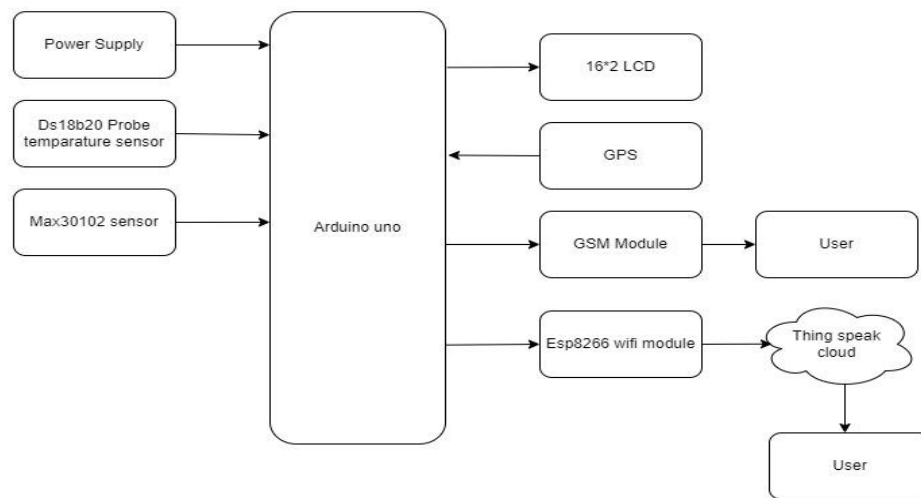
PROPOSED SYSTEM

Keeping track of the health status of your cattle is a difficult task because of the busy schedules and our daily life work. Specially conceived cattle should be periodically monitored. So, we propose an innovative system that automates this task with ease. Our device puts forward a smart cattle health tracking system using an IoT server. The IoT server used here is ThingSpeak. So that the cattle health parameters like Heart Rate, Respiration rate along with Body Temperature can be monitored. The location can be monitored in terms of latitude and longitude.

The system is implemented using the combination of hardware components. All the hardware components are assembled in the implementation phase. The circuit diagram of the developed system is demonstrated in below Fig. All the sensors are connected with ESP32 using physical pins. ESP32 is used as a processing device as it has a built-in Wi-Fi module. For all sensors, the Vcc and GND are

connected with the *Vcc* and GND pin of ESP32. In the case of the heart beat sensor, the signal pin is connected with the D26 pin of ESP32. The data pin of LM35 is mapped with the D35 pin of the microcontroller (ESP32). These are the case with specific cattle.

The user prototype is depicted in a figure where the system is tested with one user. Figure is the block diagram that explains IoT based Health Monitoring System using Wi-fi module (ESP8266) & Arduino, Pulse oximeter and Temperature Sensors measures BPM & Environmental Temperature respectively. The Arduino processes the code and displays to 16*2 LCD Display. ESP8266 Wi-fi module connects to wi-Fi and sends the data to the IoT device server. The server used here is Thingspeak. The data can be monitored fro any part of the world by logging into the ThingSpeak channel.

ARCHITECTURE OF THE PROPOSED SYSTEM

SAMPLE RESULTS
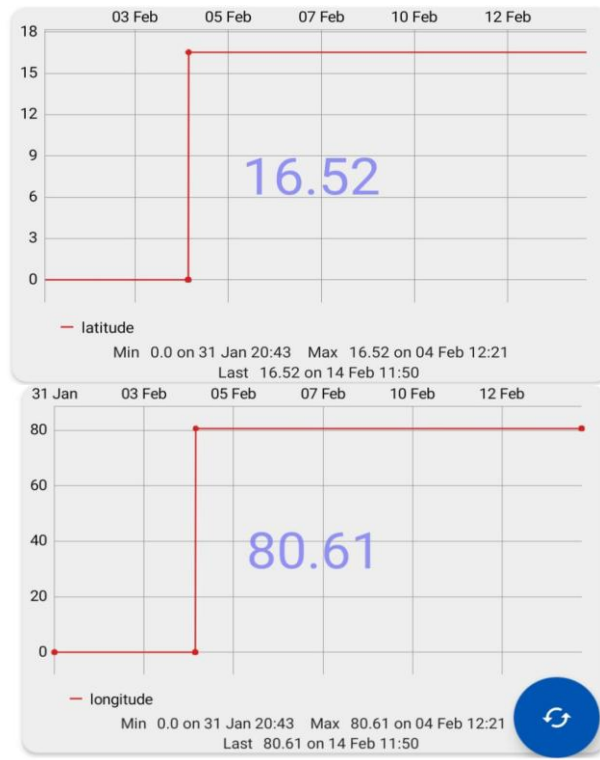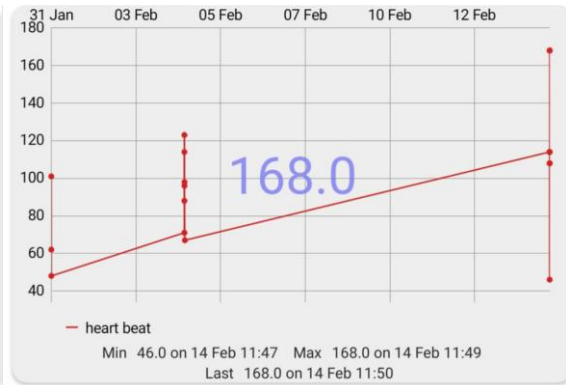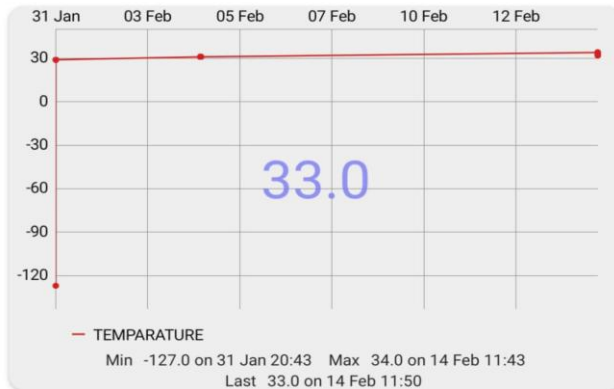
CONCLUSION

This paper aims to extend the platform proposed in, initially designed for cattle, by including wearable and unobtrusive sensors to monitor cattle with live location. This IoT-based device allows users to determine their health parameters, which could help regulate their health over time. Eventually, the cattle could seek medical assistance if the need arises. The system easily shares their health parameter data instantly within one application. As we know, the IoT is now considered one of the most desirable solutions in health monitoring. It makes sure that the parameter data is secured inside the cloud, and the most important thing is that the owner can monitor the health of any cattle at any distance. The paper is about an IoT-based cattle health monitoring system using Arduino that has been developed.

REFERENCES

[1]Sharma, Bhisham, and Deepika Koundal. "Cattle health monitoring system using wireless sensor network: a survey from innovation perspective." *IET Wireless Sensor Systems* 8, no. 4

(2018): 143-151,

[2]Shabani, Isak, Tonit Biba, and Betim Çiço. "Design of a Cattle- Health-Monitoring System Using Microservices and IoT Devices." *Computers* 11, no. 5 (2022): 79.

[3]Rony, Md, Dola Barai, and Zahid Hasan. "Cattle External Disease Classification Using Deep Learning Techniques." In 2021.

[4]Muppa, Sai Karthik, Naresh Kannan, Shivam Neer Shah, and Ranjan Goyal. "A Micro Controller based Monitoring System for Cattle Farm Security." In *2018 International Conference on Computing, Power and Communication Technologies (GUCON)*, pp. 570-574. IEEE, 2018.

[5]R.N. Handcock, D.L. Swain, G.J. Bishop-Hurley, K.P. Pattison, T. Wark, P. Valencia, P. Corke, C.J. O'Neill, monitoring animal behaviour and environmental interactions using wireless sensor networks, GPS collars and satellite remote sensing. Int. J. Sci. Eng. Res. **7**(3) (2016)

[6]E.S. Nadimi, H.T. Søgaarda, T. Bakb, F.W. Oudshoorna, ZigBee-based wireless sensor networks for monitoring animal presence and pasture time in a strip of new grass. Comput. Electron. Agric. **74**, 254–278 (2010)

[7]Hopster, H. Blokhuis, H.J.: Validation of a heart-rate monitor for measuring a stress response in dairy cows. Can. J. Anim. Sci. 465–476