International Journal of Advance Research in Science and Engineering
Volume No. 13, Issue No. 06, June 2024
www.ijarse.com
IJARSE
ISSN 2319 - 8354

# FARM ANIMAL LOCATION TRACKING AND HEALTH MONITORING SYSTEM USING GPS, GSM AND ARDUINO

Dr. K. Kanthi Kumar,M.Tech, Ph.D[1], Professor[1], A.Jyothirmai[2] , B.Naveen[3], G.H N Keshav Mitra[4], G V J Narasimha[5], Sk. Abdulla Basha[6] , U.G Students
Department of ECE, Tirumala Engineering College-522601, Palnadu(Dist), JNTU Kakinada, India.

**ABSTRACT —** The Farm Animal Location Tracking System (FALTS) is a smart technology that helps farmers keep an eye on their animals. It works by using special devices that animals wear, kind of like a collar. These devices have GPS and GSM technology inside them. That means they can tell where the animals are and send that information to a central computer system that farmers can access. With FALTS, farmers can do lots of things to take better care of their animals. They can track where each animal is in real-time. This helps them make sure animals don't wander off or get lost. If an animal does go missing, FALTS sends a message to the farmer right away. This helps reduce the chances of animals getting stolen or lost.

***Keywords: GSM, GPS-based animal tracking***

## I. INTRODUCTION

The introduction of GPS tracking systems has revolutionized the management and understanding of farm animals' behaviour and their interaction with their environment. By tagging animals with radio transmitters and receivers, GPS technology enables farmers and researchers to locate animals easily and accurately. This innovation is particularly crucial for applications requiring real-time, fast, and stable data processing, such as GPS-based animal tracking. GPS, among various other technologies, plays a pivotal role in numerous applications today. In the realm of animal tracking, it provides invaluable insights into the movements and behaviours of animals. The GPS tracking system records the location and route travelled by each animal, allowing observers from remote locations to monitor their activities effectively. This data is transmitted to a web application, which provides precise location information to users.

One of the key advantages of GPS-based animal tracking is its ability to function in various climatic conditions.

## II . METHODOLOGY

### Existing System

The radio tracking system for animals, employing the very high frequency (VHF) method, operates through a network involving a base station, radio collar, and relay stations. At the heart of this system is the base station, which emits coded signals at regular intervals, typically once every 20 seconds. These signals serve as beacons for the radio collar worn by the animal. Upon receiving the signal, the pager within the collar activates the LORAN-C receiver. LORAN- C, standing for Long Range Aid to Navigation, is a terrestrial navigation system that utilizes radio signals transmitted from fixed ground- based stations. The collar's radio transmitter then rebroadcasts the received LORAN-C signals to nearby relay stations. These relay stations are strategically located within the tracking area and serve as intermediaries between the animal and the base station. They receive the signals from the collar, amplify them if necessary, and then re-transmit them back to the base station. The base station, equipped with computers and specialized software, processes the received signals to determine the animal's location. It triangulates the animal's position by analysing the signals received from at least three different relay stations. The coordinates of the animal's location are then displayed on a computer monitor and stored in the system's database for further analysis. While this method provides a relatively straightforward means of tracking animals over a wide area, it does have its limitations. One of the main drawbacks is the difficulty in pinpointing the exact location of the animal. Since the system relies on triangulation based on signals

received from multiple relay stations, there may be some margin of error, requiring search efforts within a certain radius around the calculated location. Despite this limitation, the VHF radio tracking system remains a valuable tool for researchers and wildlife managers in monitoring animal movements and behaviours.

## Proposed System

The project incorporates a comprehensive system for tracking animals in real-time using a combination of GPS, GSM, and SMS technologies. GPS (Global Positioning System) is utilized for live location tracking, receiving positional data from satellites. This data is crucial for accurately determining the animals' whereabouts at any given moment. GSM (Global System for Mobile Communications) technology complements GPS by facilitating wireless communication. Through GSM, messages regarding the animals' locations can be transmitted efficiently. This enables the system to provide updates and alerts regarding the animals' movements or status.

Additionally, the integration of an LM35 temperature sensor adds another layer of functionality to the system. This sensor monitors the temperature of the animals in real-time. If an animal's temperature rises unexpectedly, indicating potential fever or injury, the system triggers an automatic SMS notification. This notification is sent to designated recipients, such as forest officers, enabling them to promptly intervene and provide necessary care. The core components of the system include Arduino microcontrollers, GPS modules, GSM modules, and SMS modules. The Arduino microcontroller serves as the central processing unit, coordinating the functionalities of the various modules. The GPS module retrieves accurate location coordinates, while the GSM module handles data transmission. The SMS module facilitates communication by sending notifications to predefined contacts.

**Block Diagram:**

The basic block diagram of proposed system. It consists of Arduino UNO, Temperature Sensor, GPS, GSM, LCD and Power Supply. The Arduino Uno is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino.

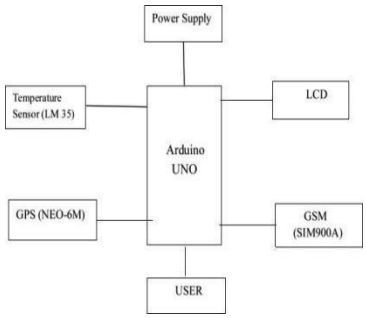


Figure 1: Block Diagram for proposed system

## III. HARDWARE REQUIREMENTS

**Arduino :** The Arduino Uno R3 is a popular microcontroller board widely used in electronics projects and prototyping. Developed by Arduino LLC, it is part of the Arduino ecosystem, which includes a range of compatible boards, sensors, shields, and accessories. The Uno R3 is particularly favoured among hobbyists, educators, and professionals for its simplicity, versatility, and affordability. At the heart of the Arduino Uno R3 is the Atmega328P microcontroller, manufactured by Atmel (now Microchip Technology).

Figure 2 : Arduino UNO R3 Board

**LCD :** The term LCD stands for liquid crystal display. It is one kind of electronic display module used in an extensive range of applications like various circuits & devices like mobile phones, calculators, computers, TV sets, etc.

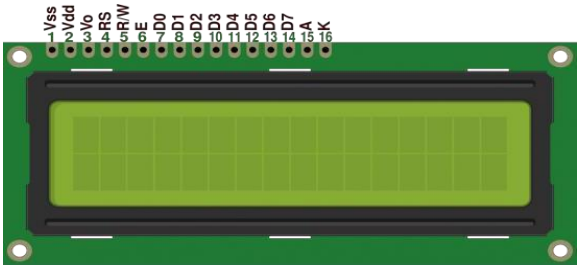


Figure 3 : 16 X 2 Pin Diagram

**LM 35 Sensor :** LM35 is a temperature measuring device having an analog output voltage proportional to the temperature. It provides output voltage in Centigrade (Celsius). It does not require any external calibration circuitry. The sensitivity of LM35 is 10mV/degree Celsius.

**GPS Module :** GPS receiver module gives output in standard (National Marine Electronics Association) NMEA string format. It provides output serially on Tx pin with default 9600 Baud rate. This NMEA string output from GPS receiver contains different parameters separated by commas like longitude ,latitude, altitude, time etc. Each string starts with '$' and ends with carriage return/line feed sequence.

**GSM Module :** SIM900A V4.0 Kit wireless Extension Module GSM GPRS Board with Antenna is based on SIM900A chip having on board two set power of supply interface namely VCC5 5V power supply, VCC4 interface, 3.5–4.5V power supply, optional power on self- starting (default), and control start. The on board SMA (default) and IP Xmini antenna interface, SIM900A interface reserved reset.

**SOFTWARE REQUIREMENTS**

**Arduino IDE:**

Arduino Integrated Development Environment (IDE) serves as the primary platform for programming Arduino microcontrollers, offering a user-friendly environment for developing and uploading code to Arduino boards. Commonly referred to as Arduino IDE, this software is instrumental in simplifying the process of creating embedded projects for individuals, hobbyists, students, and professionals alike. At the core of Arduino IDE is its simplicity and accessibility.

Moreover, Arduino IDE supports the use of third-party libraries, expanding its capabilities and enabling

users to access a wide range of additional functionalities and hardware peripherals.

**Working of the Project :**

This circuit diagram illustrates the integration of various components with an Arduino Uno microcontroller to create a versatile and portable tracking system. The system incorporates a GPS module, GSM module, temperature sensor, and a 16x2 LCD display, providing real-time location tracking along with environmental monitoring capabilities. The Arduino Uno acts as the brains of the operation, coordinating the functions of the GPS module,GSM module, temperature sensor, and LCD display.

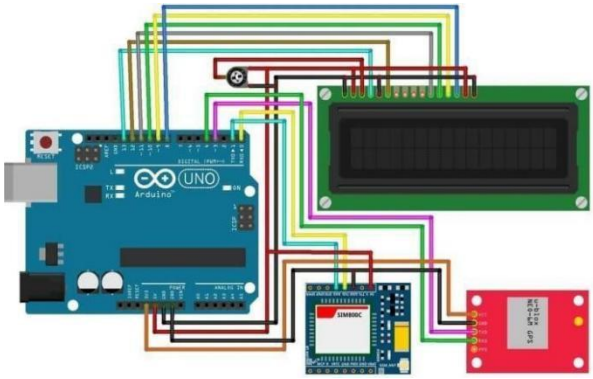

Figure 5 : Circuit Diagram of the project

**IV. RESULT :**

The project kit, as illustrated in Fig, is composed of several important parts connected to the Arduino Uno R3 board.

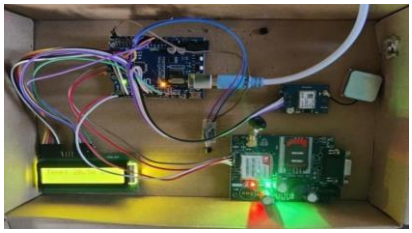

Figure 6 : Project KIT

After conducting thorough testing, we found that the system operates effectively. The display on the monitor accurately shows the temperature of the animal being monitored, allowing us to keep an eye on any changes. Additionally, the GPS module reliably determines the device's location, providing valuable information about where the animal is situated. Moreover, the GSM module consistently sends messages to the owner's phone every 10 seconds, ensuring that they stay informed about the animal's status.

Overall, our comprehensive testing confirms the system's reliability and effectiveness in real-time animal monitoring. By providing accurate temperature readings and location tracking, coupled with timely notifications to the owner, the system significantly enhances animal welfare and facilitates responsible pet ownership.

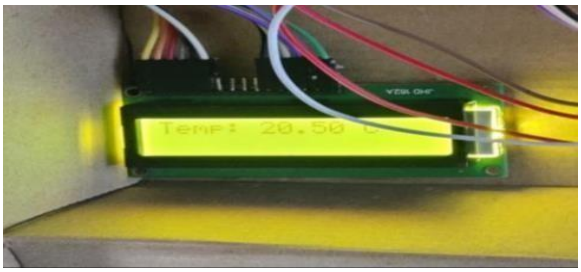

Figure 7 : Displaying Temperature on LCD

The successful implementation of this project underscores its potential to contribute positively to animal care and management The successful implementation of this project underscores its potential to contribute positively to animal care and management. With further refinement and deployment, this system could become a valuable tool for pet owners and animal welfare organizations alike, helping to ensure the health and safety of our animal companions.

## V. CONCLUSION

In conclusion, the Farm Animal Location Tracking and Health Monitoring System, powered by GPS and GSM modules, represents a significant advancement in farming practices. This innovative system not only tracks the whereabouts of animals but also monitors their health status, ensuring their safety and well-being. With the ability to send prompt alerts to farmers in case of any issues, it facilitates timely intervention and ultimately leads to healthier livestock and more efficient farming operations.

In essence, this technology demonstrates how simple yet powerful solutions can revolutionize agriculture, making it more sustainable and productive. To sum up, the Farm Animal Location Tracking and Health Monitoring System is a game- changer for farmers. It uses GPS and GSM modules to keep tabs on where animals a re and how they're feeling. By knowing where they a re, farmers can make sure they're safe and not lost. Plus, the system checks on their health, spotting any problems early on. If something's wrong, it sends a quick message to the farmer, so they can fix it fast. With this clever system, farming gets easier and animals stay healthier, showing how technology can make a big difference in agriculture.

## REFERENCES

1. G. Ramesh, K. Sivaraman, V. Subramani, P. Y. Vignesh and S. V. V. Bhogachari, "Farm Animal Location Tracking System Using Arduino and GPS Module, 2021 “International Conference on Computer Communication

and Informatics (ICCCI), Coimbatore, India, 2021, pp 1-4, doi: 10.1109/ICCCI50826.2021.9402610.

2. K. Dhivya, P. N. Kumar, S. Hariharan and G. Premalatha, "A GPS based Tracking System for Wildlife Safety," 2022 3rd International Conference on Electronics and Sustainable Communication Systems (ICESC), Coimbatore, India, 2022, pp. 428-433, doi: 10.1109/ICESC54411.2022.9885423.
3. R.Reena Roy, Ramakrishnan Raman, M. Amanullah, Vijay Kumar Pandey, E.N. Ganesh, "IoT Applications in Wildlife Conservation: Tracking and Protecting Endangered Species",pp.1542-1547, 2023.
4. Kiran Kumar Mamidi, Sai Nishwanth Valiveti, Guru Charan Vutukuri, Ashwin Kumar Dhuda, Haider Alabdeli, Rakesh Chandrashekar, Sorabh Lakhanpal, Praveen, "An IoT-based animal detection system using an interdisciplinary approach", pp.01041, 2024.
5. Gor, Maharshi & Vora, Jayneel & Tanwar, Sudeep & Tyagi, Sudhanshu & Kumar, Neeraj & Obaidat, Mohammad & Sadoun, Balqies. (2017). GATA: GPS-Arduino based Tracking and Alarm system for protection of wildlife animals. 166- 170.

10.1109/CITS.2017.8035325.

6. Sharma, Jayesh. (2021). Live GPS Location Tracking using GPRS. International Journal for Research in Applied Science and Engineering Technology. 9. 744

748.10.22214/ijraset.2021.36081.

7. Hai Wang, Abraham O. Fapojuwo, and Robert
J. Davies, “A Wireless Sensor Network for Feedlot Animal Health Monitoring”, IEEE Sensor Journal, August 2016.
8. Luca Catarinucci, Riccardo Colella, Luca Mainetti, Luigi Patrono, and, Stefano Pieretti, “Smart RFID Antenna System for Indoor Tracking and Behavior Analysis of Small Animals in Colony Cages”, IEEE Senor Journal, April 2014.
9. P. Keertana and Dr. B Vanathi, ”IOT BASED ANIMAL HEALTH MONITORING AND TRACKING SYSTEM USING ZIGBEE”. The
paper was published in the International Journal for Research Trends and Innovation (IJRTI) in 2017.
10. Mrs.D.Gowthami, K.Aakash, A.Mohammed Arsath, and V.Santhosh Kumar, "Smart Animal Health Monitoring System using IoT" published in the International Journal of Research in Engineering and Technology
(IRJEdT).
11. Mrs.D.Gowthami,K.Aakash, A.Mohammed Arsath, and V.Santhosh Kumar, "Smart Animal Health Monitoring System using IoT" published in the International Journal of Research in Engineering and Technology (IRJEdT).