National Conference on New Frontiers of Engineering, Sciences, Management and Humanities
School of Electronics and Communication Engineering, REVA University, Bengaluru
REVA UNIVERSITY Bengaluru, India
12th-13th October 2018 www.conferenceworld.in ISBN: 978-93-87793-49-1

A SURVEY PAPER ON ANALYSING PET ANIMAL HEALTH AND TRACKING SYSTEM USING IoT

Deepthi B L[1], Divya A M[2], Jaishree M N[3], Kavanasiri M A[4], Yoganandini A P[5]

[1], [2], [3], [4]Students of Electronics and Communication Department, Sambhram Institute of Technology, Bangalore
[5] Assistant Professor, Department of Electronics and Communication, Sambhram Institute of Technology, Bangalore

Abstract— *This paper presents the design and construction of a device which analyses the pet animal health data and tracking system. Pet animals need special care and for that special care the pet owner needs to know more about the pet by constantly visiting pet care and learning about her pet's behaviour and its health. Pet's temperature, breathing pattern, movements and mood are some of the parameters that tells a lot about that animal and its likes and dislikes along with the illness, if any, it is going through.*

Pet animal's best care is taken by feeding the pet and monitoring this can provide vital information to the owner about the eating/drinking pattern. Thermoregulation in lungs is a way by which animals bring their temperature down, this can be seen in animals when they start panting after running or heavy activities and hence the breathing rate of the pet can be monitored to check its temperature at all times. Movements of the animal shows the activeness of the pet, which is directly related to its health. Monitoring the movements and comparing it with the obvious observed movements can help the pet to show mood or illness. Various sensors can be used to collect these data from an animal and store it on the cloud for processing by algorithms. The processed information can then be compared against the normal conditions and alarm the pet owner regarding unmatched behaviour and at the same time the pet owner can use this processed information to consult a vet doctor regularly without even taking the pet animal along.

I.INTRODUCTION

With the increase in population, the needs of people have also increased. Many rural populations depend on livestock sector for milk and egg production. Similarly, with the introduction of pet adoption a large number of people now have either a dog or cat at home. And hence taking care of animal health and monitoring their movement becomes necessary. Over the years, there has been number of researchers done in this field to monitor animal health but the methods adapted cause either an animal's fur to be removed or small chip are inserted into animal body.Sensors and wearable technologies can be implanted on animals to detect their sweat constituents, measure body temperature, observe behavior and movement, detect stress, analyze sound, prevent disease, detect analytes and detect presence of viruses and pathogens. Wearable sensors help pet owners catch disease early, and thereby prevent deaths of animals. Pet owners can also cull diseased animals in time to prevent the spread of disease in whole cattle herds through prediction. Apart from collecting useful data regarding animal health, general farm monitoring can also be made easier and more reliable by using sensors integrated with cellphones and handheld devices instead of conventional methods, such as writing notes, keeping a farm dairy, or using simple equipment without data sharing functions. A number of systems have been developed on cellphones and handheld devices to reduce the effort of recording data manually. The final data can easily be viewed on cellphones or personal computer, which makes this technology very convenient for pet owners.

The system design would include four sensors namely, heart rate sensor, breathing rate sensor, body movement detector and jaw activity detector. Sensors will detect variations in animal health and software can be developed to analyze their health with the data by using machine learning algorithm. AIoT platform consists of three components: sensing, wireless communication and cloud service. In this project, IoT device stores the collected data in a cloud so that pet owner or wildlife officer can detect the variations in animal health from previous information.

II.LITERATURE REVIEW

In the paper titled, ―The purpose of this review article is to describe, compare and analyze various wearable technologies that have been developed recently towards providing solutions for farmed animal health management. Animal health is a serious global issue that demands apt scientific techniques. For this purpose, innovative approaches, like the use of biosensors for animal health management, has gained recognition. These sensors are at various steps commercialization,but are making their way into the practical use and application in the domain of animal health. Precision livestock farming techniques, which include a wide span of technologies, are being applied, along with advanced technologies like microfluidics, sound analyzers, image detection techniques, sweat and saliva sensing, serodiagnosis and others.[1]

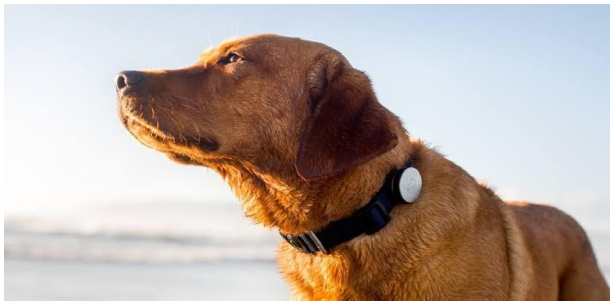
In the paper titled, ―a framework for habitual movement monitoring of animal using Internet of Things which uses to transmit the data which is sensed from remote animal to the server by using wireless transmission technology GSM. It is completely integrated so that it is possible to track anytime from anywhere. It has real time capability. The accuracy of system is affected by some factors such as weather, environment around the mobile animal, GPS receiver having accuracy is 90% and sensitivity of system is 90%.[2]

In the paper titled, ―animal health monitoring and tracking system are used for detecting any diseases at a very early stage and it can be stopped from spreading it to other animal. It includes sensors such as respiratory sensor, pulse rate sensor, temperature sensor and heart beat sensor along with a GPS tracker. Even if the animal is lost it is easy to track the animal using GPS tracker inbuilt in a wearable device. And to transmit the data, ZigBee can be used. ZigBee has very low power consumption range of 10-3000 meters and it can support upto 64000 devices having a distance of 50 meters. The energy consumption of the sensors and the system may be high and due to which recharging the batteries is required and hence wireless charging is introduced.[3]

III.PROJECTOBJECTIVES

The main objectives of the project considering the advantages and the disadvantagesare:-

1. To collect data such as chewing rate, HRV (Heart Rate Variability), breathing pattern and movements from sensors.
2. To frame the received data from the device through wireless.
3. To analyze the collected data using Machine Learning Algorithms to predict the pet animal health.
4. Animal livestock identification using UID for animals (smart tag) and owners (smart card)
5. QR code reading, processing and display of the details in mobile via Wireless technologies.



IV. METHODOLOGY

The developed animal monitoring device is used to detect animal physiological parameters such as body temperatures, physical gestures like sitting, standing, eating and heartbeat, environmental parameters such as air temperature and relative humidity. Also, e-animal husbandry information network management system is the comprehensive web-based animal husbandry software designed for better interaction between veterinary hospital, veterinary doctor, owner, farmer and animal husbandry management.

Proposed Findings

Animal monitoring device mounted on the neck sense the values and predict the health status of the animal by using cloud IoT analytics platform. The accuracy of the system is 90per cent and it can be well placed in the livestock environment.

Practical Implications

The developed system can be implemented for monitoring the health status of the animal from anywhere using mobile applications. Also, the digitized animal information helps the government to take the right decisions on policies and fund allocations.

Social Implications

The implemented system can be easily scaled up to large environments by using wireless communications and animal husbandry data will be available immediately. UID scheme for animals can uniquely identify the animal and its details.

V. BLOCK DIAGRAM

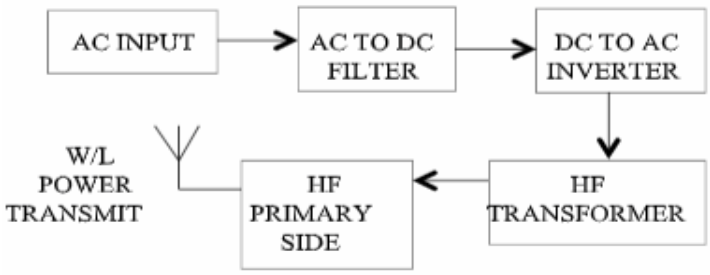


Fig. Block Diagram for receiver

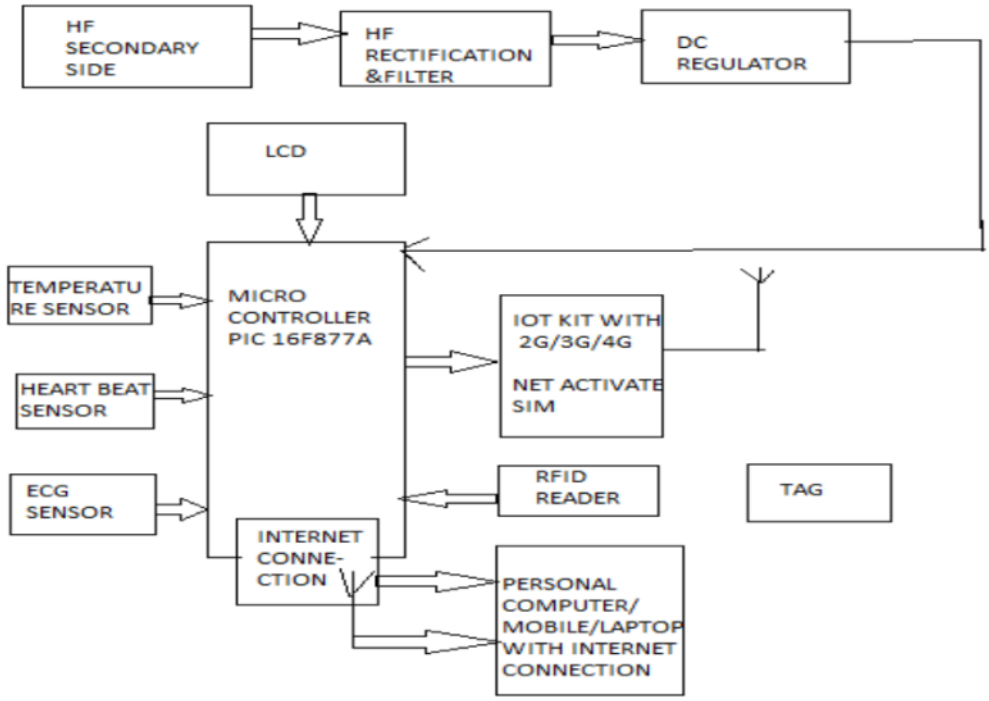


Fig. Block Diagram for transmitter

Description in detail:

GPS Modem: We have used GPS modem to retrieve and longitude and latitude of the location. This GPS modem communicates using serial communication with the microcontroller. GPS modem sends a bunch of data to the microcontroller. This bunch of Data contains many parameters which include longitude and latitude.

GSM Modem: We have used GSM modem to send SMS to the user or we can say to the forest officer. We need to insert a GSM simcard into this GSM modem. GSM modem also communicates with microcontroller using serial communication. It receives various commands from microcontroller which are used to send SMS.

Temperature sensor: We have used temperature sensor to detect the body temperature of animal. Temperature sensor is an analog sensor. Which means it gives variable voltage as per the variation in the body temperature.

Comparator: The output of temperature sensor is in analog format but microcontroller is not able to read analog voltage. It requires digital input of digital data. For this purpose, we have used a comparator between temperature sensor and microcontroller. The function of comparator is to give high or low output if the temperature is above or below the threshold level respectively. This comparator has a fixed voltage to its negative terminal. And at its positive terminal we give output of temperature sensor. So whenever the temperature crosses threshold level then comparator gives low output to the microcontroller.

LCD display: It is used to show various messages on LCD. Although LCD does not have much use in actual application but still it is really very useful for testing purpose and while developing this project. Because we can show various messages like: Sending SMS or we can display longitude and latitude of current location on LCD display.

Microcontroller: This is the important block of this project. It performs various functions like, reading coordinates from GPS modem. It finds out the longitude and latitude from this data. Sends command to the GSM modem for sending SMS. It reads data from Comparator.

Once user has received the location parameter in the format of text SMS, then he can use this location on the map to find the exact geographical location. To find out the location on printed map is quite difficult and it will consume lots of time. However now days many website providers have online maps. Google map is one of the most used and famous online map provider services. User can read the text SMS and then he can type these parameters in Google map to find the exact location.A sensors such asheartbeat sensor, body temperature sensor and ECG electrodes are used in this animal health monitoring system. These are connected to the PIC microcontrollers.

Temperature sensor LM35

The LM35 temperature sensor is used for animal temperature monitoring. Whose output voltage is linearly proportional to the Celsius temperature. The LM35 thus has number of advantages over linear temperature sensor like it does not require any external calibration, low cost,low output impedance, linear output, and precise inherent calibration make interfacing to readout or control circuitry especially easy,has very low self-heatingand it can be used with single power supplies, or with plus and minus supplies.

Heart beat monitoring

IR transmitter and receiver are placed in the pulse rate sensor in straight line to each other. Inorder to measure the pulse rate, the pulse rate sensor has to be clipped in the finger. Depending on the blood flow, the IR rays are interrupted. Due to that IR receiver conduction is interrupted so variable pulse signals are generated. Using amplifier circuit output signal is amplified and comparing with reference value.Then the final square wave signal is given to microcontroller in order to monitor the heart rate.

Electrocardiogram

Unipolar leads are used for ECG measurement, where a single positive electrode that is referenced against the two limb electrodes.These positive electrodes are located on the left arm,right arm and left leg respectively. Here the interfaced microcontroller is PIC16F877A.It is the first RISC based microcontroller fabricated in CMOS that uses separate bus for instruction and data.Some of its features are High-performance RISC CPU,it has eight level deep hardware stack,it uses only 35 singleword, instructions,all single cycle instructions except for program branches which are two cycles,direct, indirect, and relative addressing modes are present, has programmable code-protection,power saving SLEEP mode and selectable oscillator options.

It has number of advantages like low power consumption, a very small chip size, CMOS has high immunity to noise,programmed to carry out a no of tasks,low cost,wide availability easy programming and erasing capability

VI. CONCLUSION

The main idea of this paper is to integrate two existing modules developed in different platform and technology to a single module and platform. The four different sensors along with GP module are compatible to perform in an embedded system. The accuracy of the values relies on the microcontroller to give the accurate details in case of health monitoring and tracking. This model will work as strong backbone. In case of analysing any health issues for an animal.

REFERENCES

[1] Suresh Neethirajan, "Sensing and Bio- Sensing Research", Elsevier, 2017 www.elsevier.com/locate/sbsr

[2] Miss. PrajaktaSukumarManakapure, Prof. Mr. A. V. Shah, "Movement Monitoring of pet animal using Internet of Things", International Research Journal of Engineering and Technology (IRJET), May 2018 www.irjet.net

[3] P. Keertana, Dr. B. Vanathi, K. Shanmugam, "A Survey on various animal health monitoring and tracking techniques", International Research Journal of Engineering and Technology (IRJET), Feb 2017 www.irjet.net

[4] Erik Aguirre, Peio Lopez-Iturri, LeyreAzpilicueta, José Javier Astrain, JesúsVilladangos, Daniel Santesteban and Francisco Falcone, "Implementation and Analysis of a Wireless Sensor Network- Based pet location monitoring system for Domestic Scenarios", Sensors, MDPI, August 2016 www.mdpi.com/journal/sensors

[5] Emmanuel J. Awosanya and H. O. Akande, "Animal health care seeking behavior of pets or livestock owners and knowledge and awareness on zoonoses in a university community", Veterinary World, EISSN, July 2015 www.veterinaryworld.org/Vol.8/July-2015/5.pdf

[6] Meenakshi. M, Snehal . S. Kharde, "Advance Cattle Health Monitoring System using Arduino and IoT", International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering (IJAREEIE), 2016

[7] Jigarmasekar, Jashsohni, Shweta Sharma, "Review of IoT in Pet Management", IOSR Journal of Engineering (IOSRJEN), March 2018