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Pet Monitoring System

Anuradha Gite[1], Hansika Wadile[2], Atul Sargar[3], Prathamesh Malishilwant[4], Jareena Shaikh[5]
[1, 2, 3, 4]*BE (IT)SITS, Narhe Pune, India*
[5]*SITS, Narhe Pune*

Abstract: ***The statement" Technology stems from humanity" accurately portrays the modern way of life. As humans increasingly interact with physical devices and those in the real world, it has become crucial to employ a natural and intuitive methodology. Living well has become a growing demand, and as a result, raising pets in an easy way has emerged as a major concern.***

To address this issue, this study examines how computation, communication, and control technologies can improve human interaction with pets through the Internet of Things (IoT) technology. The IoT offers a new method of operational efficiency, and our study focuses on improving the pet care system by incorporating this technology.

Our research highlights the key improvements of the pet care system by utilizing the IoT and also addresses the needs of pet owners who are out for work without any trouble. To gain a more comprehensive understanding of animal behavior, researchers can utilize GPS collars that record the location and behavior of animals with high accuracy and frequency. By combining GPS collar data with remotely-sensed satellite images through wireless sensor networks (WSNs), researchers can gain insight into animal-landscape interactions and environmental impact.

Index Terms: Internet of things, Global Positioning System, Wireless Sensor Networks.

I. INTRODUCTION

Pet owners are always concerned about their pets' health and well-being, and activity levels vary based on breed and age. The objective is to notify pet owners of any unusual behavior patterns through a mobile application.

Remote monitoring of animal behavior can assist in man- aging both animal health and environmental impact. GPS collars can record high temporal frequency data to moni- tor animal behavior and interactions with the environment. Combining these ground-based sensors with remotely-sensed satellite images can provide a comprehensive understanding of animal-landscape interactions. Communication methods such as wireless sensor networks (WSNs) are essential to integrate these technologies. Wireless sensor networks have increased attention and play a crucial role in connecting everything in our lives

The bond between humans and pets has led to a growing market for monitoring pet health and behavior. It is necessary to track behavior patterns and observe any unusual patterns to keep pets safe and avoid loss. Since pets cannot express their illness, it is crucial to monitor their health. The interaction between humans and physical devices is a growing area of interest. Combining pet control with IoT technology offers exciting future developments. This study presents a smart pet care system based on the Internet of Things concept. Pet owners find it difficult to track the health of their pets and look for their pets when they are lost. With the Pet Status mobile application, we hope that pet owners can overcome all the problems described above, from losing pets to measuring heart rate, measuring the breathing rates of pets. Pet Status is also expected to be a solution to the problem of all types of pets. Pet owners who use Pet Status are also expected to be comfortable using this application so that the community for the Pet Status application is expanding and covering.

II. PREVIOUS SEARCH

The previous chapter talked about insights into the impor- tance of pet health monitoring systems. This chapter gives better insights into the project through the analysis done on various research papers related to pet behavior analysis and their location.

GPS technology is an excellent tool for tracking pets. By utilizing GPS, pet owners can accurately pinpoint the location of their pets through the coordinates displayed in the application. However, while GPS is helpful for tracking pets, it does not provide information about their health or activity levels. Currently, there are no applications or tools available that can track the health of pets. To address this issue, we aim to develop an innovative application and tool that will be useful for pet owners. Our goal is to create a comprehensive system that tracks and monitors the health and activity levels of pets in real time. This system will offer valuable insights into the well-being of pets, providing pet owners with peace of mind and the ability to take proactive measures to maintain their pets' health. There is some previous technology that applies to help human to give well-being to their pets.

A mobile application was proposed as well for pets mon- itoring health such as dog and cat which was created forpet's disease prevention and this application is connected automatically to veterinarian including to find the nearest pet'shospital and clinic.

1) Critical Literature Survey on Intelligent pet monitor sys- tem with the internet of things The interaction between humans and physical devices and objects is attracting increasing attention. Many studies have attempted toprovide a natural and intuitive approach to request services. The current trend of combining pet control andIoT technology offers exciting future developments. Thisstudy presents the smart pet care system based on the concept of the Internet of things. The proposed systemis also based on smart-home technology, including the smart pet door and pet feeder. The results not only present the key improvement of the pet care systeminvolved with the IoT technology, but also meet theneeds of owners. In this study, the WSN installed smart pet feeder is baased on the following ideas: An animal detector can detect the animal trying to access the food. Because the pet tag is the same tag of the pet doorsystem, the system will have plenty of time to retrieve the grant to feed this pet or not. The pet owner canset the permission for one pet to one feeder. Thus, only the granted pet can approach the feeder for food. Besides, most of the pets have deeply locality of animal behavior, share food is not common for them. The pet owner can schedule eating time remotely, and prevent the unwelcome insects by closing the bowl cover in the non-eating time. The pet owner can record the voice greeting to alert the eating time. [1]
2) Critical Literature Survey on Dog behaviour classifica- tion with movement sensors placed on the harness and the collar Our current results suggest that behaviourclassification was more successful from the movement sensor attached to the harness at the back of the dog rather than on the neck collar. In particular, static be- haviours of sitting, standing, and lying down were hard to differentiate with the sensor attached to the collar. Positioning may comprise a challenge for the usabilityof activity monitors for differentiating behaviours in reallife. Attaching the sensor to the collar is convenientfor the dog and the owner, but if it compromises dif- ferentiation of resting from other sedentary behaviours as concluded in (den Uijl et al., 2017), it can lead to misleading conclusions in cases where rest behaviour is used, for example, as an indicator for a dog's pain or stress level. Our current results are promising in terms of development of practical methods for automatically gaining information on dog behaviour. This type of moreaccurate information can be useful in supporting theowner in gaining overall understanding of a dog's daily life, assessment of health or sickness, and functioning ofmedication, in particular for dogs suffering from chronic illness. [2]
3) Critical Literature Survey on Implementation of GPSfor location tracking Ahmad Ashraff Bin Ariffin; Noor Hafizah Abdul Aziz; Kama Azura Othman : Stand aloneglobal positioning system receivers are widely used nowadays to accurately locating one's position. By using stand alone GPS receivers the distance between two locations on earth can also be measured. This project is aim to design and implement a low cost Global Position-ing System suitable to be used for hiking, climbing and sailing activities. The function of the GPS is to locate the position of user. The effects of line of sights in relation to different experimented locations are also studied. In this project, the hardware used is PIC18F4520 integratedwith GPS receiver typed FV-M8. The GPS moduleswill generate the coordinates of latitude and longitudeas well as the bearing angles between two positions.The algorithm to calculate the distance between twopositions was developed by using PIC C Compiler. The written algorithm extracted the data from the GPS receiver via the RS232 communication. Microcontroller is used to parse the NMEA data sentences and execute the algorithm. Finally, the output is displayed to a LCD display unit. [3]
4) Critical Literature Survey on Detepet Mobile Applica- tion for Pet Tracking Brian Wijaya Aqraldo; Je ssen; Yuliet Sentoman; Deven Markos; Harco Leslie Hendric Spits Warnars: People who have pets certainly wantto always look after pets that are loved and cared for years so there are no cases of loss of pets. Ourapplication is here to answer all problems regarding the loss of pets, we believe this application can help people who often experience the loss of pets. This application can find out where your pet is when you wear the necklace you bought on this application, and connect with this application. We recommend that people who often experience problems with losing pets can use our application because besides being able to track your pet,this application is also supported by a heart rate and breathing rate detector, as well as a footprint counterfor your pet, so you will feel safe and comfortable whenaway from your beloved pet. [4]

III. PROPOSED IDEA

We have made a pet tracking application that is very useful for pet owners. Our **'Pet Status'** application has many useful features for pet owners, especially for those who are concernedwith their pets. So our app **'Pet Status'** provides information such as heart rate, temperature, and location of the pet. Here for the interactive user interface, we have used Flutter languageand also we use Android Studio so it can run Android.

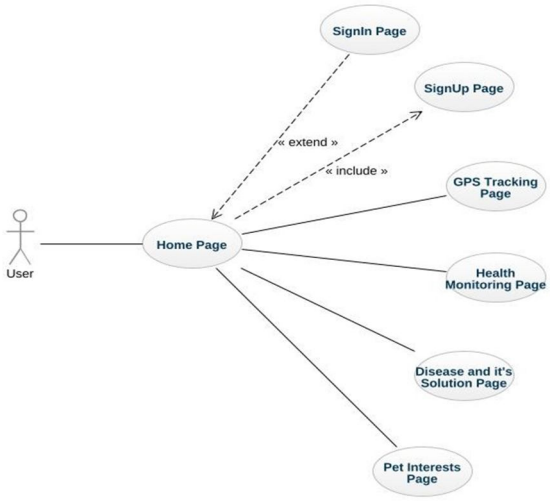
A. Pet Tracking

The main goal of our application is to track the location ofa pet in case the pet disappears. It also minimizes the loss of pets. For tracking pets we use GPS Technology. GPS sendsthe location of the pet to our application. Pet tracking can be done using a device that can be worn by a pet in the formof a '**Collar**'. So the device is connected to the Pet Status application and we can track our pets wherever they are.

B. Health Monitoring

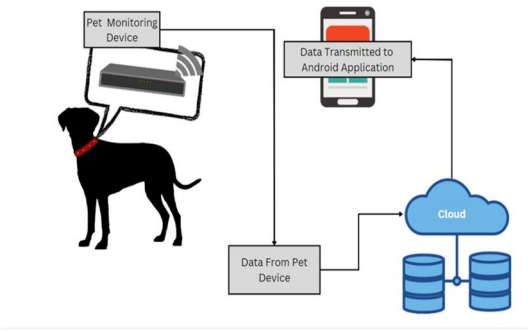
We have used different types of sensors to monitor the health of the pet. there is a temperature sensor to calculate the temperature and a heart rate sensor to calculate the heart rate. The sensors are connected to the application via WiFi. With the help of sensors, we can monitor the health of ourpets 24/7. Consistently monitoring the health of your pet can increase the chance of catching your pet's sickness before it becomes severe and even expensive.

C. Use Case Diagram



Given is the use case diagram of the Pet Status application. Users who want to use the Pet Status application must registerfirst before using the application.

D. Architecture



The figure shows the architecture of our project. The device isattached to the collar of the dog and the data from the deviceis given to the cloud. Then the information is transmittedfrom the cloud to our app.

E. GPS Sensor

The Global Positioning System (GPS) is a satellite-based navigation system that consists of 24 orbiting satellites, each of which makes two circuits around the Earth every 24 hours. Here we use the NEO-6M GPS Module for tracking purposes. The NEO-6M GPS module is a GPS receiver that can locateall locations on Earth as it is able to track approximately 22 satellites. GPS receiver module that is based on the u-blox NEO-6M GPS chipset. It is a small, low-power, and easy-to- use GPS module that communicates with a microcontroller or computer using a serial communication interface. The GPS module receives signals from GPS satellites and usesthis information to determine its position. The GPS signals contain information about the location of the satellite and by comparing the time stamp of signals from multiple satellites, the GPS module can determine its position on the Earth's surface.

F. Temperature Sensor

Here we use the DHT22 Temperature and Humidity Sensor.The DHT22 temperature and humidity sensor have many different uses and is a cost-effective sensor used to measure temperature and humidity for a wide range of applications. The sensor that uses a capacitive humidity sensor and a thermistor to measure the temperature and humidity respectively. This sensor operates on relatively low power which makes it more suitable for battery-powered projects. The sensor commu- nicates with the microcontroller using a single-wire serial interface. When the microcontroller sends a request to thesensor, the sensor responds by sending a 40-bit data stream that contains the temperature and humidity readings. The data stream contains 5 bytes of information, including the relative humidity (16 bits), temperature (16 bits), and a checksum (8 bits) to ensure data integrity. The microcontroller receives the data and uses it to calculate the temperature and humidity readings.

G. Pulse Sensor

Here we use MAX30102 Pulse Oximeter and Heart-Rate Sensor Module. The MAX30102 is a highly integrated pulse oximeter and heart-rate sensor module that measures both the reflected and transmitted light from the blood flowing througha pet's body part. It uses a combination of red and infrared light to measure the pet's heart rate. The MAX30102 module has a built-in LED driver and photo-detector which can emit and detect the light, respectively. The photo-detector measuresthe amount of light that passes through the pet's neck and converts it into an electrical signal that is processed by an internal microcontroller.

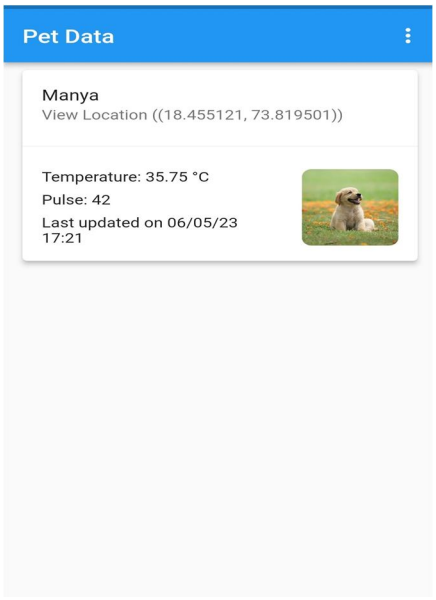
The MAX30102 module uses a complex algorithm to extractthe heart rate from the raw data received from the photodetec- tor. This algorithm uses various signal processing techniques such as filtering, baseline removal, peak detection, and thresh-olding to isolate the pulse signal from the noise. Once the pulse signal has been isolated, the algorithm calculates the heart rate by measuring the time between consecutive peaksin the pulse waveform.

IV. RESULT

The table shows the information about the pet.

TABLE I
PETS DATA TABLE

Pet	DOG	CAT
Location	Malhar gad A wing Narhe	Savitri hostel
Temperature	33.5	35.75
Heart rate	56	42



V. CONCLUSION

Our application is designed to assist pet owners in prevent- ing the loss of their beloved pets. We understand that pet owners want to ensure their pets are cared for and remain withthem for years to come. Our application provides a solution forthose who frequently experience pet loss. By Hardware deviceof our application and connecting it to the app, you can track the location of your pet. Additionally, our application features a heart rate and temperature detector. This combination of features ensures that you can feel secure and comfortable whenyou're away from your pet. We recommend our application forthose who want to keep their pets safe and avoid any future instances of pet loss.

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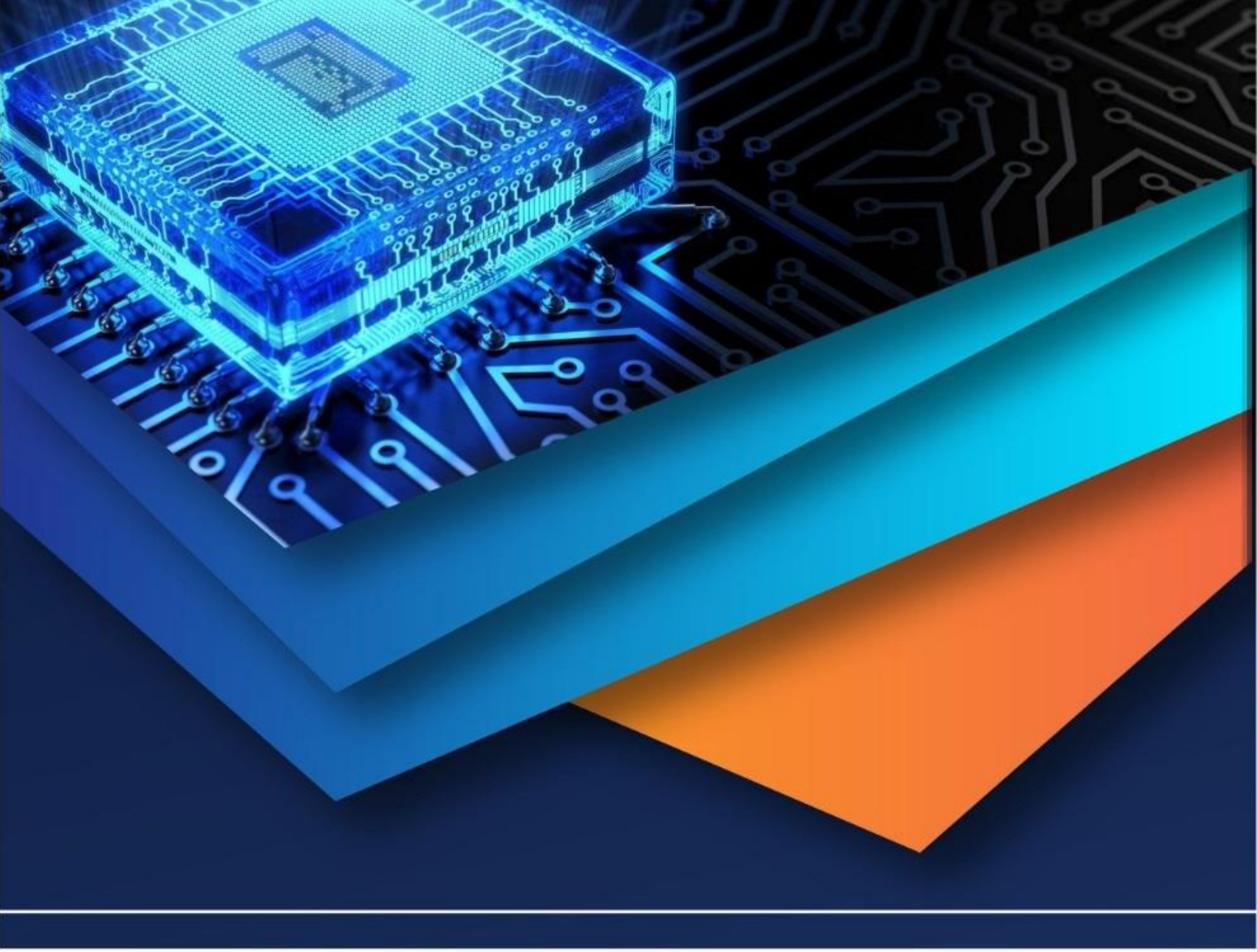

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