DOGODO: IOT BASED ENHANCED MOBILE APPLCATION TO PROVIDE ESSENTIAL HEALTH SERVICE TO DOGS- SMART HEALTH TRACKER

2021-162

Project Proposal Report

L.V.I.S THILAKARATHNE – IT18502466

B.Sc. (Hons) Degree in Information Technology

Department of software engineering

Sri Lanka Institute of information technology

SRI LANKA

February 26

DOGODO: IOT BASED ENHANCED MOBILE APPLCATION TO PROVIDE ESSENTIAL HEALTH SERVICE TO DOGS- SMART HEALTH TRACKER

2021-162

Project Proposal Report

B.Sc. (Hons) Degree in Information Technology

Department of software engineering

Sri Lanka Institute of information technology

SRI LANKA

February

Declaration of the candidate & Supervisor

We declare that this is our own work, and this proposal does not incorporate without acknowledgement any material previously submitted for a degree or diploma in any other university or Institute of higher learning and to the best of our knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text.

Name	Student Id	Signature
L.V.I.S Thilakarathne	IT18502466	Sandagomi Thilakarathne

The supervisor/s should certify the proposal report with the following declaration.

The above candidates are carrying out research for the undergraduate Dissertation under my supervision.

Signature of the supervisor: Date

Abstract

A pet dog can bring love and companionship to a family or a person. That is a well-known fact among the community. To reduce stress, prevent loneliness, people tend to keep a dog around them. Having a dog or in other words raising a dog is not an easy task. We need to take care of them as well as we get benefits out of them in return. Sometimes taking a pet to a doctor might be a tedious task depending on the person's schedule. Or else it would be hard to have a transport system depending on the size of the dog. And also lack of knowledge on dog's health can be a disaster to prevent long term risky issues. To answer this gap, we initiate a solution which cover almost every aspect that needs to cover in terms of dog's health issues. This solution will offer (smart health tracker which predicts health patterns and suggest activities and prevention methods, dog translator, breeding and predictions based on breeding module, skin related disease identifier and remedy suggestion module).

As per the individual research component, this module will carry out the task of implementing the smart health tracker and prediction-based IOT solutions providing device. This module will mainly cover Heart Rate tracker/ Body temperature tracker and Footsteps tracker. Unlike other devices in the market which provides just the heart rate, Temperature and footsteps, this device will use the above sensor information's for further usage of generating predictions and to identify patterns in dog's health. Identified sensor information will stored in a server where it uses machine learning algorithms to identify patterns in dog's health and generate useful predictions for the usage pet owner. Hence the pet owner will be able to identify abnormal temperature patterns of their dog, is their dog less active as general or especially during a certain period of time. And also, owner will be able to know about the heart rate related issues. This device will be released with an eye catching well synchronized mobile app where the owner can use to know about every detail which the device catches in advance.

Keywords: Sensor information's, prediction-based IOT device, Machine learning, Mobile App

Table of Contents

List of Figures

List of Tables

List of abbreviations

Abbreviation	Description
1. SHT	Smart Health Tracker
2. IOT	Internet of Things

List of Appendices

1. Appendix A

1. Introduction

As humans we buy dogs for different purposes in our life. Some raise dogs as for their protection, some to prevent loneliness, and also, some people raise dogs to play with their kids. Throughout the pet's life, dog give their services to the human kind. But sometimes dog's health situation can be a burden to their owners. This happens because of the lack of awareness of the symptoms which owners couldn't identify at the early stages. For humans we can identify any sort of illness prior to the actual cause from symptoms. But when it comes to dogs and any other animal which we raise as pets, it's really hard to identify any abnormality in their health statuses.

This question still hasn't been answered in the industry properly. Pets and their owners cannot establish a proper communication system among them as humans do with each other's with languages. Therefor when it comes to health issues, owners rarely find any differences or behaviors in their dogs. And another problem is" when to visit doctor?". Often this question leads to couple of questions back-to-back, Is this a small issue? Or should I take my dog to the doctor for this certain problem?

These problems mostly arise for, people who has some sort of large breeds, which in turn becomes a hassle to take the dog to the doctor. As Sri Lanka is a developing country, we do not find easy access to veterinary doctors near every city. Some pet owners might have to take couple of extra minutes or hours to visit a Veterinary doctor. Due to all these reasons, the chances of owners neglecting or not seeing minor symptoms which can cause for larger health issues are high. To address that we came up with an innovative solution which can easily deliver to every pet owner as a device and a mobile app which will perfectly sync along.

The above solution will provide owner with the benefits such as measuring and tracking dog's health statuses whenever they required. Especially, this solution will provide predictions and precautions by using daily calculated and measured data. This research will elaborate detailed information's on how this solution has answered certain questions which every pet owner has faced while raising a dog consecutively. And also, how this solution will make a difference in the pet care community as well as how well this solution will ease the tasks of dog owners.

2. Background and Literature Survey

2.1 common issues of pet dog owners

In general, each animals' reaction towards illness are varies. Since humans can't communicate with animals directly, we need to observe them carefully with their behaviors to identify any signal of illness. The only way to find out any difference in their behavior is by observing and paying attention to them carefully. Most of the indoor pet animals need these types of attention and care especially. There is a huge difference between stray/wild animals and indoor animals. Any living being get adopted to their precinct. As such, indoor raised dogs need extra more attention unlike other stray animals, since their internal immunity and other health statuses hasn't been exposed to harsh environments. Hence pet owners should be aware about their health statuses often. This is a tedious task. And mainly, for each small issue, visiting the veterinary doctor with their pet would be a hassle. Some dog breeds are large. And some might be overly aggressive. Due to these kinds of reasons, pet owners intentionally try to reduce doctor visits gradually over the time. These minor steps which pet owners neglect can be the root causes to major health issues in the long run of their dogs.

2.2 what can pet owners do about this?

As we discussed earlier, pet dogs should be paid attention carefully like any other children. Like humans needs good nutrition's and intensive exercises to have a good healthy life, dogs require the same. But looking over these tasks and paying more attention might be hectic and a huge burden to a person who is tightly tied to a schedule or to a nuclear family. Nevertheless, identifying any internal changes in dogs' body is almost impossible until the pet shows an unusual behavior. Due to these issues, pet owners might not see symptoms or any illnesses that should be paid attention in the early stages. Therefor these neglections and lack of awareness might put that pet dog's life at a risk. Most of the indoor raised dogs are adopted to a certain routine where they eat sleep and relaxed most of the hours in a day. This lifestyle of that dog might lead it to Hyperlipidemia and Diabetes stages. As for the moment there has been couple of technological based solutions established in the market for this issue [1]. To prevent unnecessary risks from rooting without acknowledging, inventors has delivered smart

5. Would it be easy for you to have a device which can generate your Pet dog's internal health such as (temperature/footsteps (calories)/respiratory levels)?
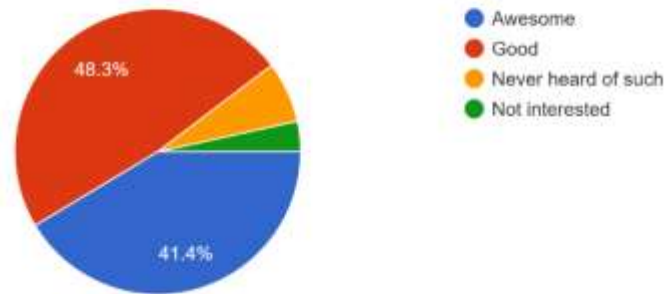
58 responses

Figure 1 Survey about normal SHT's

tracking systems to the market. These tracking devices has mobile apps which syncs along with it.

As per the survey, most of the responders would like to have a device which can track their dog's health. Rather than rushing to a doctor for each and every symptom, it's better to know your dog. Then pet owners know what exactly wrong with their pet.

3.3 how current solutions answer this matter?

Following solutions which already exists in the market tracks body temperature, footsteps and heart rate of the dog [2]. And the sensor information's which captures by the device will be shown through the mobile app which comes along as a unit. the question which arises from following solutions is that just information from sensor devices is enough to take an action?

6. What do you think about a system which can predicts exercises and diet plans by tracking dogs foot steps and heart rate levels for the future health benefits?
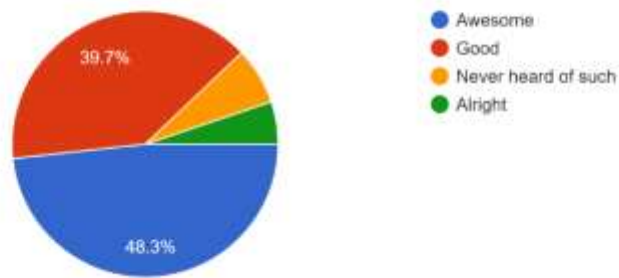
58 responses

- Awesome
- Good
- Never heard of such
- Alright

39.7%

48.3%

Figure 2 Survey about SHT with predictions and suggestions

Device and the sensors won't help the owner to identify the real issue of the dog. Device need to be more innovative to teach about owners' dog by using collection of data over a period of time. With regards to the above response, most of the users like to have a device which can predict and generate more information's through the IOT device.

3. Research Gap

There are multiple solutions in the market to track different aspects of dog's health. As for an instance, there are couple of devices which can measure the body temperature, footsteps and heart rate of the dogs. But the main concern is what shall the owner do with the device information? The main reason that pet owners fail to identify and take actions for certain illnesses of dogs is not knowing enough information about the procedures. Even though there are apps and devices in the market, there hasn't been any solution which can provide "**what can you do next**?" answer along with the system. Here are the gaps which I found in the community and can be filled with an innovative and efficient solution.

- Heart rate tracker which can identify patterns and predicts health statuses and activities accordingly
  There are couple of IOT devices in the market which can measure dogs heart rate. But these devices have been framed just into showing what is the current heart rate for the moment. This solution will never identify any problems of your dog. To further elaborate how this gap has been affected to the pet owners is, that current heart rate can be misleading due to the situation. Normal resting heart rate of a dog usually range between 70-120 [4]. But this range can be slightly changed according to the weight and height of the dog. Therefor just by measuring heart rate one time, owner can't come to any conclusions about the dog health status. To overcome this issue, pet owners require a device which can take heart rate information daily over a period of time to identify any pattern of dog's health.

- Temperature tracker which can identify body temperature and inform about abnormal signs during a certain period.
  There are devices to track body temperature of dogs. But as mentioned earlier, there are no much value in calculating current body temperature to come to any conclusion. Here are couple of factors that can affect the dog's body temperature,
  - Environment temperature
  - Dehydration
  - Consumption of heaty foods

By considering the above factors, pet owners can't straight away come to any conclusion with one-time sensor information. If there's enough information to identify sudden body temperature ranges, owner can take actions accordingly.

With a device which can store data and identify any patterns, can save lots dogs from health issues.

- Foots step tracker which can identify daily footsteps and suggest exercises according to the daily activity level of the dog.
  In general dogs are very active animals. But this factor can get drastically change according to its environment. Here are some reasons that dogs can be less active,
    - No companionship
    - Less attention
    - Fast foods and process foods can affect dog's health straight away
    - Some breeds are less active in general (Bassett Hound, pug, Great Dane etc.)

Activeness is a one of the main factors which contributes for long healthy life of a dog. Most of the time dogs stay at home alone without any company. During this period dogs tend to sleep more. This routine can make dog a less active one. In long run this issue can leads to several issues. To prevent that owners can track footsteps of dogs with current devices in the market. But that won't do the necessary actions which requires. These activities should be recorded. And this information can be used to identify how much footsteps that the dog has taken as an average per day and week. If there's a solution which can identify these patterns and suggest exercises for the dog, it can prevent lots of dogs from getting victims of heart diseases.

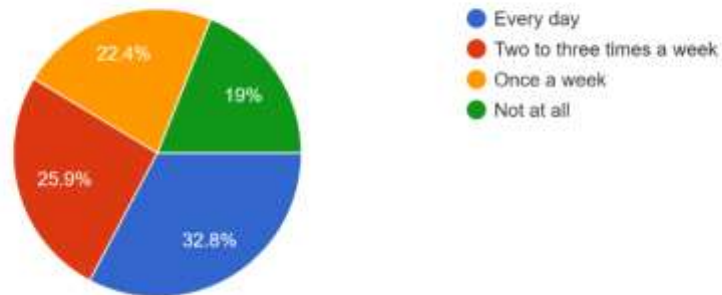8. How often do you take your dog to a walk?
58 responses

Figure 3 Survey about owners taking out their dogs for a walk

according to the survey still there is a portion who do not take their dog to a walk. It is an essential thing to a dog which doesn't have enough space inside the house to walk around. Not just for the exercise purposes, taking the dog out is an adventure to the do from its perspective. It's because domestic dogs don't get see the outside of the world more often. Some dogs rarely get that chance

In general, the solutions in the market doesn't provide the service which pet owners requires (providing information's which can be used take actions, information's that can educate the pet owner about the dog and its health status). And at the same time the devices which are exist in the market are highly rate and very expensive [3].

4. Research Problem

As humans who love pets, there is one strong factor which everyone misunderstands widely among the society. We often compare wild animals and domestic animals using same factors and put into the same caliber thinking both categories are same. Every living being gets adopted to its environment. And especially,

- o Their immune system
- o Reaction to the environment changes
- o Insect bites
- o Foods and liquids

Will be unique and tolerable according to the environment which they grow in. A stray dog which grew in streets can have a strong immune system while a domestic dog which raised entirely inside a house has a weak one. Due to these reasons, pet owners must be knowledgeable to some extent to have a dog. But not every pet owner can afford to know each detail before they own a one. Raising an animal is a step-by-step process which in return gives experience to the person.

At the puppy stage, every owner gives special care. But this process gradually gets neglected when the dog gets old. As for the normal process for a new born puppy, a puppy should be taken weekly and monthly to the veterinary doctor until a year. During this period, puppy gets relevant vaccines and other treatment for growth and health. After the first year, treatments get gradually reduced to long time durations (within the first year every month. After the first year, every 6 months and so on depending on the doctor suggestion).

7. How do you rate the process of taking your dog to a doctor to a small issue which can be sorted out by a drug store with correct details?
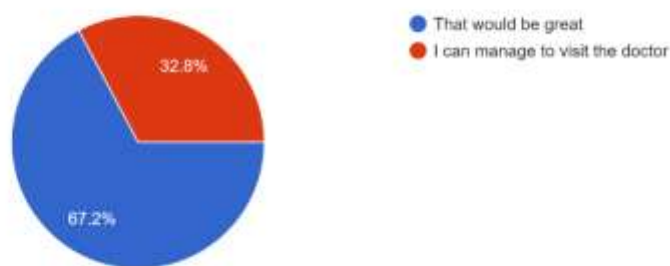58 responses

- That would be great
- I can manage to visit the doctor

32.8%

67.2%

Figure 4 Survey about the difficulty of taking the dog to the doctor

Even though the vital treatment periods are gradually reduced, pet owners should be concerned as usual about their dog's health. But most of the time this factor gets neglect among the community. This neglection can be caused by,

- o Busy schedule of the pet owner
- o Lack of knowledge about the dog's health
- o Thought of giving healthy foods would be just enough
- o Dog tend to do activities on its own
- o Not seeing any signs of illness from outside

Most of the time these neglections get ended up giving long term health issues to dogs. With the correct use of technology, these problem gaps can be answered efficiently. Unfortunately, the solutions that has been released to the market hasn't brought up to the point where it can give proper guidance and knowledge to the pet owners. As I mentioned earlier, a device which just measures (temperature, heart rate, and footsteps) does not educate or inform pet owners to take actions which requires for their pet dogs.

Domestic dogs should be paid more attention carefully. With current schedules and life patterns of people, it is something difficult to afford. But every problem has its own way of solving. Therefor my research will bring up a solution which can measure a track internal health of dogs. Specially system will recognize unusual behaviors of the sensor information's. And by using that information, system will provide predictions and suggestions for relevant areas which the service requires. This solution's primary object is to prevent dogs from diseases and laying a path to a healthy strong life.

5. Objectives

5.1 Main objective

The main objective of this component is not to provide just a tracking device where its primary target is to display sensor information through a mobile app. This module is simply more than that. Through this module, the IOT device will mainly collect dog's

1. Body Temperature
2. Heart Rates
3. Footsteps

And these data will be collected daily according to the requirement of the pet owner. And collected data will be used along with pre captured data to identify patterns and predict useful information using machine learning algorithms such regression. Module will isolate information sensor wisely to generate useful information to the user. Since there are three different sensors inside the IOT device, collected data will be directed to real time data base for the storage purposes. Once the information's are stored inside the data base, each sensor information will get tallied with other data to identify any abnormalities among the data. For an instance, if the dog heart rate gets lower over a certain period of time, that should be informed to the pet owner through the mobile app with actions that can be taken to prevent unnecessary risks.

As mentioned, each module will provide more information from gathered data using machine learning algorithms. Therefor the main objective is to provide an innovative useful solution to the pet owner for their dogs.

Figure 5 how the leash gets attached to the dog

This device will mainly get attached into a comfortable leash which will get tightened into the body of the dog. The leash will custom made from cushioning (comfortable sponge) and the device will be located under the left leg of the dog. Therefor the belt won't give unnecessary weigh to the dog. Instead, the device information can be captured without any interruption and harm to the dog.

5.2 Specific objectives

1. Heart rate sensor which helps to identify unusual patterns and predicts about health

This is a one component of the main IOT device (Smart Health Tracker). This component will mainly focus on tracking the heart beat rate of the dog. Primary target is to gather heart beat rate of the dog daily to identify any patterns that can cause harm to the dog and to prevent it by taking necessary actions. By using the functionalities of this module, the pet owner (user) can get an overall idea about past weeks information's on dog's heart rate. This module will help user to identify,

- o Weekly or monthly heart rate patterns as a diagnosis report along with other sensor information's which can be shared with doctors and drug stores
- o Low and high heart rate levels will be informed to the user.
- o And also, information's will be shared through app as suggestions on what user can do about those high and low heart rate levels
- o Information's on risky heart rate levels. And specially reasons why it can cause.
- o Exercise suggestions to main a good health

2. Body temperature sensor which helps to identify and track normal and irregular temperatures.

This is the second component of the main IOT device (Smart Health Tracker). This component will mainly focus on watching the dog's body temperature daily. This device will be able to identify high and low temperatures of the dog. Normal body temperature range of dogs is 101 to 102.5 degrees Fahrenheits. but this can be slightly changed according to the environment. Therefor solution will gather data daily to distinguish normal body temperatures from abnormal temperatures which pet owner should be concerned. This module will help user to identify,

- o Weekly or monthly Body Temperature patterns as a diagnosis report along with other sensor information's which can be shared with doctors and drug stores

- High and Low body temperatures.
- And also, information's will be shared through app as suggestions on what user can do about those high and low Body temperature levels.
- Information's about remedies for fever

3. Footstep tracker which helps to track the activity level of the dog and suggest exercises to the dog

This is the third component of the main IOT device (Smart Health Tracker). This component will primarily focus on tracking the daily activity levels of the dog. Therefor this device will be able to identify how many steps dogs has taken within the day. Depending on that, device can decide whether the dog is active and a healthy one. If the dog hasn't taken any steps which a normal healthy dog would take, device will suggest and inform the pet owner through the app to take the dog out for a walk. This module will help user to identify,

- Daily and weekly steps which dog has taken.
- If dog has taken less steps, app will inform to take the dog out for a walk
- App will suggest exercises
- Weekly step targets for dog depending on the weight levels.

6. Methodology

In order to elaborate the process of this Research Component, we want to get a brief idea about the main divisions and technologies that are getting used to implement the device. Starting from the IOT device, it uses Node MCU technology which has **WIFI and Bluetooth** compatibility. Therefor Node MCU chip can bring absolute unique technology which the research project needed the most. And also, the feather weight of the chip will not bother the Dog by giving extra weight on the leash. IOT device will mainly base on the NODE MCU chip and relevant sensors will be attached according to the necessity.

Here is a brief idea about how sensor and sensor information's will deliver the relevant data to the server.

- ➢ Device will be located under the front left leg of the dog (in front of the heart, there for sensor information's will be more accurate)

- ➢ Sensor information's will be recorded using Node MCU and Arduino Uno 3 technology)

- ➢ Recorded Sensor information's will be directed to the Mongo atlas database to be analyze further using regression algorithms to identify patterns using Machine learning.

- ➢ Sensor information will be analyzed with preset of data which gathered related to Heart Rate / temperatures and footsteps of the Dogs.

- ➢ Analyzed data will be shown in the Mobile app for owners' perusal.

- ➢ Device location won't be any issue to the dog since it locates under the arm.

Gathered data will be analyzed using Regression analysis methods to identify unique patterns. Identified patterns will get used to generate health statuses of the dog consecutively (Heart Rate, Temperature, Footsteps).

Here is a summary of how the system flow works,

1. IOT device will be located on the leash of the dog

2. Gathered information's will be directed to the Graph QL API.

3. After the API will deliver the information's the server. Small data will be directed to the Mongo atlas database while large ones will be stored in AWS

4. Gathered data will be analyzed using regression algorithms to find out patterns and unique behaviors.

5. Identified patterns will be shared with the mobile app.

6.1 Testing

For the device and project testing purposes, following process will be conducted,

- Testing will be mainly implemented on neighbors' dogs.

- Implementations will carefully be organized under the owner's supervision.

- Smart device will be handed over to the owner for two days.

- Selected owners will get two to three days to use the device to get information.

- Setup guides will be delivered to the owners.

7. Project Requirements

Table 1 Scope of the project

Scope of the Project	

	➢ Smart Tracker with the sensors (Temperature / Heart Rate / Foot Steps)
	➢ Supporting Mobile App.
	➢ Custom-made Body leash.
	➢ Predictions,
	    1. Based on historical data, predicting Temperature levels and what can cause them.
	    2. Heart rate levels and increases and decreasing of significant levels.
	    3. Based on Footsteps, activity levels, exercise routines and dietary plans.
	➢ Sensor information's will be stored to analyze and identify patterns of the health.
	➢ Exercise suggestions and Diet plans according to the activity levels of the dog.
	➢ Daily notifications to the owner's smart phone.
	➢ Diagnosis reports which can be shown to the doctors and drug stores when necessary.
	➢ Exercise routines and plans

8. Conclusions and Recommendations

This solution can bring an answer to the issues that has been risen among the community we live. Even though there are answers, as mentioned above, not a single product has been able to tap the real issue which dog owners face day to day. Current devices which has been released to the market only provides certain number of features which cannot provide the expected out come to the dog owners. Here are the features which current solutions provide and what this research project expects to provide,

Table 2 What Research Project Offers

Existing solutions deliverables	Research Project Deliverables
➢ Smart Trackers which provides sensor information's ➢ Supporting Mobile APP (for only some devices) ➢ Just device or Device which attached to a dog leash.	➢ Smart Tracker with the sensors (Temperature / Heart Rate / Foot Steps) ➢ Supporting Mobile App. ➢ Device will be attached to a custom-made Body leash. ➢ Predictions using sensor information's ➢ Sensor information's will be stored to analyze and identify patterns of the health. ➢ Exercise suggestions and Diet plans according to the activity levels of the dog. ➢ Daily notifications to the owner's smart phone. ➢ Diagnosis reports which can be shown to the doctors and drug stores when necessary. ➢ Exercise routines and plans

9. Budget and budget justifications

	ITEM	AMOUNT
1	NODE MCU CHIP	1000
2	SENSORS	1200
3	LEASH	500
4	BOX	150
5	DB SUBSCRIPTION	
		2850
	APPROX	3000

Table 3 Budget

- Above Budget is an approximate expense calculation of one device.
- This cost can be reduced in bulk production.
- Hence with the IOT device and app will be a reasonable product for the customers.
- Bulk production can be delivered to the community for a small price which can be afforded by the Dog owners.

17

Reference List

[1] Punit Gupta, Deepika Agrawal, Jasmeet Chhabra, Pulkit Kumar Dhir "IOT based smart Healthcare Kit", 2016.

[2] Robert L. Hollis, "Dog Behavior Monitoring and training Apparatus", 2002.

[3] "MeasureON! Harness - VetMeasure", *VetMeasure*, 2021. [Online]. Available: https://vetmeasure.com/product/measureon-harness/. [Accessed: 12- Feb- 2021]

[4] Dog Resting Heart Rates [Online] Available :
https://www.msdvetmanual.com/special-subjects/reference-guides/resting-heart-rates
[Accessed on: 02- Jan- 2021]

[5] Bence Varga , Anna Gergely , Ágoston Galambos ,Anna Kis, "Heart Rate and Heart Rate Variability during Sleep in Family Dogs (Canis familiaris). Moderate Effect of Pre-Sleep Emotions ", 2018.

[6] Olli Lahdenoja, Tero Hurnanen1 , Matti Kaisti , Juho Koskinen , Jarno Tuominen , Matti Vähä-Heikkilä , Laura Parikka, Maria Wiberg , Tero Koivisto, Mikko Pänkäälä, "Cardiac monitoring of dogs via smartphone mechanocardiography: a feasibility study", 2002.
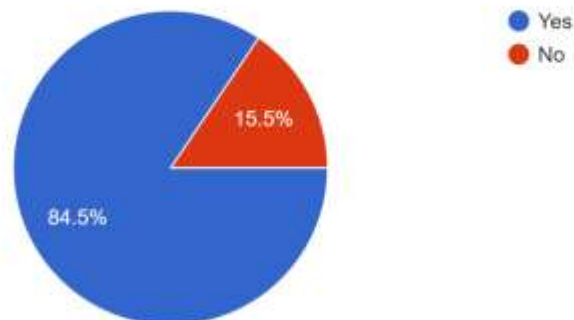
Appendices

Appendix A: Complete questionnaire results
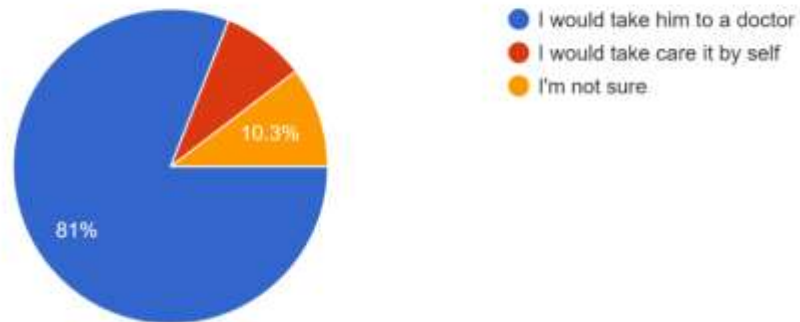
1. How well do think you understand your dog?
58 responses

- 20%
- 40%
- 60%
- 80%,
- 100%

36.2%
10.3%
10.3%
36.2%
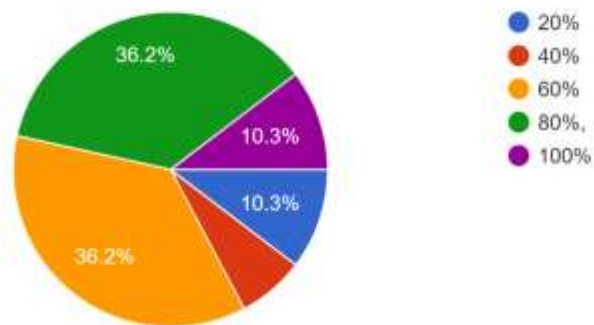
2. Can you understand if the dog is suffering from an illness?
58 responses

- Yes
- No

15.5%
84.5%

3. If you understand that the dog is suffering what would you do?
58 responses

- ● I would take him to a doctor
- ● I would take care it by self
- ● I'm not sure

10.3%

81%

4. Would you like to have a device that would help the understand the dog better?
58 responses
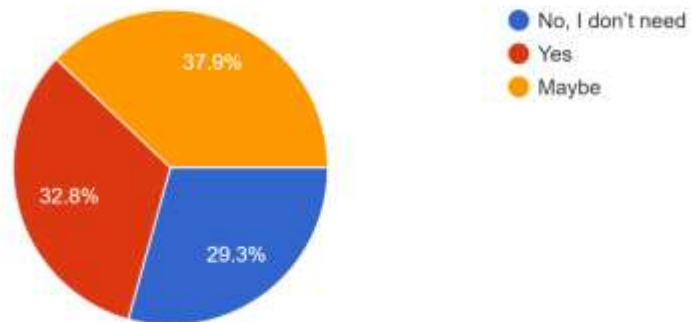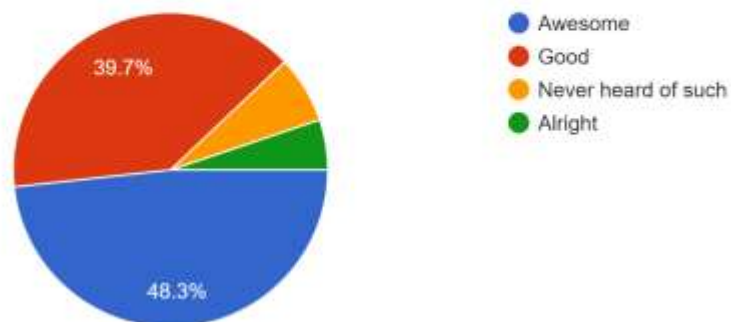

- ● No, I don't need
- ● Yes
- ● Maybe

37.9%

32.8%

29.3%

5. Would it be easy for you to have a device which can generate your Pet dog's internal health such as (temperature/footsteps (calories)/respiratory levels)?

58 responses

- Awesome
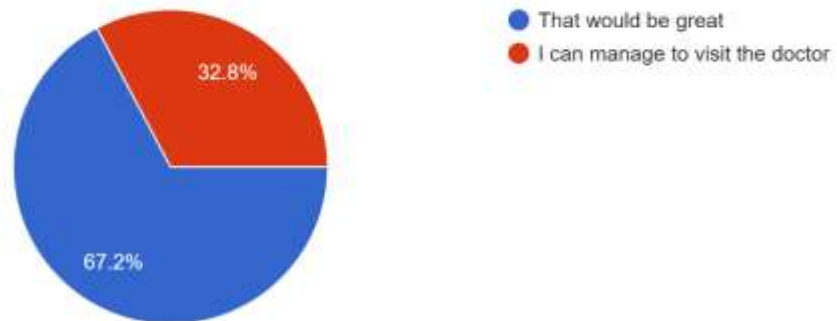- Good
- Never heard of such
- Not interested

48.3%

41.4%

6. What do you think about a system which can predicts exercises and diet plans by tracking dogs foot steps and heart rate levels for the future health benefits?

58 responses

- Awesome
- Good
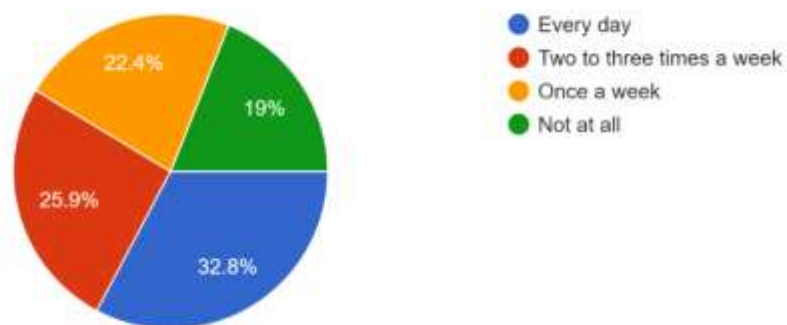- Never heard of such
- Alright

39.7%

48.3%

7. How do you rate the process of taking your dog to a doctor to a small issue which can be sorted out by a drug store with correct details?
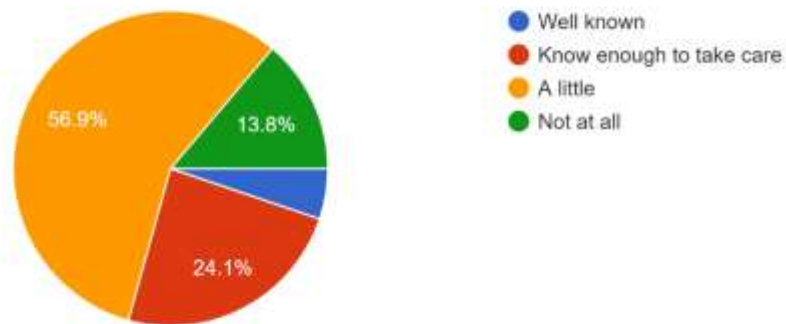
58 responses

- That would be great
- I can manage to visit the doctor

32.8%

67.2%

8. How often do you take your dog to a walk?

58 responses

- Every day
- Two to three times a week
- Once a week
- Not at all

22.4%

19%

25.9%

32.8%

9. How do you know what result will come after a cross dog mix breed?
58 responses

- Well known
- Know enough to take care
- A little
- Not at all

56.9% 13.8% 24.1%

10. How do you normally find a partner for your pet?
58 responses

- Through word of mouth
- By the doctor
- Wait till some person brings a mate

32.8% 32.8% 34.5%
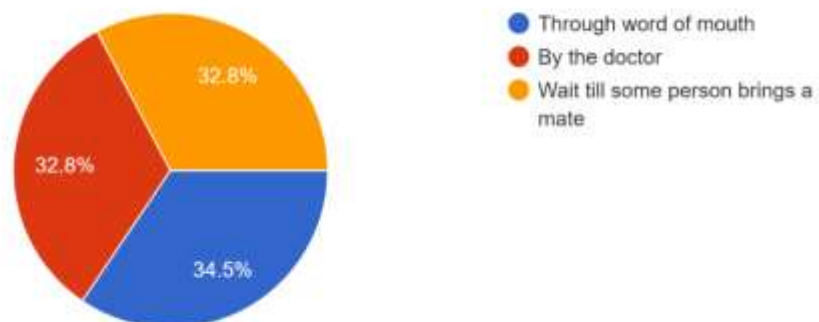
11. How to find necessary food recommendations for your pet?

58 responses
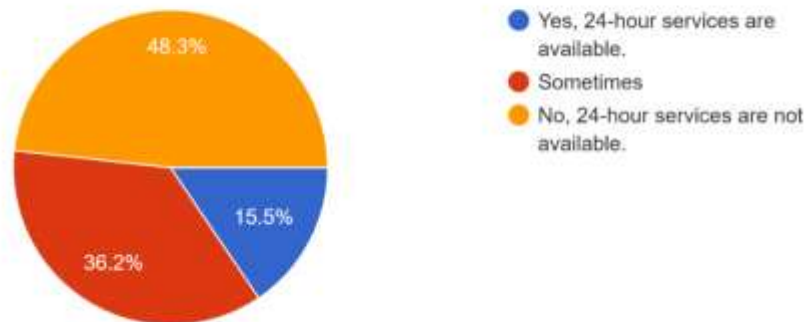

- Online
- Doctor
- From people who have experience

37.9%
56.9%
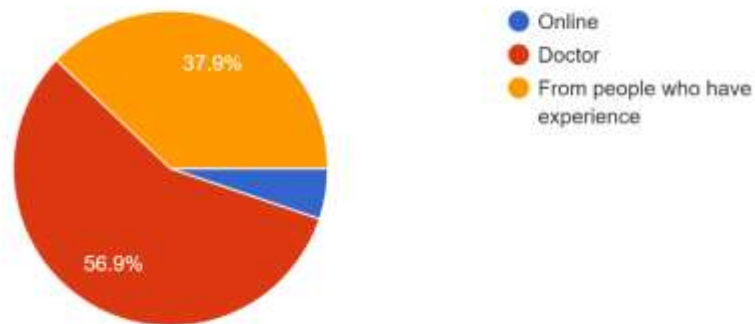
12. If you are not going to channel a doctor for your pet how do you find medical treatment for your newborn pet?

58 responses

- Online
- Doctor
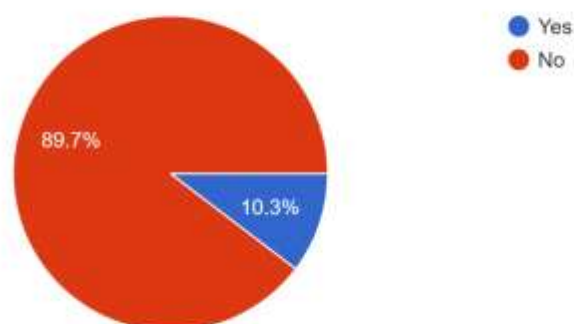- General foods which every pet takes

20.7%
46.6%
32.8%

24
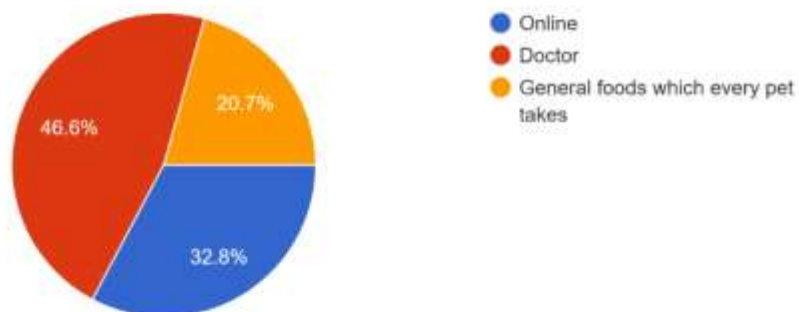
13. In your area, are veterinary services available 24 hours a day?

58 responses

- Yes, 24-hour services are available.
- Sometimes
- No, 24-hour services are not available.

48.3%

15.5%

36.2%

14. Have you ever used a mobile app to identify your pet dog's skin diseases?

58 responses

- Yes
- No

89.7%

10.3%

15. Do you pay attention to your dog's skin 24 hours a day?
58 responses

- Very much
- A lot
- A little
- Not at all

53.4%
12.1%
12.1%
22.4%
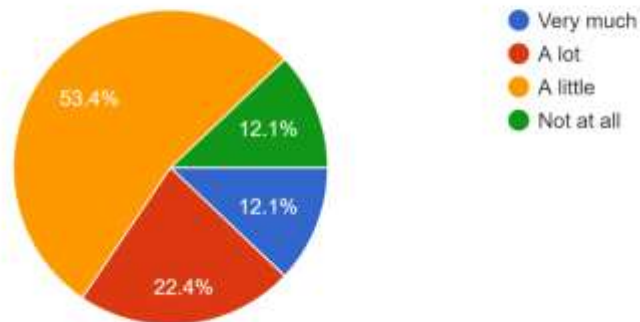
16. If there is a mobile application system for identifying small skin diseases without meeting a doctor, it helps identify skin di.... Do you agree with those mentioned above?
58 responses

- Strongly Agreed.
- Agreed
- Maybe
- Disagreed

41.4%
12.1%
43.1%
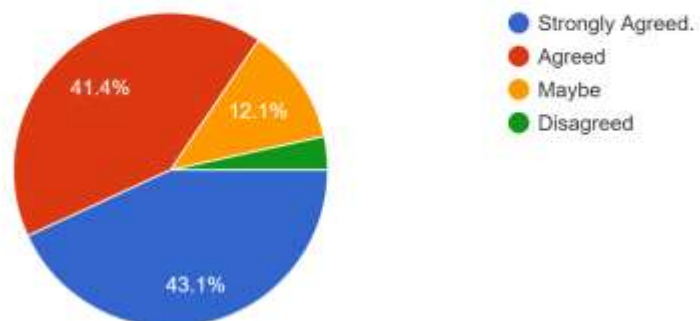
17. What is your level of knowledge about dogs?

58 responses

- High
- Medium
- Low

75%
16.7%
8.3%