

Design and Implementation of Real-time Health Check System for Pet

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Abstract: -Products in a variety of fields are being created following increased use of Smartphone and activation of IOT market and pet-related applications are also growing due to the increase of pets. However, IOT-linked application that is specialized in pet's health is not yet in wide spread. This paper designed and implemented an application that measures health condition of a pet that is left alone and notifies the users about the information, which is the largest concern among the single people and salary men that raise pet. We expect that this application can provide an opportunity for the pet owners to receive health condition information of pet and pay more attention. This application is applicable to not only pets, but also senior and several other situations like a house that has to be monitored remotely.

Key-Words: - IOT , Web Application, Arduino, HTML5

1 Introduction

Pet is a term that contains a meaning as a family member, referring to an animal that lives with people and exchanges emotions with them. The number of households that keep pets is continuously increasing due to increase of household income, change into an aging society and increase of single household [1]. Pet was once regarded as an animal, but recently it has become a precious existence that is used in child therapy or is regarded as one of family members. Following the change of people's perception, domestic pet industry market is also experiencing dramatic growth [2]. In response to such growth of pet market, pet-related applications are also prospering, which include pet health diary application, pet obesity care application, etc [3].

Following this trend, this paper designed and implemented 'real-time pet health checking system' combined with 'pet Smart leash' which can check condition of pets in real time that are dramatically increasing and make them in data.

2 Development Platform

2.1 Arduino

Arduino is an open source computing platform based on simple micro controller board that provides development environment for conversational object software where it receives information from diverse sensors and controls diverse output such as motor and light. Arduino has

features of low cost, easy access and infinite expandability. While most of micro controller system has limited plausible operating system, Arduino is a multi platform that can be used in Microsoft Windows, Macintosh OSX and Linux. Moreover, non engineers such as designers can relatively easily use the programming as it provides simple and easy programming environment [4, 5, 6].

2.2 Intel Edison

Edison is an open source board that Intel showcased secondly after Galileo. It targets companies of all sizes that produce home electronics or are in the IOT-related industry. It is a low-cost general-purpose computing platform and has low entry barrier. Edison has a very small size as SD card, low electronic power, rich function and eco system support and it manufactures prototype rapidly. Edison can be installed in a standard SD card slot and the SD card connector is compatible with SDIO (Secure Digital Input Output) so that SDIO slave can function not only as existing SD card but also as SDIO host. As for the electronic power supply, the voltage is supplied through SD card slot and hence it operates with very low consumption electronic power [7].

3 System Requirement Analysis

According to the research by Nonghyup Economic Research Institute, 17.9% of domestic household are keeping pet as of 2012 and the market size is

estimated to continuously grow [8]. Hence, it is necessary to provide accurate and reliable information about pet's health condition. We believe that this system is able to provide information about the pet's health condition to the owner in real time with high accuracy and reliability.

4. Design

4.1 Structural Design

Figure 1 below shows the data analysis flowchart of 'real-time pet health checking system'. Data are received from IOT product attached to the pet and pets are classified into large dog and small dog. The information is stored in the DB where the data about a pet are accumulated.

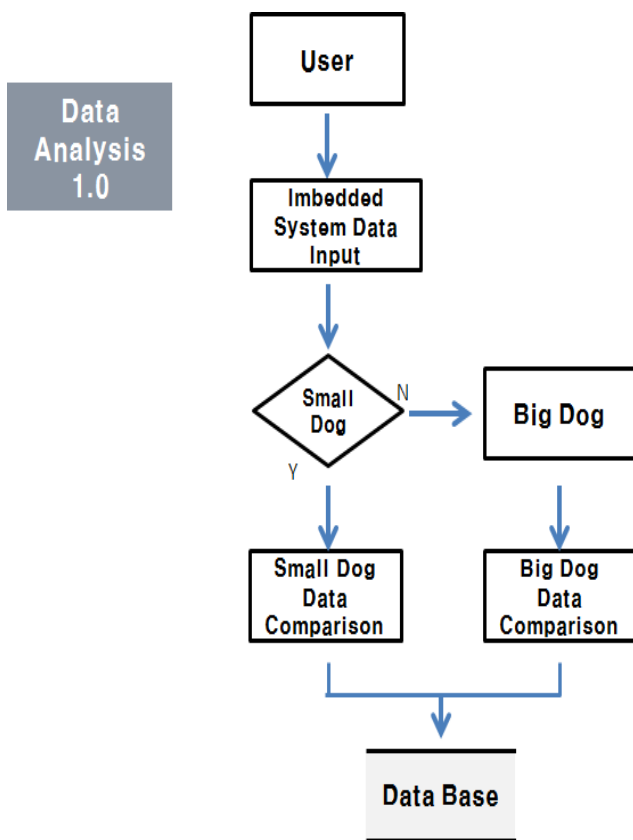


Fig.1 Data Analysis Flowchart

Figure 2 below shows the flowchart of pet registration of 'real-time pet health checking system'. It is a flowchart of a page where users can enter information about pet and change it.

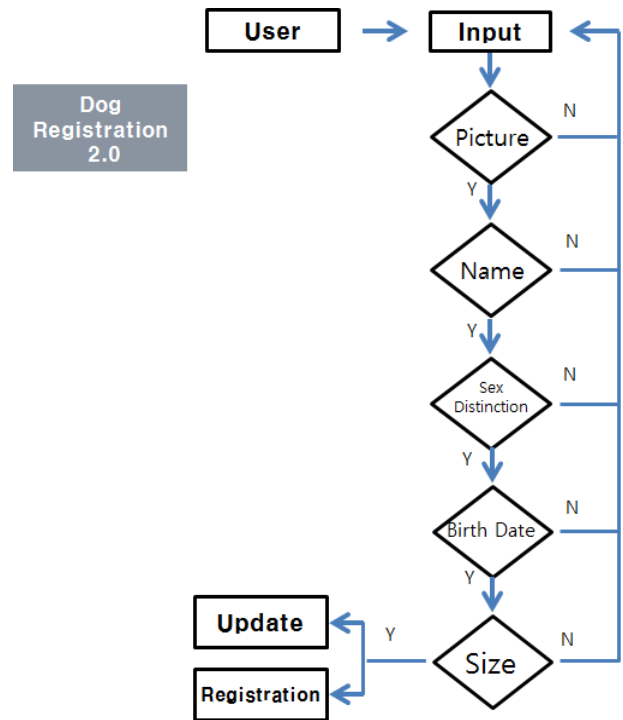


Fig.2 Dog Registration Flowchart

4.2 UI Design

Figure 3, which shows initial screen of this system, is the UI specifications of the page that shows pet's real time health condition such as temperature and heart rate. It was manufactured such that diverse contents can be viewed at the same time.

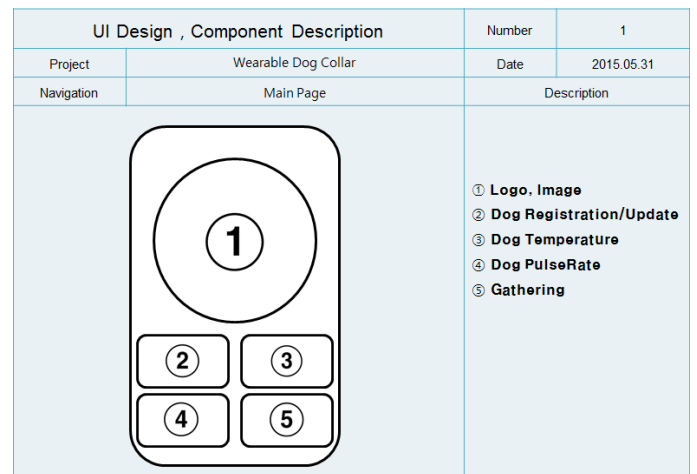


Fig. 3 Main Page UI Design

Figure 4 shows UI specifications of the dog registration/revision page. It is a page where users register and manage the individual information of pet.

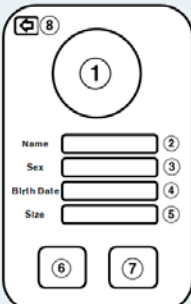
Design , Component Description		Number	2
Project	Wearable Dog Collar	Date	2015.05.31
Navigation	Dog Registration	Description	
		<ul style="list-style-type: none"> ① Dog Image ② Dog Name Registration ③ Dog Sex ④ Dog Birth Date ⑤ Dog Size ⑥ Update ⑦ Registration ⑧ Back 	

Fig. 4 Dog Registration/Update UI Design

Figure 5 shows UI specifications of the page that displays temperature of pet in real time and shows them in graphs.

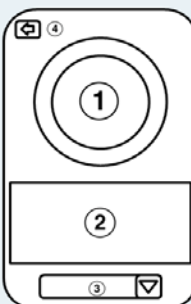
UI Image , Component Description		Number	3
Project	Wearable Dog Collar	Date	2015.05.31
Navigation	Temperature	Description	
		<ul style="list-style-type: none"> ① Current Dog Temperature ② Temperature Graph by Every Hour ③ Temperature Graph by Day, Week, Month ④ Back 	

Fig. 5 Temperature Sensor Page UI Design

Figure 6 shows UI specifications of the manufactured page that shows both of temperature and heart rate of pet in graphs so that users can view them in weekly or monthly basis.

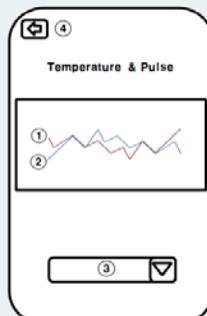
Design , Component Description		Number	5
Project	Wearable Dog Collar	Date	2015.05.31
Navigation	Temperature & Pulse	Description	
		<ul style="list-style-type: none"> ① Pulse Graph ② Temperature Graph ③ Pulse Graph by Day, Week, Month ④ Back 	

Fig. 6 Temperature/Pulse Graph UI Design

5 Implementation

'Real-time pet health checking system' in this paper was implemented by uploading data in real time using Android for the users' check and testing was conducted by using Android cell phone. IOT product was implemented in prototype development form by using Arduino. Figure 7 below shows the hardware modeling image of 'real-time pet health checking system'. It is made as a pet leash where temperature sensor and heartbeat sensor are attached.

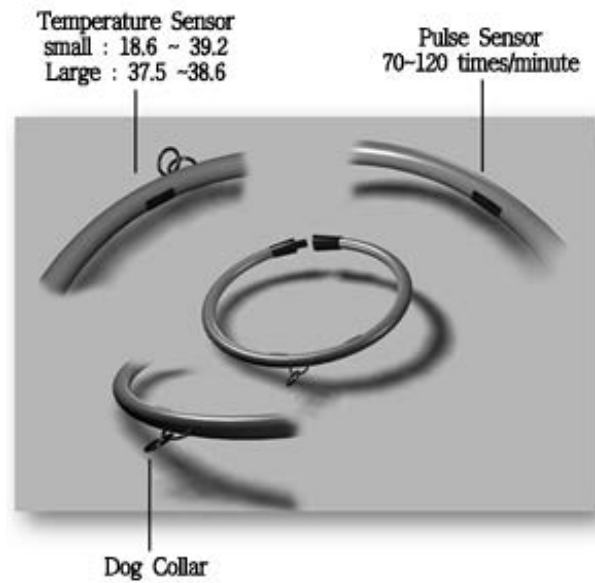


Fig.7 Dog Collar Prototype Image

Figure 8 shows the main screen of this system which was implemented by putting buttons of heart rate and temperature button. Logo and button are located at the center of the screen to prevent gaze dispersion of users and to increase concentration.

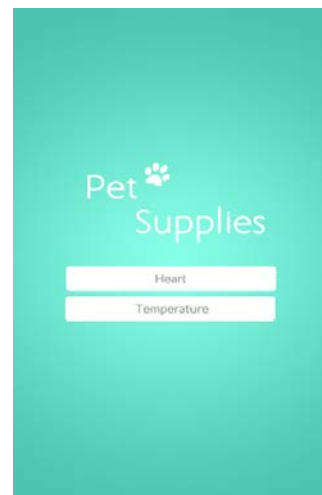


Fig. 8 Main Page

Figure 9 shows source that measures temperature and heart rate by using Intel Edison and transfers the measured value to web through wi-fi sensor.

```

if (c == '\n' && currentLineIsBlank) {
  // send a standard http response header
  client.println("HTTP/1.1 200 OK");
  client.println("Content-Type: text/html");
  client.println("Connection: close");
  client.println("Refresh: 5");
  client.println();
  client.println("<!DOCTYPE HTML>");
  client.println("<html>");
  // delivered to the web measured temperature
  // and heart rate
  client.print("pressure ");
  client.print(" is ");
  client.println(value1);
  client.print("temperature ");
  client.print(" is ");
  client.print(value2);
  client.println("<br />");
}

```

Fig. 9 Source Code

Figure 10 shows the screen where heart rate and temperature of pet are checked. It was implemented by parsing the data on web so that real time heart rate and temperature of pet can be checked in the application.

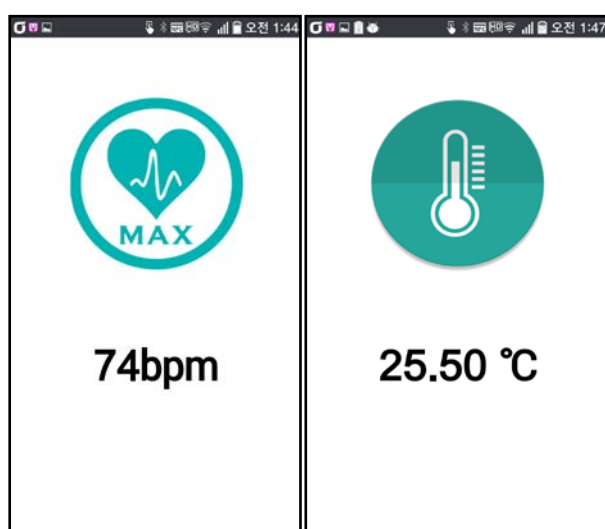


Fig. 10 Pulse and Temperature Check

The number of people who have pets is dramatically increasing following the rapid change of society due to increase of nuclear family and single household as well as population aging. As a result, more and more pets are leaved alone for longer time. In this situation, 'pet health checking system' developed in this paper is expected to lessen worries of users who raise pet dogs by providing information about the health condition of their pet in real time. This application is applicable to not only pets, but also senior and several other situations like a house that has to be monitored remotely. Moreover, it is also expected that predicting the time to visit veterinary clinic in advance will be possible as the system checks the pet's health condition in real time and lets the users know about the pet condition by giving information of weekly and monthly average.

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6 Conclusion