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Senior Project Proposal
The E.Dog Sitter
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What is the E.dog Sitter?

My idea is to have a device that will have the capability of connecting to the internet by using Wi-Fi, feed your dog, and watch over your dog for you. The device is connected to the internet through a website so that the user can access the website from a computer or a phone. This gives the user the ability to control the device, and give commands to the device, such as to pour water or refill food for the user’s pet. It also has a force sensor (scale) that is placed under the dog’s bowl so it will weigh the bowl and display the weight value on the website. This allows the user to know if their pets have eaten their food or not, and also they can refill the food/water anywhere in the world as long as they can connect to the internet.

The E.dog Sitter connects to the internet through your home router. It is linked to a website and uses an android phone application that is easy to install. The website and the phone application give you the ability to send commands to your E.dog Sitter. For example, you can refill the pets’ water and food, or you have the option of viewing a camera so that you can see what your dog is doing. The microcontroller is the brain of this device; it contains all the programmable software, and it receives and analyzes the data from the force sensor (scale) and the camera. The force sensor measures the weight of the dog bowl. The data will be sent to the microcontroller and will be recorded to your E.dog Sitter website account which will send you a notification if the bowl is empty. The camera will send the data (images) to the microcontroller which will then analyze the data and upload them to your E.dog Sitter website account, so that anytime you access your account you will be able to watch the real time video from the camera.

Benefits of the E.dog Sitter

The E.Dog Sitter has a lot of uses for all dog owners and especially to all the people who love their dogs, but sometimes they may be too busy with work or other things. Also, some people do not trust a stranger to take care of their dog in their absence. Therefore, the E.Dog Sitter gives you the feeling that you are with your dog at all times, and you are the one who is taking care of him or her. This project is not just for the dogs. It can be used for any animals you have and you need to feed and take care of, but you are too busy with other things in life to do so. Like when you have a farm that is far away from your house and you need to feed your birds or goats, the E.Dog Sitter can be used to work with these animals and you can use it as long as you can connect to the internet. When I think about this in an economic view, it will have a great impact on farmers because they don’t have to hire as many people and give them a salary to take care of their animals, but they can just buy the E.dog Sitter for a fixed price and then not worry about paying any employees. It will save a lot of animals’ lives especially for the people who are losing their animals because their farms are far away from where they live. Your animals life won’t depend on this device because you can always go and check on your animals, but this device
gives you the help you need to take care of your animals and to do the other tasks you have at the same time.

Recently, there has been a couple of devices on the market like this, but most of them either only have a big enough size to serve a couple times, or they don’t have unique features like wireless connectivity or force sensors. The E.Dog Sitter is combining two current devices on the market, which are the Feed-and-go and the le bistro programmable feeder. The E.Dog Sitter can hold the same amount of food as the le bistro programmable feeder, and it has the same size and shape as the one showing in Figure 1. However, the E.Dog Sitter is different than the le bistro programmable feeder because it has most of the features of the Feed-and-go device. Especially, the wireless connectivity and the force sensor. The Feed-and-go has a small food capacity which is just 0.5 lbs., but the E.Dog Sitter can hold over 5 lbs which allow more servings in between refills.

**Detailed description**

1. Controlled Arm Gate to Feed the Pet

Having a gate that is controlled by the microcontroller is the goal for this project, so the users can feed their pets with the E.dog Sitter. The main idea for this device is to have an arm (motor) that can control the gate of the food to open and close quickly in a short amount of time, so the arm will be able to refill the bowl size for one serving, and it won’t leave the gate open after the bowl has been refilled.

2. Force sensor (scale)
I am using a force sensor (scale) which has the capability of taking measurements in the range from 0 to 10 lbs. This is a good range for the amount of food for the dog to receive. The sensor is small so it is easy to place under the dog’s bowl and weigh the food. It also produces low noise and has a fast response time. The microcontroller will receive the measurement and display it on the website.

3. Wireless connectivity

One of the most important features of the E.Dog Sitter is its wireless connectivity because you do not want to limit the number of places that you can put the device in your house or farm and still have it work. With the wireless feature you can place the device in any location in your house as long as it is connected to your home router. Also, you can move the device anytime you want without worrying about LAN wiring. The E.Dog Sitter can connect to your house router through the Wi-Fi.

4. Feeding schedule (automatic feeding)

The feeding schedule feature is really important for any dog owners because this feature gives you the ability to schedule a max of three feedings per day. Therefore, the E.Dog Sitter will automatically refill water and food for your dog at a scheduled time.

5. Fast to set up with SoftAP

In order to configure the device parameters, you can connect it through USB to your home computer and then you can add your Wi-Fi name and password, so the device will connect to your router. Also, you can use the SoftAP mode which is a software enabled access point that will allow fast access to the E.Dog Sitter.

6. Watch your pet from anywhere

It is really important to be able to watch your dog in order to have peace of mind. The camera will give you the ability to watch your dog anytime you want by accessing your E.Dog Sitter website account, or your E.Dog Sitter phone application account. You will be able to watch a real time video as long as you have connection to the internet.

7. Notification Phone System

The notification system helps people who are busy during the day and may sometimes forget to feed their dog, therefore, the notification phone system will allow you to setup a notification message at a specific time that will be displayed on your android phone application to remind you to feed or watch your dog. Also, the system will send you a notification when your dog’s bowl is empty, which will be known from the force sensor measurements.

Prioritized list of features:

1. Controlled Arm Gate to Feed the Pet (motor)
2. Force sensor (scale)
3. Wireless connectivity
4. Feeding schedule (automatic feeding)
5. Fast to set up with SoftAP
6. Watch your pet from anywhere
7. Notification Phone System

Constraints and Standards

One of the constraints of the E.Dog Sitter is movability, so the user can feed his or her pet in any place. The E.Dog Sitter is small device that’s about 15 in * 20 in * 17 in, so it will be easy for you to move around. Also, it can hold about 5 lbs of food, so it allows multiple servings in between refills. Each serving has to be in the correct range of about 4 cups of pet food, so the force sensor range is between 0 and 10 lbs. Also, the gate has to close fairly quickly so the device won’t overfeed the pet.

Also, in order to make the E.Dog Sitter to be movable, it has to have two main things, which are wireless connectivity (Wi-Fi with stander of 802.11) and it has to support the communication to the web through hypertext transfer protocol (HTTP).

The wireless connectivity (Wi-Fi) standard is IEEE 802.11(X) where the X stands for a, b, g and n, all of which allow transmission and reception of data at least at a rate of 1.5 Mbit/s, which is a quick enough rate to send the force sensor data every hour, or whenever the weight of the bowl changes.

The E.Dog Sitter supports HTTP for the web server that displays the data of the force sensor and controls the motor through the web page that is based on HTTP, and it connects to the web through the TCP/IP stack.

Development Plan

My preliminary development plan for the E.Dog Sitter is to design an arm gate motor circuit that can be controlled by the microcontroller. After I can open and close the gate through the microcontroller, I will then design a force sensor circuit that can send the weight of the bowl to the microcontroller. Also, I will need to design a power supply that connects to the power outlet in the lab, so I can power on my circuits.

After I have the data in the microcontroller, I will connect a Wi-Fi module to the microcontroller like the Xpico Wi-Fi module. It’s a ready-to-go module, so it will connect to the Wi-Fi in a fast and easy way. After I connect the microcontroller to the home network (router) then I have to figure out how to write HTTP and TCP/IP stack to connect the E.dog Sitter to the cloud, so I can send and receive data through the internet.

I have to figure out a way to demonstrate the product on campus, because the network on the university’s campus is secure.
Figure 2: preliminary block diagram for the E.Dog Sitter.
Figure 3: The E.Dog Sitter sketch.

Bibliography

Feed-and-go is a similar product which has most of the features, but it can hold limited servings:

http://www.feedandgo.com

Le bistro programmable feeder which is has the same size and shape of the E.Dog Sitter:


IEEE Wi-Fi standard 802.11:

http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=4248378

HTTP and TCP/IP stack:

The Xpico Wi-Fi module:
