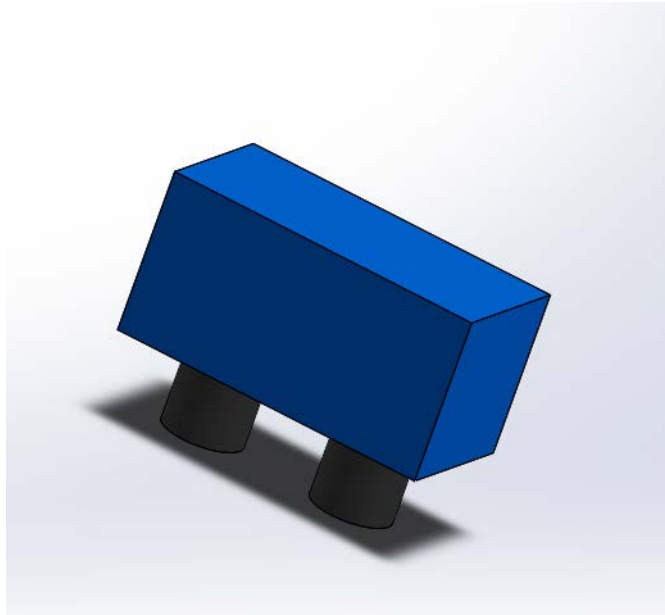


# **Rover SMART Collar**

**EDSGN 100 Section 14**



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## **Executive Summary**

Rover, is a Smart Collar which syncs to a mobile app on your smartphone. It allows you to track your dog's location, as well as set an "anywhere invisible fence". This product was designed for dog owners, who, would like the convenience of being able to set boundaries for their dogs no matter where they go. For this product, we sat down and thought about what would help pet owners out.

## **Introduction**

Invisible fences are a pain, but having your dog run away is even worse. Luckily, we came up with our product that gets rid of the need of the expensive and hard to manage invisible fence and replaces it with an easy to use smart device. All that needs to be done is to put the collar on your dog, set an area on your phone through our app, and let your dog go. Everything else is taken care of for you. No more headaches or repairing an invisible fence.

## **Use Case**

Our product is a shock collar that acts as an anywhere invisible fence. It has the features of a shock collar, SMART collar, and an invisible fence all in one easy to use device. All controlled from a smartphone.

## Current Competitors

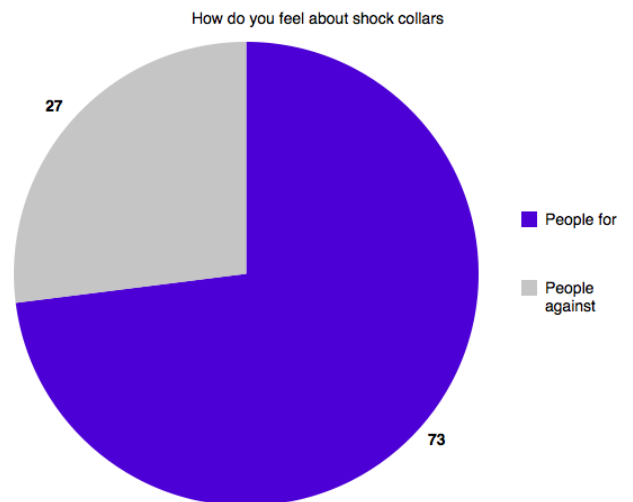
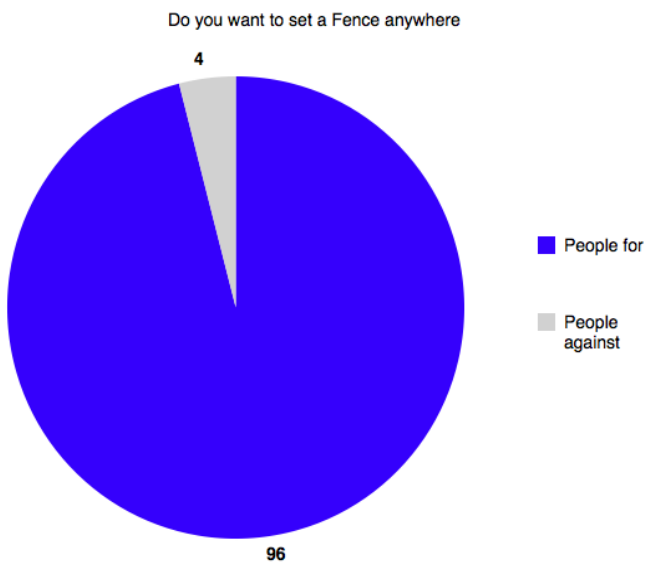
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There are two collars that are on the market that are similar to what our SMART collar does. There is Tagg and Whistle, both of which tracks your dogs and helps find it if it runs away. Our product does not directly compete with these collars because our collar solves a different issue. Our collar employs our idea of an anywhere invisible fence which allows a user to have their dog roam free in a given area set by them. There is nothing else on the market like our product, but these were the most similar.

# Customer Needs

To assess the needs of our potential customers we devised a ten question survey. This survey looked for users thoughts and opinions on key features and concepts of our product. The main topic we were interested in was the customer's thoughts on shock collars. The results are summarized below in our pie graph. It is evident that most people were okay with shock collars. Our survey received thirty responses through various means.



# Concepts Generation

## **Concept 1:**

Our first concept, and the concept we also ended up going with was having the shock collar, and having the processing of data done on the phone. This would make the battery life of the collar much longer, but make the product more reliant on the use of a smartphone.

## **Concept 2:**

Concept 2 was very similar to concept 1 with the main difference being that the collar would process the data. This would make the collar not as reliant on the smart phone by not having to have the collar and phone always connected. This design had many drawbacks though that are represented in our decision matrix.

## **Concept 3:**

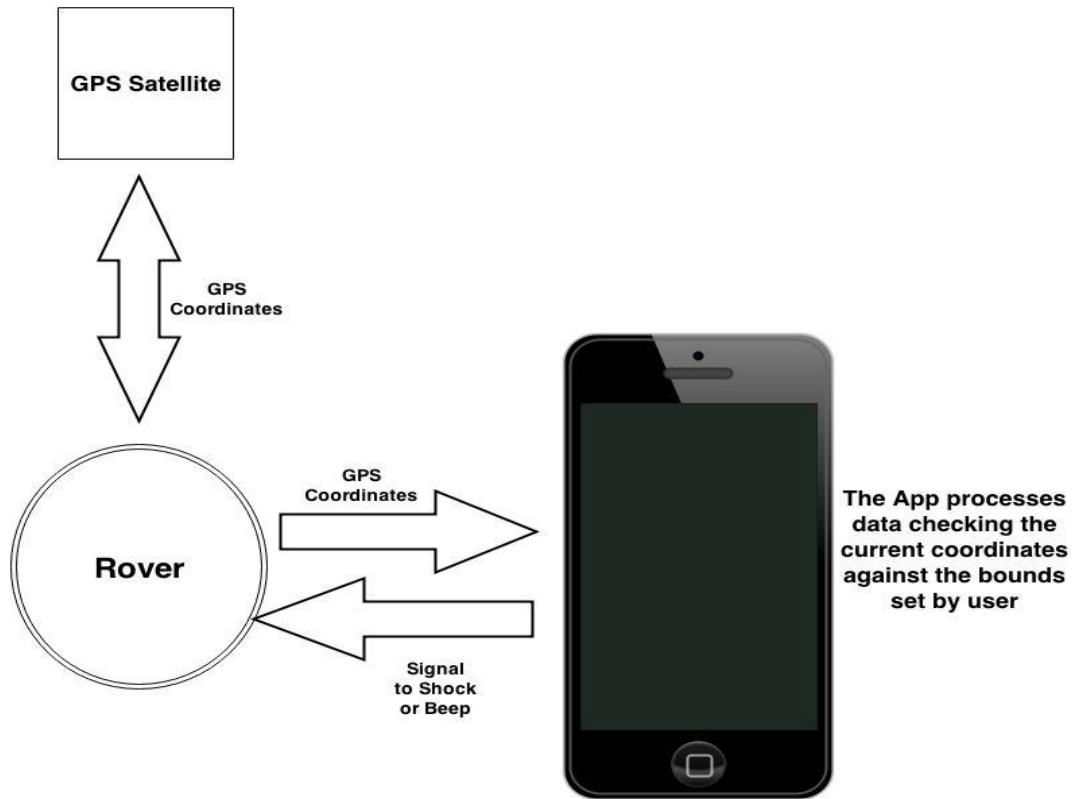
This collar employed everything from concept 1, but without a shocking device. This device would purely use sound. While this concept would avoid the complaints of shock collars, it would simply not be as effective as the other concepts.

# Concept Selection

To decide which concept was best we devised a decision matrix. We chose the criteria for the decision matrix by considering key concerns with the product and key features. We then assigned a value from 1-5 to each of the criteria for each concept. These scores were summed and the highest concept is the one that we chose. This made for a very easy and analytical approach to choosing which concept to pursue.

Criteria	Concept 1	Concept 2	Concept 3
Battery Life	3	1	5
Cost	3	2	5
Ease of Use	5	3	1
Size	4	2	5
Meets Customer Needs	5	4	1
<b>Total</b>	<b>20</b>	<b>12</b>	<b>17</b>

## Systems Diagram



## Design Analysis

### Overview

Our product works by having the user select an area on their phone using our app. The screen will use a google map-esque mapping service to provide accurate maps. Once the user sets the area they simply turn the collar on and the collar starts relaying coordinates back to the phone. These coordinates are obtained by the collar's GPS and are transmitted over WiFi.

The app calculates the coordinate boundaries of the area chosen on the phone, and checks the current coordinates against them. If the collar is approaching the boundaries a signal to turn on the beeper in the collar is sent to the collar. Once the coordinates of the collar are out of the boundary range a signal to shock the dog is sent to the collar. The collar responds by shocking or beeping depending on the signal sent.

### **The Application**

The app on the smartphone will be a lightweight app that is responsible for the user setting areas on their phone, but also providing the ability to save favorite areas. The app also will calculate the boundary coordinates using data from the area set. The app receives data from the collar's GPS and check it against these boundaries. The app the user interfaces with will be very simple and sleek and as low battery usage as possible.

### **Ethics**

We found that there are little ethical concerns with our product. Security and Privacy wise we see there being no issues since sensitive data is not conveyed by our product. Some people may have a problem with the use of a shock collar. This is why we have the beep mechanism explained above, and also why we conducted the survey which did find that most people were okay with it.

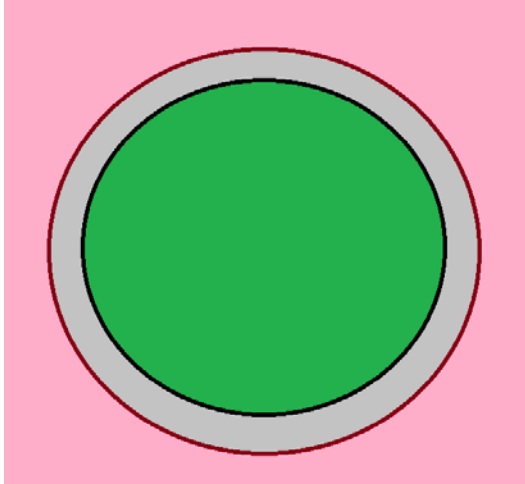


## **Purpose of the Beep**

The purpose of having our device beep is to give the dog an early warning system that a shock will happen if it keeps approaching. The dog will associate the shock and beep once it has been shocked once before. This is how a dog knows to stay in any area with a traditional product. If it is shocked it knows not to continue. Our way tries to add a humane element to it hoping the dog associates the beep with a shock so it will go back to a non-beeping area. Just like a dog would go back to a non-shocking area. The dog can still get shocked if it goes past its boundaries, but this will help reduce the amount of shocks a dog gets because it will know to stop and turn back once it hears a beep.

This is because a beep will be associated with something bad like a shock. This literally works with the same logic of a traditional invisible fence but adds a beeping mechanism in hopes the dog associates the beep with a shock. This would hopefully make the dog stop at a beep instead of needing to be physically shocked. Though shocking will occur if it breaks the boundary. If the dog never has been shocked after the device beeps the dog obviously will not respond to a beep at all. This is why the dog will need to break the boundary the first few times using this product until it builds that association. We thought that this is a great way to help dogs get shocked less and it works on the same logic as a traditional shock collar, but just with an added feature.

## Visualization of Areas



**Green** - Chosen Area

**Grey** - Beeping Starts

**Pink** - Small Shocks are Delivered

## Cost

We estimate the cost of our product to be around \$150-\$200. This is as a result of the cost of a shock collar and a typical GPS. We believe that this is a reasonable price given that the collars on the market are in this range, and an invisible fence system cost from \$150 - \$300. Our product does what both of these products do, but for much less. The app for the smartphone would be free to the user, and the user only buys the collar for our price stated above. This makes sense as a result of wanting to

keep the entry price low. There is a huge dog market and a need for this product. We can take advantage of the huge demand by keeping the price low so it is affordable to most people.

## **Concept of Operations**

### **Scenario 1:**

Our first scenario is that the product is bought for dogs of various sizes. This is a very likely scenario to run into since dog owners have dogs ranging from miniatures to large dogs. This necessitates that the SMART collar component must be removable from the physical collar, and that the pins are changeable. Dogs of varying sizes would need varying length of pins for the shock collar.

We would address this scenario by including varying sizes of pins. We would also make the collar components are easy to remove from the physical collar and easy to replace pins. This is a very likely scenario to run into.

### **Scenario 2:**

Our second scenario is that your phone dies while trying to use our product. This scenario is a concern, but is unavoidable. Concept 2 and 3 made this scenario much less likely to be a problem, but had more negatives than positive. When considering personal experience and other's experience we found that people's phone do not often die.

There is no best way for us as a product to prevent this, and it is more the concern of the user. Though the app would be designed to be as low usage as possible

in order to try and avoid excessive battery drain. Users should charge their phones on a regular basis which seems to be a common practice in people we talked to regarding this.

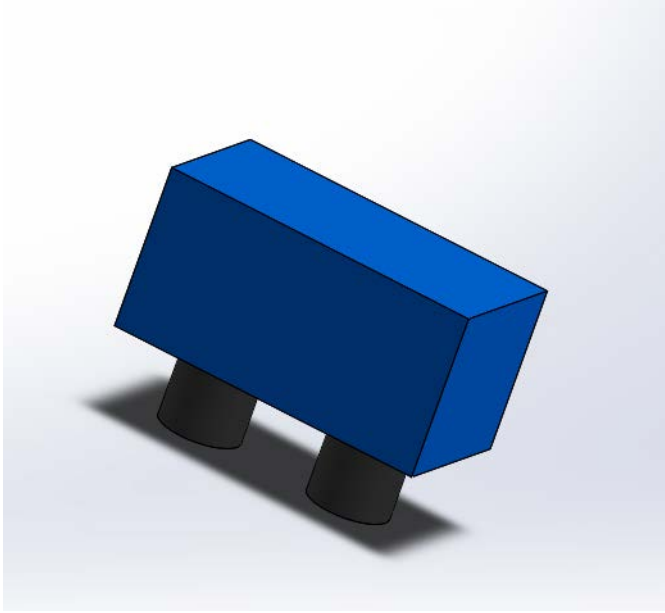
### **Scenario 3:**

Our third scenario is an area is set previously and you turn the collar on while not in that area. An example will be using this product at the park and then you turn it off to go home, but you turn the product on at home. This presents the challenge that the coordinates your dog is at at home are out of the boundary set at the park. This means the signal to shock will be sent, but not be needed.

Our solution to this is twofold. First, we would have an emergency shut off button on the app for general safety purposes. But more importantly when you turn on the collar it prompts you to enter an area or okay the previously set area. This prevents accidentally encountering the scenario presented above.

### **3D Model**

Our 3D model represents the removable smart collar component with shock collar and prods attached. The collar itself is not modeled since the collar can vary for each user since our device would easily work with other collars. The component is 2 inches long and an inch in height. This is a little bigger than a small shock collar.



## Conclusion

With a price so close to our competitors, yet doing so much more than them this product could be very successful. It ties in AT&T's goals of the internet of things, along with the needs of pet owners. Everyone wins on this low cost, high functioning device that could change how one interacts with their pet.

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