Prioritized Design Criteria

High Priority	Middle Priority	Low Priority
User-friendly graphical area selection for restricted zones.	Should save the end-user money.	Proximity warning with different alert types.
Make use of at least two APIs.	UX must be utilitarian.	Product made to work internationally.
Make a product offering a unique experience	Allow different zones to restrict different things such as a speed or entering the zone at all.	Automatable tasks should be automated.
Product will need to work under a private network.	Alerts in the product to prevent accidents.	Risk monitoring in different zones by tracking and monitoring data from the UE's.
The product will need to be made adaptable to future changes.	Product is demonstratable.	Capacity limit to prevent crowding.
Must have low latency.	Product must be cloud-ready.	Overall aesthetics.
Must be network aware.		
Has to maintain human safety.		

User Benchmarking

AiPITE GPS Pet Tracker, Activity Monitor for Dog, Real-Time Location & Escape Alerts & Virtual Fences, No Monthly Fee & Support Multi User Co-Monitoring, Waterproof & Drop-Proof on Amazon

> I am not sure how this tracker communicates its location back to the ap without having LTE or GSM services (monthly fee). It seems to piggyback on WIFI and maybe other cellular devices. I live in a rural area, and it had a hard time locating the dog when we were away from any possible internet connectivity. I placed the tracker at different locations around town and it displayed the location on the ap. I placed it near the grocery store and drove away and a mile away I was able to see where it was on the ap. I assume the tracker communicates over WIFI signals and even though it is not logged into the WIFI it still transmits it's location. I do believe it is better suited for populated areas but for the price it is a solid purchase. When the dog goes for an adventure in a rural area and visits a house with WIFI you can at least know what direction he is going. This comes with a sturdy

reflective collar and magnetic charging cord. The tracker slides onto the collar on 2 Sturdy rails and clicks on with a clip that needs lifted to remove it, so can't accidently be pushed and released. Ap is also very intuitive and integrates with google maps to provide a visual display on where your dog is. It seems that the tracker has a remote activation system. I hold the power button to turn it off and it shows red when button is touched meaning it is off. If I do something in the ap and touch the button again it is green and on. This seems like a good thing to me

Update: I turned it off and did nothing on the ap and placed it in a drawer for a couple days. When I went to use it, it was on, and battery was dead. Off should mean off. Make sure you charge it before you need it.

(Must be able to connect to signals at a distance, power efficient, dongles should have proper identification when they're on or off, app integrates with Google Maps)

Tractive XL GPS Tracker for Large Dogs - Waterproof, GPS Location & Smart Pet Activity Tracker, Unlimited Range, Works with Any Collar (Green) on Amazon

We have been through invisible fences which did not work due to the amount of tree coverage, shock collars, which have short range, all in all 5 different collars to try to rein him in; all unsuccessful. I had thought of a tracker, but, did not want to pay for a subscription.

I can see where he's been and I can see if he makes an Abrupt turn to return when I blow the whistle which is good to know! I've tried it a couple of times in the woods as long as I have cell reception it seems to work very well even when he's a few hundred yards away.

(Consider overall coverage and potential signal blockers, high precision and real time GPS is appreciated)

GPS Wireless Dog Fence System, Electric Dog Fence by GPS Signal, Range 65-3280 ft, Adjustable Warning Strength, Rechargeable, Upgraded Pet Containment System, Harmless and Suitable for All Dogs on Amazon

Setup was very easy to do, it took a few attempts to get the radius point in the correct location for our odd shaped 1 acre property but was easy enough to reset its position. We had previously had a wired invisible dog fence at our other home which worked well at first but became troublesome later on with wire failure, this system eliminates that but does however require to be reset every few days as instructed for satellite drift which is no big deal. My only complaint is that the radius can only be increased in increments of 10 meters, in my situation a 5 meter increment would have been better for us. This system saved me a lot of time and effort as I didn't have to bury a wire.

After 2 hours of the initial setup, it started going off anywhere within 10-15 feet of the boundary lines. As I was trying to show them the "safe zone" and literally saying "good boy safe zone" (well within the boundary) it starting beeping and vibrated them!!! The look on my dogs face was absolute horror and heartbreak. I decided to test it again the next day and put the shock on with the tester piece, turns out if you go near the line it does all three at the

same time without warning !!!! No prior beep for getting close, just full beep, vibrate and SHOCK. This is completely inhumane for dogs!! There is no warning they are even close! You are literally teaching them by shocking them without cause. I seen a review somewhere in here that the shock on a human put them on their butt. Think about the training and what you are literally leash walking your dog into to teach them the perimeter.

(Zone setting should be easy, physical landmarks can work but can be faulty and may require consistent calibration, device works radially from the center which isn't good for abstract areas. Device in the case continued to function with bad connecting resulting in shocks/vibrations to the dog in the safe areas, device doesn't warn user before enter danger zone)

Metrics

1. Use multiple Shabodi APIs
2. Have as little latency as possible
3. Create varying levels of restriction for zones
4. Have high locational precision
5. Have a high refresh rate
6. Acquire initial position quickly
7. Be unique

Target Specifications

	Ideal	Acceptable
1. Use multiple Shabodi APIs	4+ APIs used	At least 2 APIs used
2. Have as little latency as possible	Alerts within 1 second of entering restricted zone	Alerts within 3 seconds of entering restricted zone
3. Create varying levels of restriction for zones	Unlimited customizable zone types	2 different, specified zone types
4. Have high locational precision	Accurate to within 0.1m	Accurate to within 1.5m
5. Have a high refresh rate	At least 25Hz refresh rate	At least 1Hz refresh rate
6. Acquire initial position quickly	Acquire in ≤5s	Acquire in ≤60s
7. Be unique	Offer 3+ unique features	Offer 1-2 unique features

Reflection

Shabodi's focus being more towards professionals and enterprises is important as it means any criteria related to consumer appeal can be reduced. Our product still needs to attract customers, but aesthetics and hyper simplicity are weighted less than overall functionality. Their want for our product to be unique is also important as they are after ideas that may be functional in other use cases, therefore producing something new is important. Shabodi believes that software is never finished and that it always gets better, therefore making our product adaptable to changes in the future is important. They also like avoiding monolithic applications. They also want to avoid devices and programs that just use communications, therefore integrated APIs are needed to interact with the network and allow for the system to be more net aware.

For the most part, our interpretation of Shabodi's needs has remained the same between this deliverable and the last. However, we have added two needs to our list since the first meeting with Shabodi: making a user-friendly graphical area selection for restricted zones, and making an, overall, aesthetically pleasing product. The prior was found while browsing through the original project outline on Makerepo, and was only now included since Shabodi never explicitly mentioned it during the meeting. The latter is based on our technical benchmarking, as we noticed that competing and similar products have contributed a reasonable amount of effort to this need, meaning that our product would have to as well to succeed in the desired enterprise market.