DOGFINDER

Guy Keller | Moshiko Said | Itay Fiszman

What is DogFinder?

DogFinder is a new way to never let your best friend out of sight.

With DogFinder, you can make sure that your dog is at home when you're at work or away. You can also use the DogFinder app & device to use our network of users, and find your dog if he / she is ever lost.

The idea is simple:

Our device is easily set to connect with your home WiFi network, and is paired with your phone. Whenever your dog leaves home without you - the device will alert the dog is lost. You, of course, will be notified.

The device will also be discoverable by other dog owners in our network, so whenever one of them passes by your lost dog – you will know where and when your dog was spotted. Let us walk you through the app:



SIGN UP

As a first step you are required to sign up / sign in to the application.

If you don't already have a user you are required to register.



	•
SAMEUNG	
* 🛯 🔻	18:47
https://doghelpertenant.b2clogin.com	:
n with your user name	
name	7
Vord Forgot your password?	_
word	
in	
have an account? Sign up now	
	/

Azure Authentication Service

To verify the email provided is indeed the user's email, we use Azure Authentication Service. The user receives a unique code via email, which he then enters into the app.

Until the user enters a correct code he / she can not proceed.





Scanning Device QR Code

In order to pair the device with with your account, you can scan a QR code on the device's package.

If you prefer, you can register the device by entering the device's ID directly.





Entering Dog Details

In this screen you enter your dog's details a name and a photo.

Those details will be used to make your dog easy to identify by app users, in the unfortunate case it is lost.





Home Page

The App's home page, which is shown whenever you open it



Settings Page

The settings page, which allows you to choose your preferences regarding the app.

On this page you can choose:

1. What kind of notifications you'd like to receive, and when - If your dog is lost, what notifications would you like to receive? A mobile notification, a notification via email or both? How about when your dog is found, or when someone else's lost dog is near you? 2. In case someone finds your dog
would you like your number to
be shown to them, so they could
contact you directly?
3. Would you like to enter Silent

mode, in which you will receive no notifications? That might be the case if you know someone else is walking your dog, and you don't want it to be reported as lost. And many more...

	•					
SAMSUNG						
* 🔃 💎 📶 🔳 17:21						
ent mode witching ON you will turn off notifications						
ification in case my dog got lost						
p notification	•					
ail notification	•					
ifications in case my dog was found						
p Notification ding your dog's last location.	•					
ail ding your dog's last location.						
veal My Number e my phone number with users near my dog.						
sonal Details For Contact						
Phone Number						
ail For Notifications	Input text					
p Find Other Lost Dogs						
gs Finder						

Dog Status

This is the dog status page, which allows you to track the whereabouts of your dog. When your dog is at home, our device connects to your home WiFi network. Whenever it successfully connects to it, we can be certain your dog is at home. If that is the case - you will see your dog is "at home" when you enter the status page.



However, you probably walk your dog several times a day. When you're on a walk, your dog isn't lost - but isn't at home either.

So how could we avoid marking your dog as lost unnecessarily when you're on a walk? When your dog leaves home, the device can't connect to the home WiFi - at which point it's bluetooth capabilities are activated.

When the owner's phone discovers the bluetooth of the device - the dog is marked us "with you" instead of "lost", and the owner will not receive notifications.



Lost Dog Notification

Sometimes, unfortunately, your dog is actually lost. When your dog isn't home (can't connect to your home WiFi), and isn't with you (your phone does not find the device's bluetooth beacon), it will be defined as lost.

In which case you can receive notifications via email or mobile, depending on your settings - as seen above.



•	(·····	••	(0
		IN G			
3 o E					44
		₽		\square	:
g Finder N und Inbox	Vessage	- Luc	cy is r	not	☆
doghelper Hi, we're so app to get r	r@noreply.c prry to inform y more informat	you - Lu ion.	n 24 Icy is los	t. Open	the
doghelper to itayfiszm	r@noreply.c an@mail.tau.	com Ye ac.il ∽	sterday	4	:
Reply	« Reply	all	<u>ہ</u>	Forward	đ
\triangleleft	0				
)			

Lost Dog Notification

Moreover - when your dog is lost, you will be able to see it in the status page.



Map Screen

When your dog is lost - other users who are near it will detect the device's bluetooth beacon. When that happens, their phones will immediately send the location in which your dog was spotted. You will be able to see the last location in which your dog was spotted comparing to your current location, on the map screen - which is accessible from your status page whenever your dog is lost.

We're using an API to translate your dogs coordinates to the nearest street address, so you can navigate to the location easily.





Map Implementation

These are the details of our map implementation, in short. You can learn more in depth by watching our demonstration video.

- Google Maps integration with open source package
- Using Coordinates-To-Address **REST API**
- Your location & your pet's latest location marked on the map

Bluetooth Implementation

These are the details of our bluetooth scan implementation, in short. You can learn more in depth by watching our demonstration video.

- Scanning through background tasks regardless of the phone status.
- Scanning for devices with unique "DogHelpers" names.
 - Focused on low battery usage: Timing the scan with other apps background tasks GPS access and azure function call only on unique DH name.

Inspected Dog Screen & Notification

When a you're near a lost dog, and your phone detects the device's bluetooth beacon,

you will receive a notification that a lost dog is near you.

By clicking on the notification or entering the relevant section of the app, you will be able to see the name and picture of the lost dog, to make helping the owner easier.

Moreover - the owner will receive a notification stating the lost dog has been spotted.





Dog Found Notification

Finally, when your dog is back home
you will receive a notification
(depending on your preferences) that
states your dog is back.
Time to relax, the pet has been found
and is no safe at home.



ARCHITECTURE

As long as the device is connected to the home WiFi local network, it sends HTTP message to Azure's IoT Hub every 15 seconds. This message, referred as "heartbeat", indicates the dog is at home, in the business logic perspective.

What's IoT Hub? IoT hub is an Azure service, which acts as a gateway for all messages from IoT devices, and routes messages as defined. It has essential properties such as load balancing, security and more.

The IoT Hub routes the heartbeat messages to Event Hub.

What's Event Hub? Event Hub is an Azure service, acts as an highly scalable message ingestion service (sort of a very sophisticated message queue). It provides us the ability to manage heavy stream of many messages sent by many devices simultaneously.

The Event Hub triggers Azure Function, responsible for handling the message.

What's Azure Function? Azure Function is Azure's state-of-the-art implementation of the serverless concept – allowing developers, like us, to provide mainly "just code" to implement business logic, without worrying at all about the infrastructure of our hosting environment.

Azure Function stores the time of the last heartbeat sent from the particular device. What's Azure Table? Azure Table is Azure's NoSQL (non-relational) data storage. As opposed to SQL database, it invests less effort automatically on the over-head of synchronization and data integrity. It was a good choice for us, because our focus was providing large number of customers at once, while data is not shared between different users. Every 30 seconds, a scheduled Azure Function runs, and searches for devices that have not reported a heartbeat for over 15 seconds. When finding such devices, we notify the owners their dog is lost. We reach the owners via email or notification, as defined in the application settings.

Email is sent via SendGrid, an external SMTP service, used for sending emails. The notification is sent via Notification Hub, Azure's notification service, that integrates with platform-specific notifications protocol (Android, in our case).





The application scans regularly for Bluetooth network, and searches for Bluetooth network that follow our naming convention.

For example, device 1234 broadcasts Bluetooth network under the name DH_1234. When a different user passes nearby the device (i.e, the lost dog), the Bluetooth scan would spot the device, and call an Azure Function in the cloud. The message include the application's GPS location and the device ID.



If the Azure Function recognizes the input device as a lost device, the owner is reported (via email and\or notification) of its dog inspection, with the location.

We used Google Maps API to present the user the recent location of the dog, as we know it.





Also, the user who has inspected the device, is also notified there is a lost dog nearby, with the owner's contact details and the dog's photo.







When the device returns home, the device reconnects to the home local WiFi network automatically. The device reinitializes the routine of sending heartbeat messages.

When Azure Function receives heartbeat from a lost device, it notifies the device's owner of the good news.



