

Exploiting Social Navigation

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Outline

- Intro
- Goals & Motivation
- Attacks (+Demos \ (^o^)/)
- Defense
- Summary & Conclusions

Intro

- Navigation (like most content) is becoming social
 - *Waze* has over 50 Million Users
- The data is being crowdsourced
 - But the crowd is oblivious to consequences
- What kind of attacks can be applied in this context?
 - Can the crowdsourcing process be exploited?
- How to mitigate?

How did this happen?



- while driving out of congested Jerusalem with *Waze* on, on a Thursday afternoon.

As a joke, called and told my adviser
He took it too seriously..



Enter undergrads*!



+



=

Israeli Students Spoof Waze App With Fake Traffic Jam

Kelsley D. Atherton at 04:46 AM Apr 1 2014

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Israeli Students Spoof Waze App With Fake Traffic Jam

The future of cyber attacks is likely arriving...
By Kelse **GEOLocalizado**

Estudiantes reportan un embotellamiento falso en Waze que duró horas

eban Zamorano 26 Marzo 2014

The Hacker News™

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Popular Navigation App hijacked with Fake Bots to Cause Traffic Jam

Friday, April 04, 2014 by [Sivan Chalkhad](#)



Waze Attacked: Technion Students Create Traffic Jam Cyber Attack On GPS App

Students from the Technion created a program able to disrupt Waze's advanced navigation systems, causing it to report fictitious traffic jams that redirected routes on the popular GPS platform.

As part of their studies in computer science at the Technion in Haifa, two students constructed a program capable of disrupting traffic reports provided by the popular navigation service Waze by creating fictitious traffic reports to steer drivers off course. Using the program that they constructed, the students were able to create a traffic jam that continued for hours and forced thousands of drivers to steer clear of their regular routes.

The vice president of Waze operations yesterday said that the company is looking into methods to prevent such attacks.

Read More: [NoCamels](#)

Posted on March 26, 2014 with 3 notes.
Tagged with [Israel](#), [Waze](#), [Technion](#), [Cyber Attacks](#).

3 Notes



Fake Traffic Jams Can Be Created on Waze

Apr 02, 2014 11:36



Imagine seeing a route all jammed up on Waze. Now imagine that's all fake, because a couple of students have figured a way to create fake traffic jams with the app.

Shir Yadid and Meital Ben-Sinai from Technion-Israel Institute of Technology registered thousands of phony Waze users by impersonating smart phones. They then sent fake users to the same GPS location, creating a massive traffic jam in the eyes of other Waze users.

Israeli Students Spoof Waze App With Fake Traffic Jam

Published By Popski - 2 days ago

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A Traffic Jam Dan69en via Wikimedia Commons
What happens when an app becomes so popular it's basically a public utility? For a school project, Shir Yadid and Meital Ben-Sinai, fourth-year students at Technion-Israel Institute of Technology, hacked the incredibly popular Waze GPS map, an Israeli-made smartphone app that provides directions and alerts drivers to traffic and accidents. The students created

a virtual traffic jam to show how malicious hackers might create a real one. One of the ways that Waze learns about traffic problems is through reports from users. At its best, the app crowdsources...

[read more...](#)

THE PRINCIPAL

Headlines: Australia - Canada - New Zealand - United Kingdom - United States

Students hack Waze, send in army of traffic bots

Posted on March 25, 2014 by admin | 240 Views



Successfully hacked popular social GPS map and traffic app Waze, causing it to report a nonexistent traffic jam.

The attack, somewhat reminiscent of the wonderfully ridiculous Die Hard 4.0 plot, was carried out by Shir Yadid and Meital Ben-Sinai, two software engineering students in their fourth year at the Israel Institute of Technology.

Richie in 7:10 AM

Waze under attack: Israeli students fake traffic jam on popular map app

For a school project, two software engineering students at the Technion caused Waze to report a nonexistent traffic jam.

By M8 Ehab | Mar 25, 2014 | 2:19 AM

2 8+1 Tweet 33 Recommend Share 53 people recommend this. Be the first of your friends to

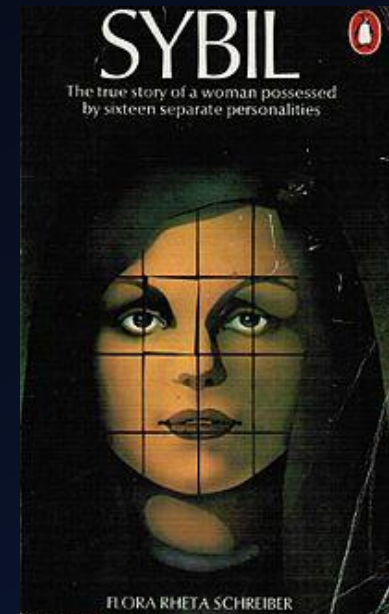


Turns here? Are you sure? Photo by Reuters

Research Goal

- Successfully apply a **Sybil Attack** to a social navigation system
 - And explore what can be gained

“In a Sybil attack the attacker subverts the reputation system of a peer-to-peer network by creating a large number of pseudonymous identities, using them to gain a disproportionately large influence”

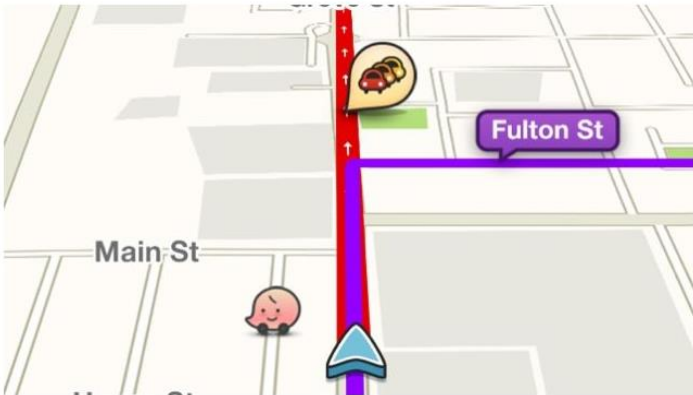


Motivation

Irate Homeowners Are Spoofing Waze To Reroute LA Traffic

Damon Lavrinc
Filed to: TRAFFIC 11/18/14 1:41pm

42,542 🔥 8 ★



PISSED OFF L.A. HOMEOWNERS WAZE IS THE DEVIL!

11/14/2014 12:40 AM PST BY TMZ STAFF



Waze: You can't fool our app with fake traffic reports

Israel-based company refutes report that affluent residents of LA were pushing traffic back to crowded freeway by reporting pretend traffic jams.

By Haaretz | Nov. 16, 2014 | 5:12 PM

Is It Really Possible To Trick Waze To Keep Traffic Off Your Street?

Alissa Walker
Filed to: URBANISM 11/18/14 4:42pm

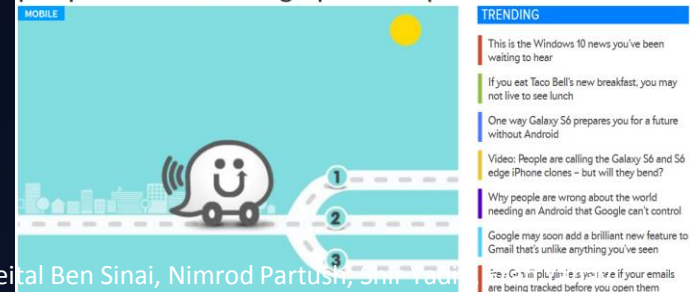
44,229 🔥 7 ★

Cops accused of fiddling with their locations on Waze to fool drivers

Technically Incorrect: Hundreds of Miami police officers allegedly log on to the app and register false locations, thereby being able to still surprise drivers. There's only one problem: there's no evidence.

by Chris Matyszczyk @ChrisMatyszczyk / February 12, 2015 4:19 PM PST

Miami cops are sending fake data to Waze to stop people from knowing speed trap locations



Attacks



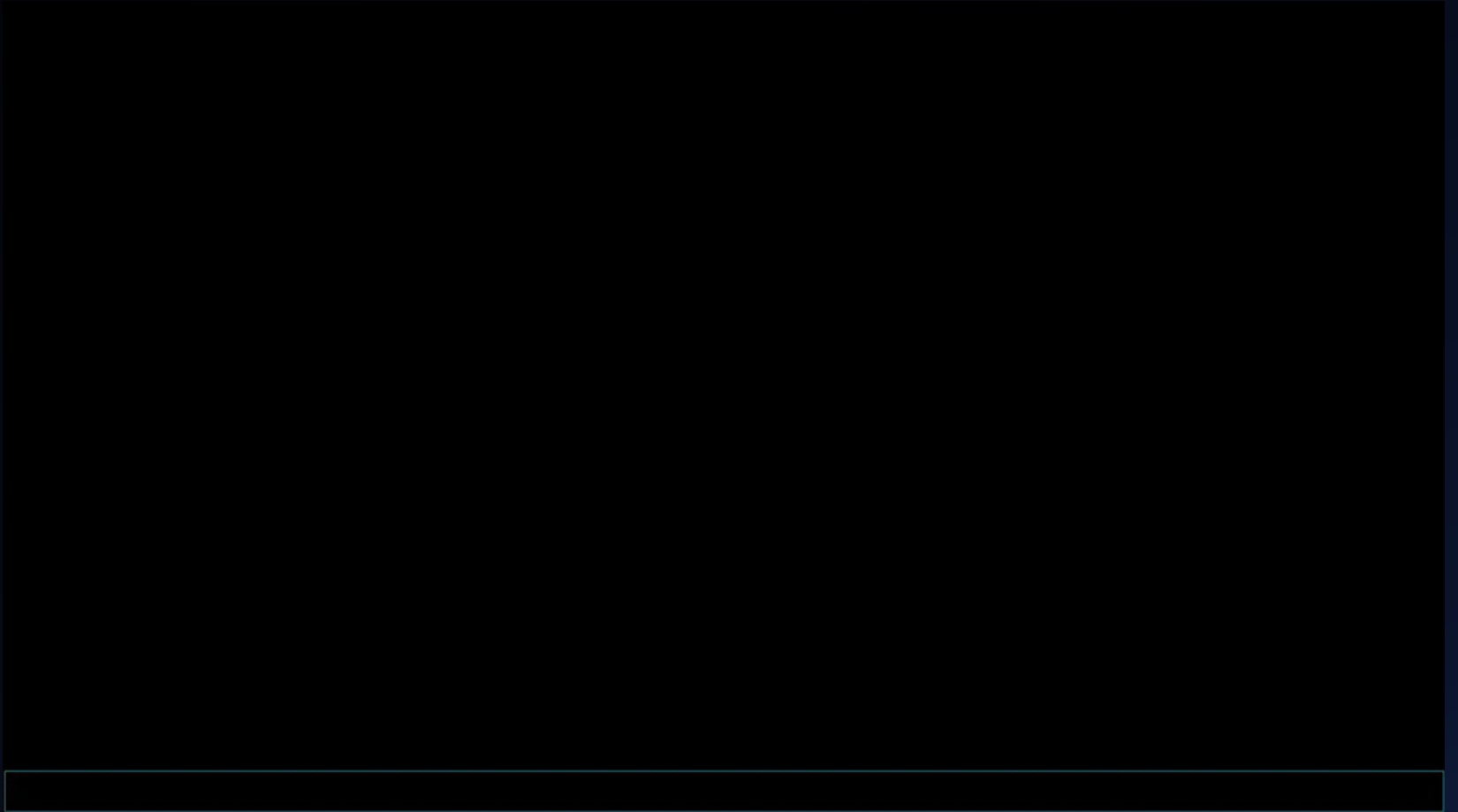
Attack #1: Creating False Congestion & Affecting Routing

- (Insert Demo Here)

Navigation



Successful Attack



Navigation has Changed!



Spoof Attack: Responses

- *"These students may be in an "excellence program" but obviously they, and more so the academic adviser, **have lost their moral compass** which is far more important for providing direction than Waze. Even if the project was done as a prank or as an academic exercise, **the results are no different than physically going out and blocking a major roadway**, something that presumably would not be tolerated by the legal system. And to then go and brag about it? **Why are they not swiftly being investigated by the police..**"*

Spoof Attack: Disclosure

- We notified *Waze* of the attack 2 months before publishing
- We saw a change in the registration process roughly 6 months after publishing (+8 months)
- 6 months later, the attack seemed to have been patched
 - At least in the small setting of our experiment

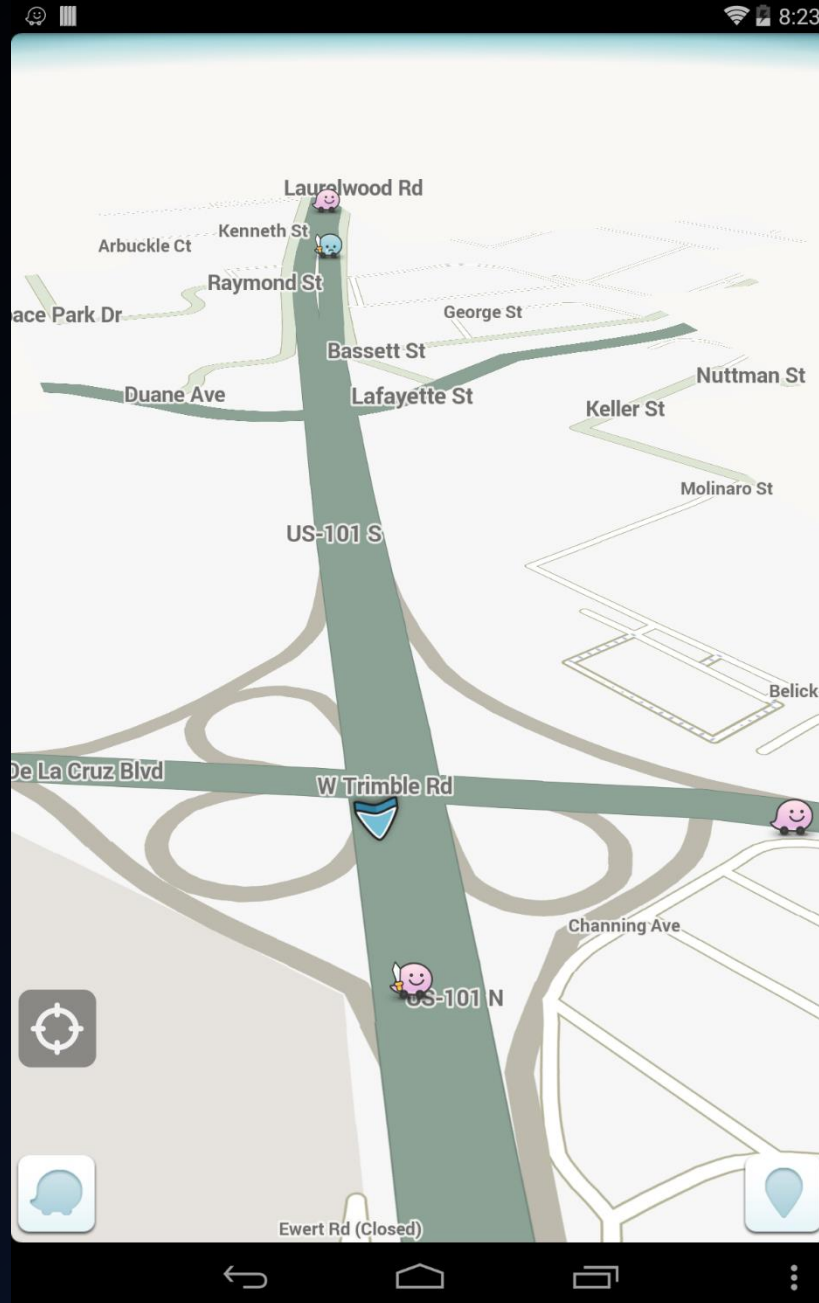
Spoof Attack: Implications

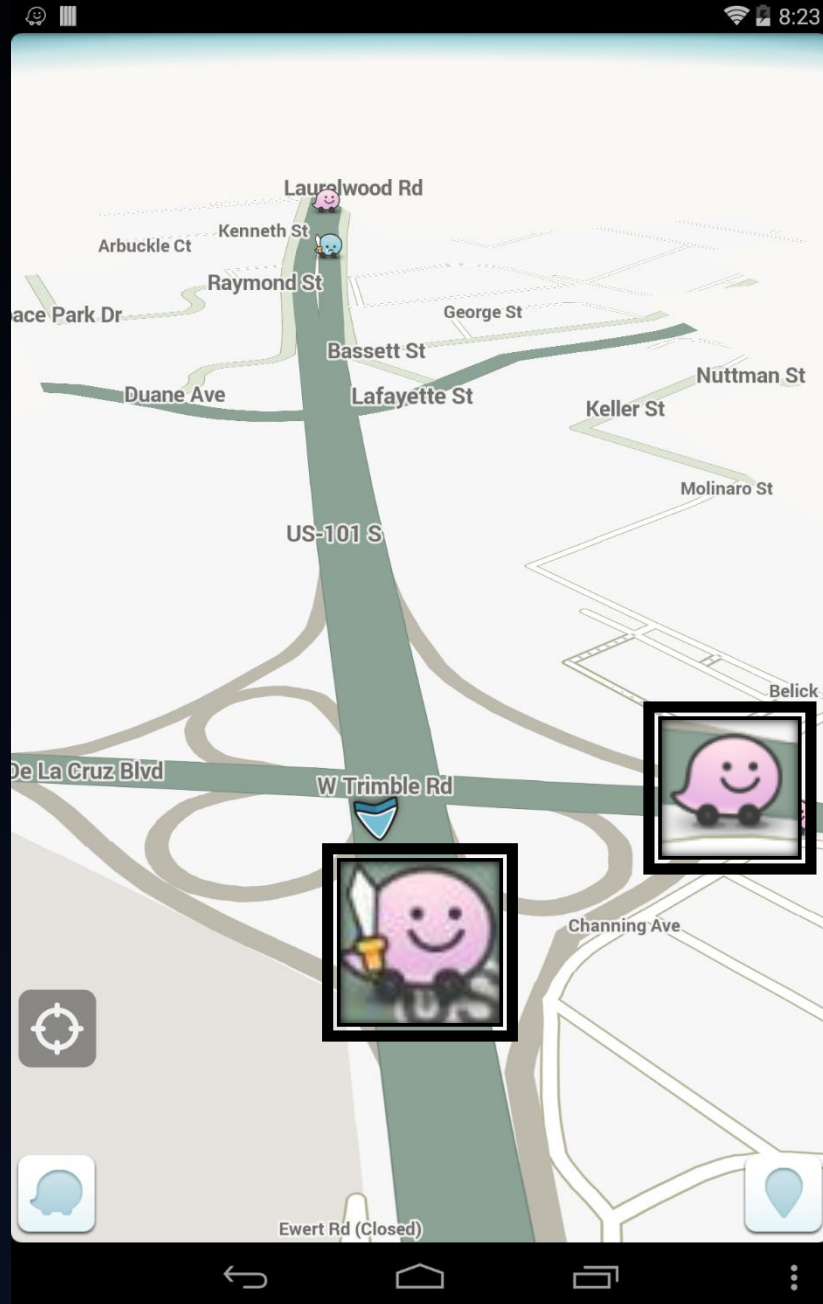
- National
 - Render the system useless
 - Waste time & fuel (& pollution) of users
- Private Financial
 - Congest (free) roads near toll roads
 - Make people drive by my restaurant\sign
 - Create congestion near the competition
- Criminal
 - Lead a target down an attacker controlled path
- Personal
 - Clear roads to save time
 - Get people out (or in?) of your neighborhood

Attack #2: Tracking Users

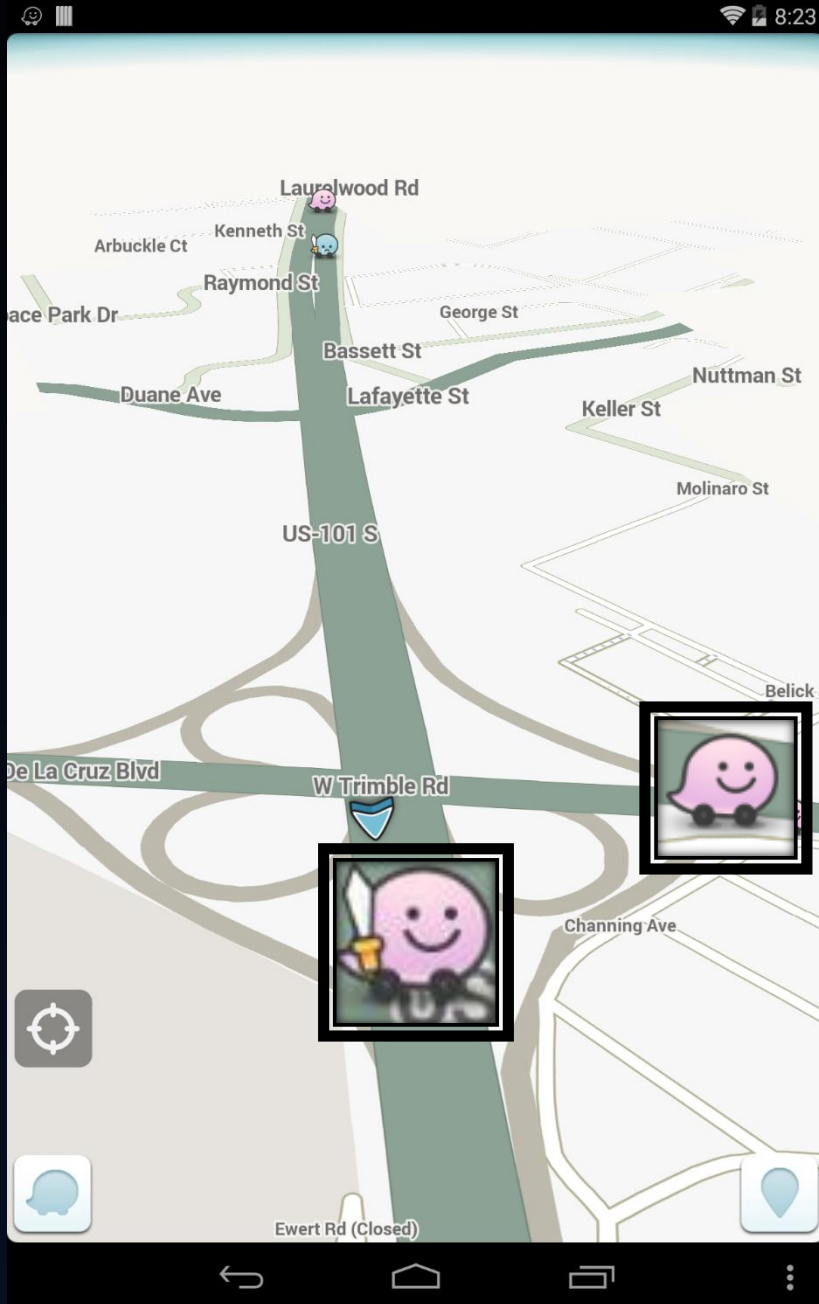
- (Insert Demo Here)





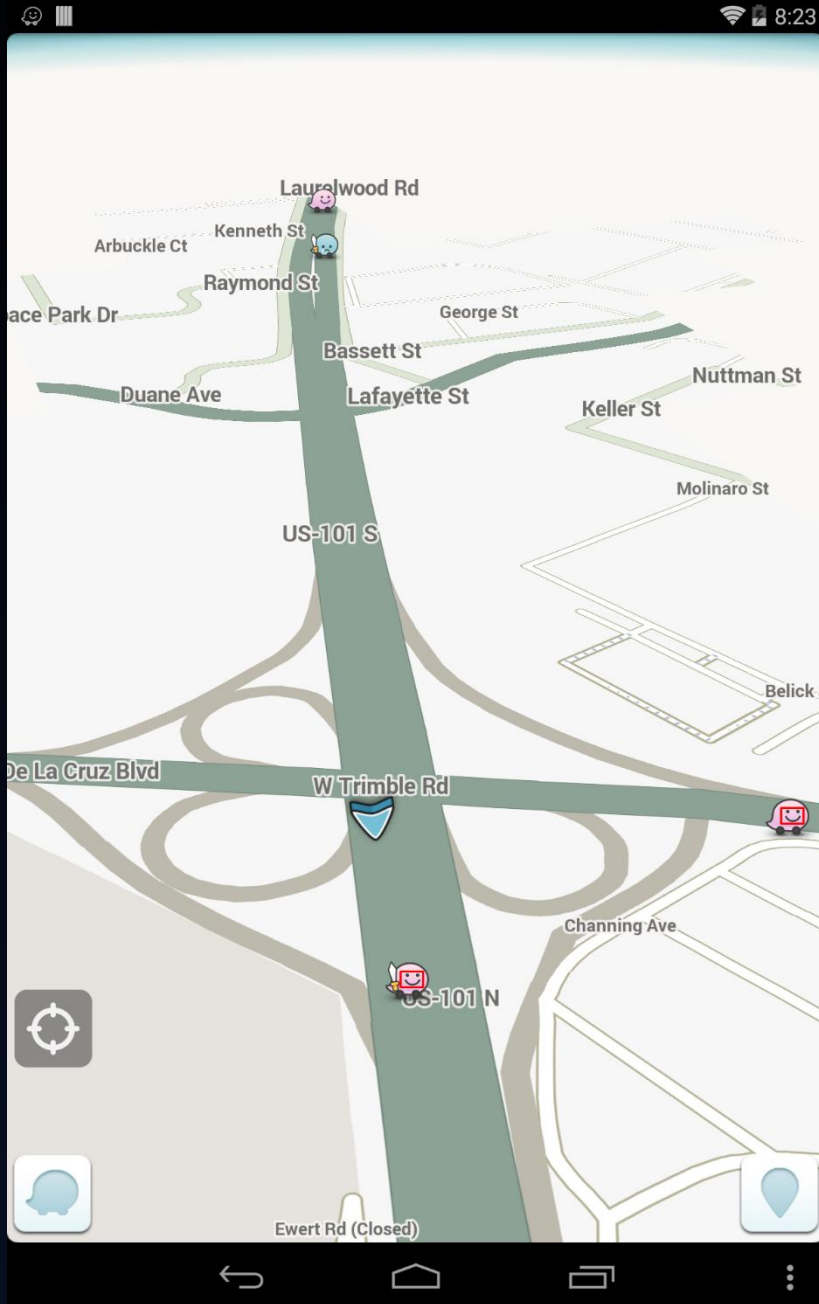


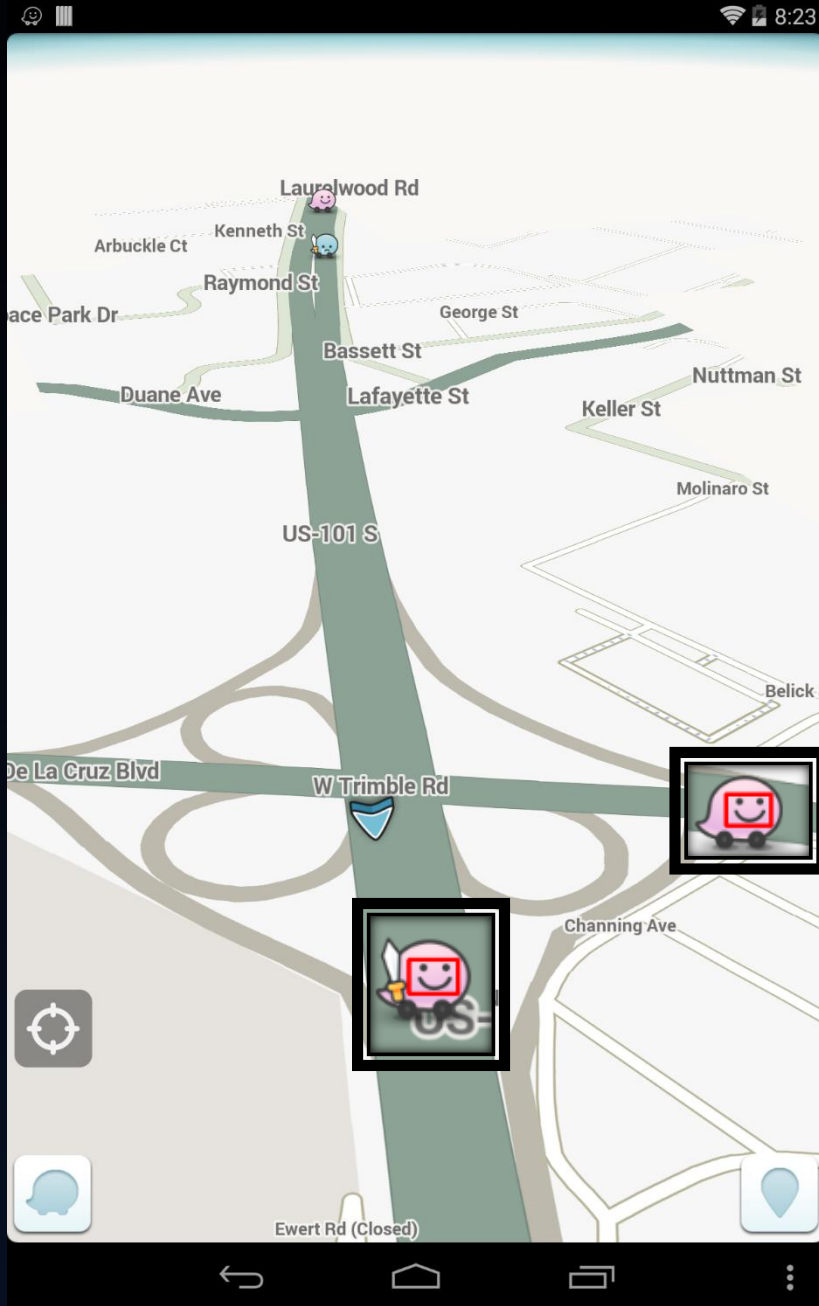
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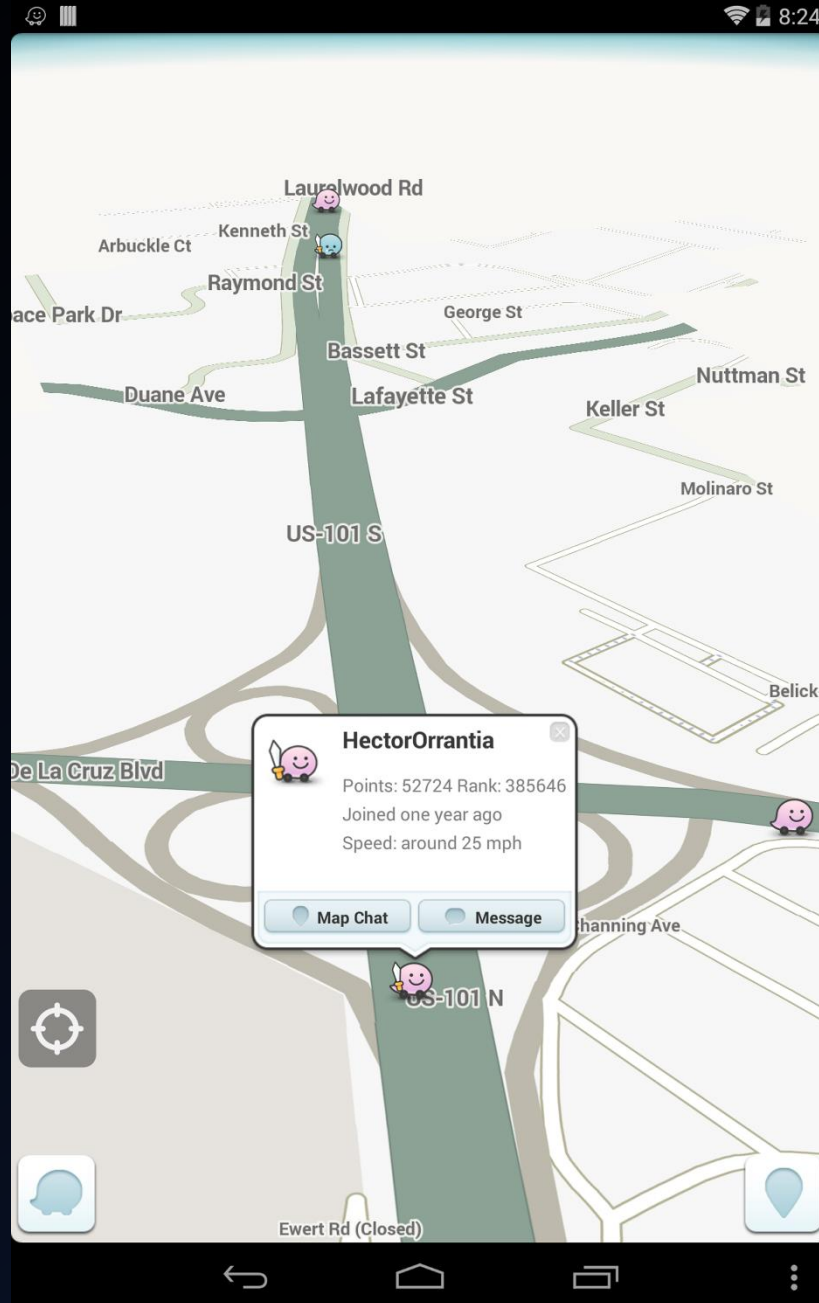


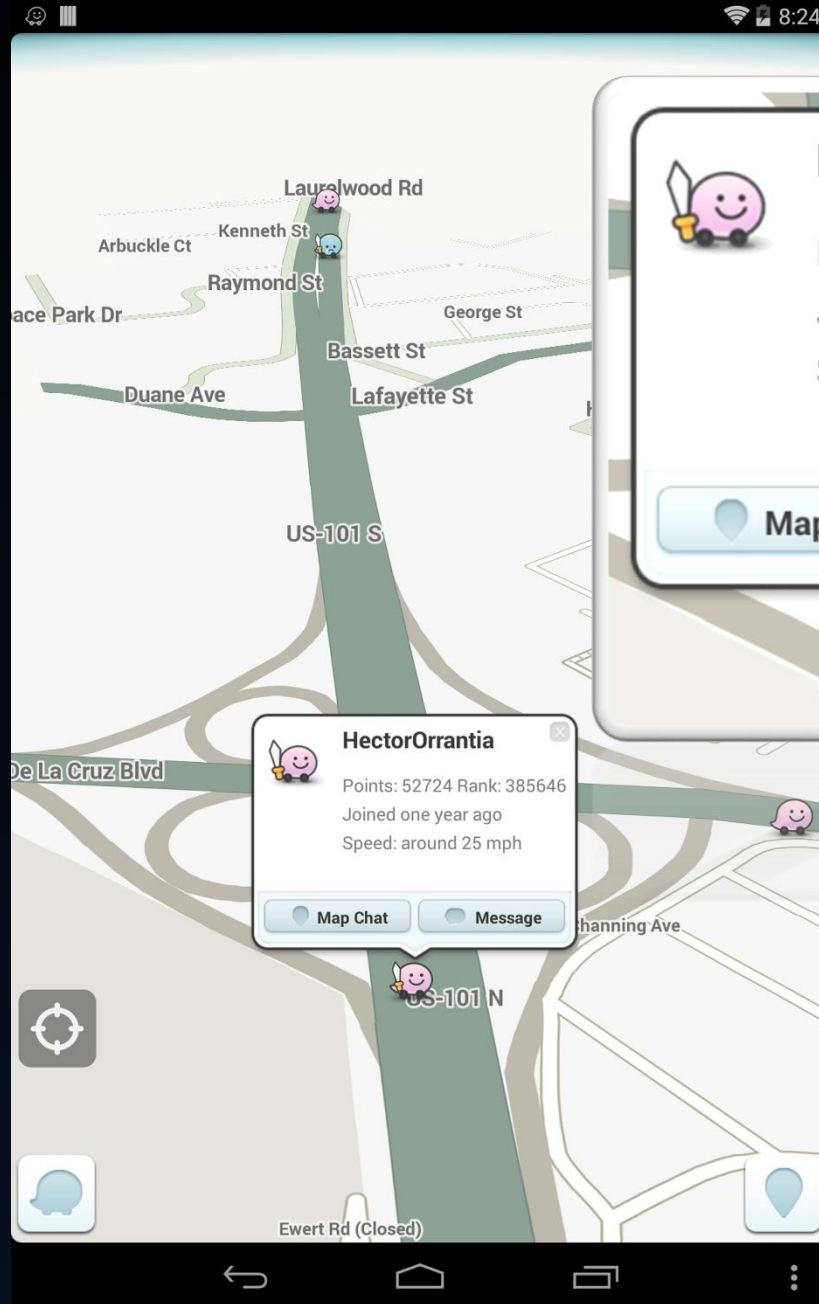


You're Never Fully
Dressed Without A
Smile





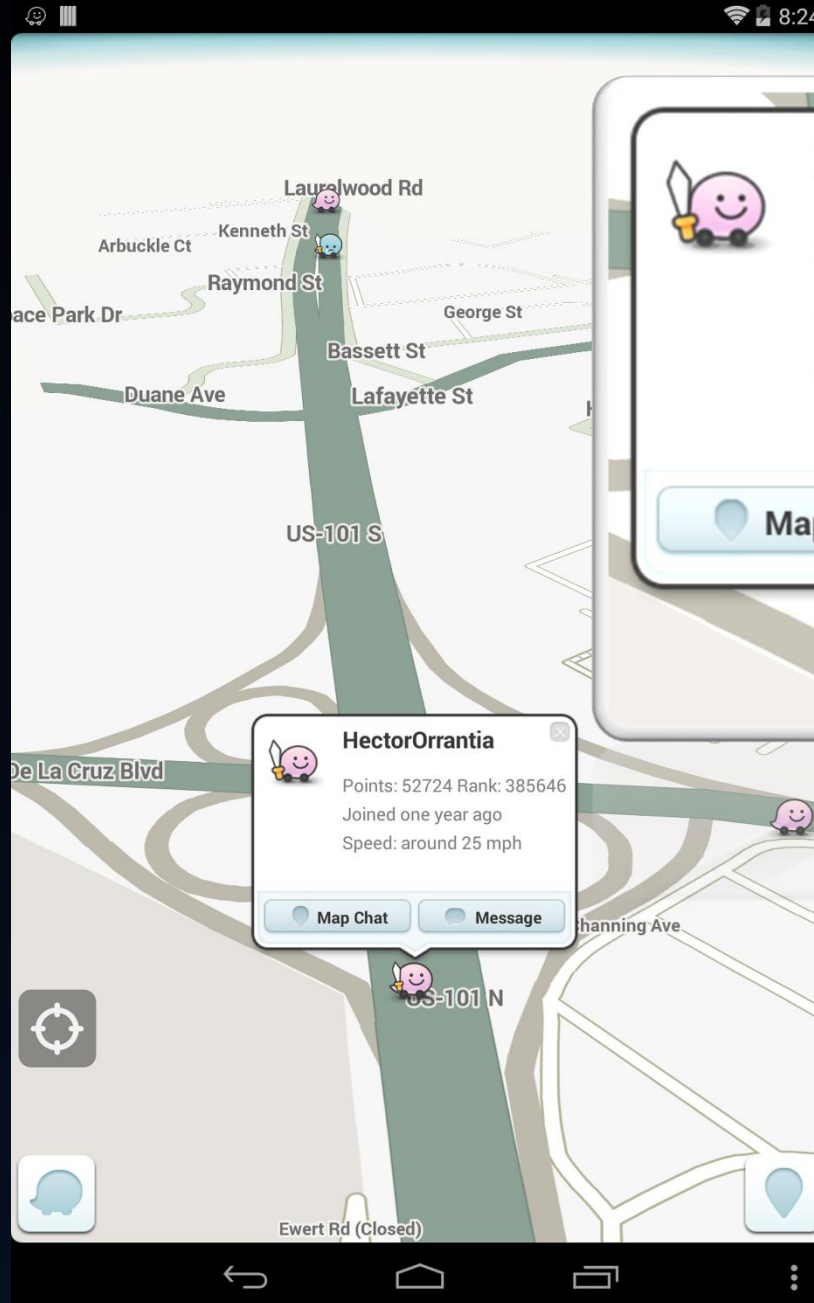






Points

Rank

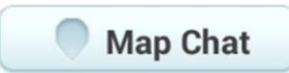
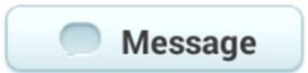
Joined



 **HectorOrrantia**



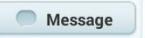
Points: 52724 Rank: 385646
Joined one year ago
Speed: around 25 mph

 **Map Chat**  **Message**

 **HectorOrrantia**



Points: 52724 Rank: 385646
Joined one year ago
Speed: around 25 mph

 **Map Chat**  **Message**

Points

Rank

Joined

HectorOrrantia

52724

385646

one year ago

A screenshot of a social navigation profile card for a user named HectorOrrantia. The card is white with rounded corners and a thin border. At the top left is a pink circular avatar with a smiling face and a yellow sword. To the right of the avatar is the name "HectorOrrantia" in bold black text, with a small grey close button (an 'X' in a square) to its right. Below the name, the text "Points: 52724 Rank: 385646" is displayed in a smaller font. Underneath that is "Joined one year ago" and "Speed: around 25 mph". At the bottom of the card are two light blue buttons: "Map Chat" with a location pin icon and "Message" with a speech bubble icon. The card is overlaid on a map background showing a road labeled "US-101 N" with a smaller version of the pink avatar icon on the road.

Points

Rank

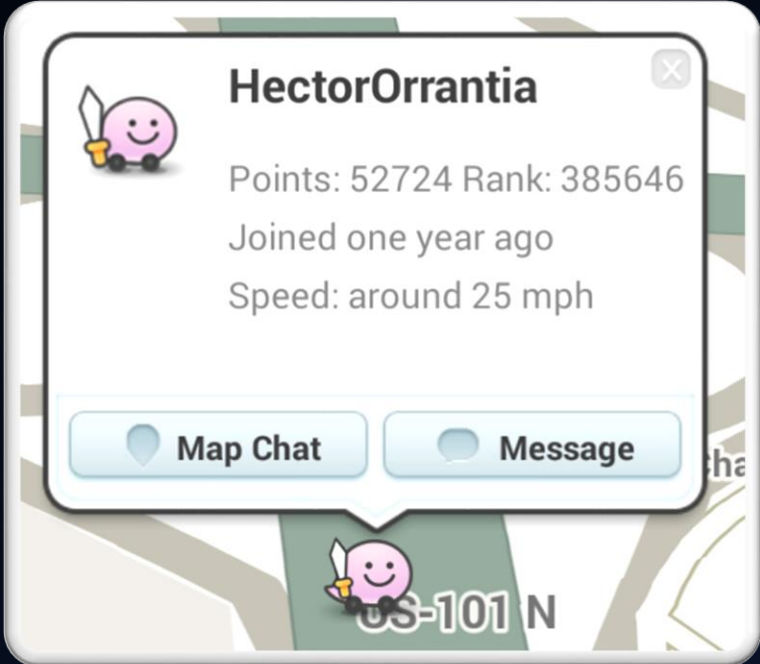
Joined

HectorOrrantia

52724

385646

one year ago



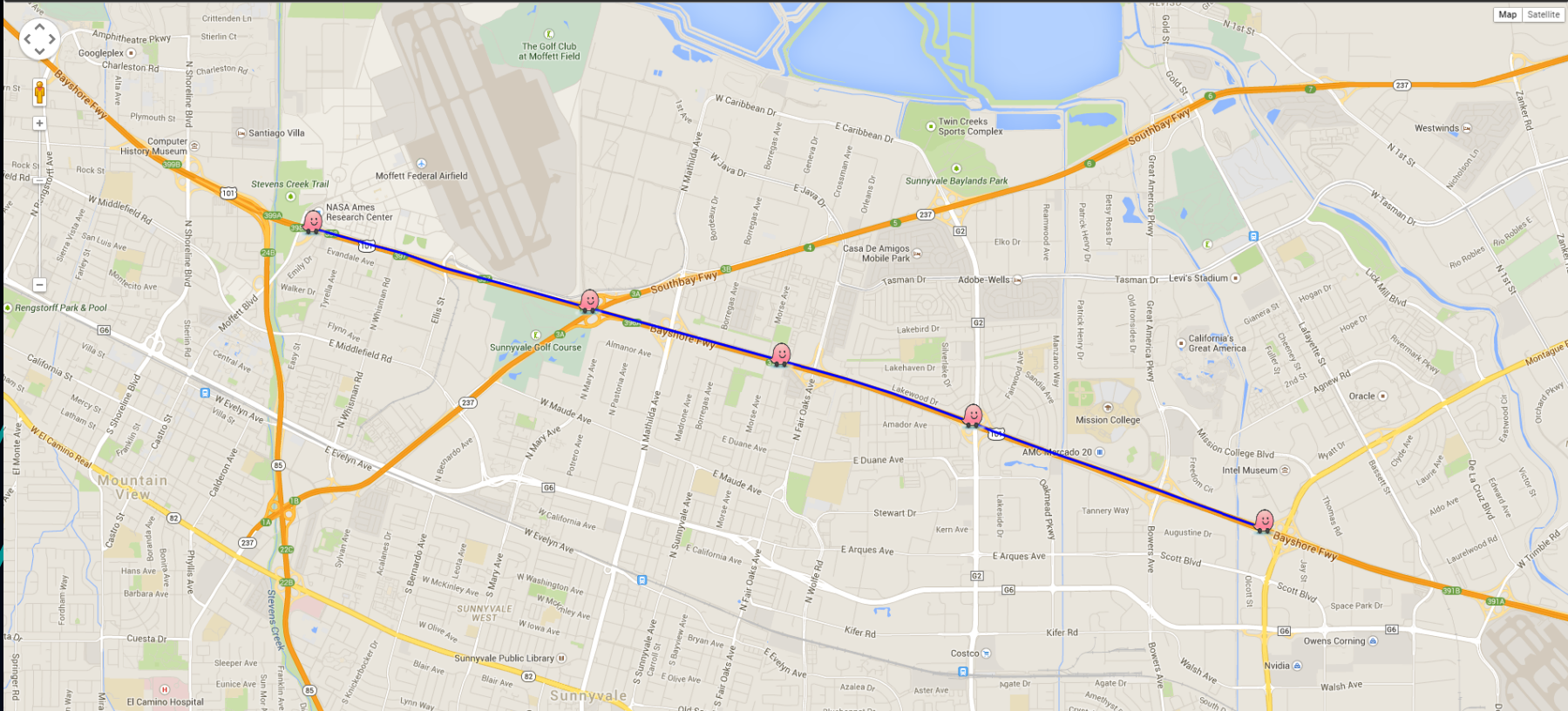
Hectororrantia

52724 385646

one year ago



TrackWaze From: --:--:-- To: --:--:-- All areas



Privacy Attack: Implications

- 2-way street
 - Track location from identity
 - Spy on people
 - Know if a target is near you
 - Infer identity from location
 - Infer persons of interest from location
- Attack can be focused
- R\W
 - Tracking is read, Spoofing is write

Mitigating Attacks



- Tracking attack: Waze allows you to opt out of the 'Live map'
 - But this is not the default option
- Spoofing attack: Can be mitigated by using carrier information
 - Waze started doing this after the attack became public 😊
- Read more in the white paper!

Summary

- A Sybil attack on Social navigation is possible
- We demonstrated a spoofing & tracking attack
 - Attacks requires no RE-ing, uses the Waze mechanism against itself
- Tracked thousands of users
- Successfully created false congestion reports
 - Reproducible
 - Routing affected
 - **Vast implications**
- Suggested mitigation
 - Adapted by *Waze* (??)

Conclusions

- Users should beware of blindly trusting social applications
 - Even in reliable applications such as *Waze*
- Applications with millions of users can and should put more effort into security
- Undergrads* can be useful



Questions?