

<http://digilit.weltgewandt-ev.de>

<b>Activity title</b>	<b>Big data and smart city</b>
Overview	Session on big data related to the idea of a smart city
Objectives	<ul style="list-style-type: none"><li>- Gaining information on big data and smart cities,</li><li>- Developing an own opinion regarding both issues reflecting pro and contra aspects,</li><li>- P. get actively involved and experience self-efficacy</li></ul>
Materials	Article on big data (imprint), smartphone/PC for researches, paper, pen
Time	1,5 hours
Group size	6-20
Instructions for trainers	<p>1. <b>Association game</b> related to big data – 10 min. All participants sit in a row. The facilitator puts three chairs in front of the group and takes a seat in the middle of them. He/she says a term, for example „big data“. Participants who have an association to this word take a seat at the right or the left chair. The facilitator asks the person at the right, then at the left using the words: „I am the ... [big data]. And who are you?“ Neighbours answer: „I am the ... [smartwatch]“ or „I am the ... [mozilla facebook container]“. The facilitator makes a decision between the two answers and goes back to the group. In our example he/she prefer „smartwatch“. The participant with this association moves in the middle of the three chairs. Others of the group with ideas to this term sit at the left and the right of the „smartphone“. The same conversation type starts – and so on.</p> <p>2. <b>Big data and smart cities</b> – 40 min - The trainer distributes the Wiki article on big data in the group. All read the article in smaller groups. - In smaller groups, the participants (p.) create a word cloud related to big data. - Research task in small groups: What means smart city? P. create a mind-map on small cities.</p> <p>3. <b>Heaven or Hell?</b> - Two groups prepare a conference on smart cities and big data. One collects arguments “pro” smart city (“heaven”), the other provide arguments against (“hell”) - 15 min - <i>Conference</i> role-playing game: your city as a smart city: heaven or hell? - 15 min The trainer moderates the discussion contrasting the different points of view - Reflection on the conference game – 10 min.</p>
Debriefing and evaluation	What insights did you get on big data and smart cities? Did the conference game help finding an own position?
Tips for trainers	It might occur that some of the participants avoid playing a role game. Invite them to be the observer. Ask them for their feedback



Co-funded by the  
Erasmus+ Programme  
of the European Union



after the role-playing game.

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<b>Activity title</b>	<b>Big data in the pocket: the smartphone example</b>
Overview	Session on big data related to everyday's behaviour
Objectives	<ul style="list-style-type: none"><li>- Gaining information on big data and smartphone,</li><li>- Discuss own data providing and developing data awareness,</li></ul>
Materials	Articles (see 4.), smartphone, paper, pen
Time	1,5 hours
Group size	6-20
Instructions for trainers	<ol style="list-style-type: none"><li>1. Introduction to the issue – 5 min.</li><li>2. Build small groups of 3-4 persons.</li><li>3. Participants (p.) describe and visualise one daily routine with regard to their smartphone (map of activities). Exchange in the group. - 15 min.</li><li>4. P. read the articles “Big data development driven by your smartphone”, “Smartphones Are Spies”, and “Smartphones are Helping to Generate Big Data”. - 15 min.</li><li>5. P. exchange on the articles and add information on smartphone tracking to the daily routine's map/image. Presenting to the whole group. - 20 min.</li><li>6. Discussion: “I have nothing to hide.” or Is Data Awareness Exhausting? - 20 min.</li><li>7. Which and how much information do I want provide? → Trainer explains self-protections; article: “How to stop your smartphone from tracking your every move, sharing data and sending ads” - 15 min.</li></ol>
Debriefing and evaluation	What insights did you get on smartphone tracking? What do you think about it?
Tips for trainers	Point 7 would be done at best with participants, one using iPhone, the other Android. Both can show directly at the device the proposed actions.

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## Big data development driven by your smartphone

Kasia Fulara 27.06.2018

Big data – the term seems to be very ambiguous for some, while others cannot imagine development and functioning of the modern world without it. Big data helps to win election, drives the economy, is used in medicine, sports, insurance, e-commerce, industry, marketing and many more. The potential of using big data is huge and there is practically no area that will not be affected by this technology.

The growing amount of data generated by each of us is conducive to the development of big data. The intense increase in the availability of mobile phones in societies around the world – even the poorest – obviously leads to the collection of ever larger data packages about our behavior. The use of small, portable electronic devices to generate information is obviously not new. For over two decades, portable computers and PDA devices have been used for collecting census data, conducting interviews with consumers of various goods and services, and for probing potential voters. However, access to such devices was never before as wide as it is today. At the end of 2016, the penetration rates for mobile telephony were at the level of 98% in the world (128% in developed countries and 89% in developing countries). According to the International Telecommunications Union, “today there are almost as many telephone subscriptions as people in the world”.

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What your phone knows about you?

Have you ever wondered what your smartphone knows about you? Or how does it find out about your behaviour? Wouldn't it be great if it could analyze for you things that you are not able to?

Smartphones now can do this, and many researchers are currently devoted to find ways to collect and interpret the most useful information. Modern smartphones are equipped with many powerful sensors that allow phones to generate data about you. While this may alarm anyone for whom privacy and data protection is important, sensors are also an opportunity to help smartphone users in many different, often non-obvious ways.

How much data do we leave in our phones? Here are some impressive statistics:

Over 5 billion people around the world use smartphones every day to make calls, tweet and search for information.

30 billion posts is shared on Facebook every month

Data is growing faster than ever before, and by 2020, about 1.7 megabytes of new information for every person in the world will be created in every second.

By 2020, our accumulated digital world of data will increase from 4.4 zettabytes to around 44 zettabytes or 44 trillion gigabytes.

Every second we create new data. For example, we perform 40,000 queries every second (Google only), which gives 3.5 searches per day and 1.2 trillions of searches per year.

In August 2016, over 1 billion people used Facebook in one day

This year, more than 1.5 billion smartphones equipped with sensors capable of collecting all kinds of data will be sent

At the moment, less than 0.5% of all data is analyzed and used for business purposes, we can only imagine what will happen if this percentage will be doubled.

luca-bravo-205341-unsplash

## How does your phone gather data?

Knowing how powerful data generated by our cell phones is, it is worth considering how mobile devices acquire all this information. The basic tools used for this purpose are various types of **sensors** embedded in the phone.

Our smartphones contain more sensors than most people could imagine. Android and iPhone phones include: a **sound sensor** (microphone), an **image** sensor (camera), a **touch** sensor (screen), an **accelerometer**, a **light sensor**, a proximity sensor and several sensors to determine the location (including a gyroscope, a magnetometer, or a global GPS positioning system).

Most of them the average phone user recognizes well and is aware of their use. In this article, I am presenting a description of a few lesser-known sensors that your telephone certainly has and which you might not have even known about:

### Accelerometer

Accelerometers support motion detection and can be found in both fitness trackers and telephones. Thanks to this sensor, the smartphone can follow your steps. It also has additional uses. Thanks to accelerometers, it is possible to determine in which direction the telephone is directed, which becomes an increasingly useful tool in applications based on augmented reality (AR). The sensor itself consists of other smaller sensors, including microscopic crystalline structures, which can be stressed due to accelerating forces. The accelerometer interprets the voltage coming from the crystals, thanks to which it can find out how fast and in which direction the phone is moving. From switching the application from portrait to landscape, to showing the current speed in the driving applications, the accelerometer is one of the most important sensors in the phone.

### Gyroscope

The gyroscope helps the accelerometer determine how the phone is oriented. Thanks to it, playing a racing game and steering the vehicle by tilting the screen, the phone senses what you are doing and how you move the device in space. Gyroscopes are of course not only used in telephones – their properties are used, for example, by the aviation industry or the film industry. The first wide commercial application of MEMS (microelectromechanical) gyroscopes, i.e. those used in telephones, took place with the launch of the iPhone 4 in 2010. It was then extremely innovative to have a telephone that could detect the orientation with such accuracy – nowadays, we consider it as something obvious.

### Magnetometer

Complementing the triumvirate of sensors responsible for orienting where the phone is in the physical space is a **magnetometer**. This sensor measures magnetic fields and can – by changing the output voltage in the phone – determine which route is north. When you go in and out of compass mode on Apple Maps or Google Maps, the magnetometer begins to wonder which way the map should be directed. It also supports standalone compass applications. To make this sensor fully usable, it must work in tandem with the data coming from the phone's accelerometer and the GPS device.

### GPS

The GPS devices in the phones receive a signal from the satellite in space. To tell you in which part of the planet you are standing (or driving) you do not need any additional data from your phone. Therefore, even if your phone loses the signal, you can still see the exact point where you are currently on the fuzzy map. So how does the GPS system determine our position? GPS continuously connects the system with many satellites, and then calculates our location.

This, however, is not the only way your phone can determine where you are. Calculating the distance to cell towers by telephone can also be used to determine the approximate location.

Modern GPS devices in smartphones – to get more accurate location readings – usually combine GPS signals with other data, such as mobile signal strength.

Obviously, phones have a lot more sensors than those mentioned above. Many phones have built-in barometers by which it is possible to measure air pressure, or sensors that measure the light intensity in a room and adjust the brightness of the screen accordingly. Regardless of how many sensors your phone has, all of them have one basic feature – they generate huge data packages, which can be practically used after proper analysis (one example of this use is presented below).

nasa-43569

How all of this impacts the big data development?

Many attributes of using mobile phones affect their usefulness in developing big data. First of all, it's speed – generating information via a mobile phone can significantly speed up the process of data collection. Where network availability enables near-instant transmission of data to the central office, shortening the time between local collection and delivery of data can save weeks or even months in the entire information collection process. In addition, early warning systems can be set up by mobile phones, allowing analysts to quickly identify potential problems with data collection activities and (potentially) correct them in real-time. An additional advantage is the possibility of relatively simple joining different categories of data. Depending on the function of the telephone used, the text data captured by the mobile phone can be combined with data in other formats, such as photo, audio and video images. For example – if the subject of our analysis is a building, thanks to the data obtained from a smartphone, we can also specify information such as: its appearance (thanks to documentation from the camera sensors), geo-location data (thanks to GPS), and possibly add text information in a form of a note.

The second aspect, thanks to which the use of big data can be intensively developed is, of course, financing. The generation of data by mobile phones can take place at much lower costs than it is possible in the traditional way. The enormous popularity of these devices, the amount of data they generate and the possibility of their rapid transmission makes the business use of big data based on mobile telephony cheaper than ever before.

How your smartphone-generated data can be used?

Knowing how much data smartphone generates, and how the process looks, a natural question arises – what exactly can you do with such information? One of the examples of using data from phone sensors are so-called UBI (Usage-Based Insurance) in which the personalized offer is based on the actual behavior of the driver. At Sparkbit, we have created a special system that – thanks to the information obtained from smartphones – is able to evaluate the technique and driving behaviour. By March 2018, we have accumulated 330 million kilometers of historical routes made by our system users. Each month we have over 30,000 active users, and each of them registers on average over 70 new routes. The route covered by the driver is represented as a sequence of points from the GPS containing information such as geographical coordinates, estimated position accuracy, vehicle speed or direction in which the vehicle moves. Based on these data, the system detects dangerous driver behavior, and then issues a point score for the route covered and, consequently, the driver himself.

This is just one of many examples of the practical use of big data marriage with mobile phones – certainly the potential of this connection is huge and will only generate business popularity.

## Smartphones are Helping to Generate Big Data

<http://www.frontlinegenomics.com/news/15340/smartphones-big-data-technology-diseases/>

9 Oct 17

Alex Esson

A rise in personal devices such as iPhones and Fitbits is enabling more scientists' access to a wider range of information, making way for a better insight than ever before.

Driving this research forward, reports Cosmos, is the Centre for Big Data Research in Health (CBDRH) at Australia's University of New South Wales, whereby a large variety of personal devices are being used to find new ways of diagnosing and treating disease.

Dr Timothy Churches, a Data Scientist at CBDRH and the Ingham Institute in Sydney, explained, "Smartphones now come with incredibly sensitive accelerometers that can pick up the slightest tap or jiggle. We're looking at using smartphones to characterise the gaits of patients after surgery, and using machine learning methods to try and detect changes that could indicate problems with hip or knee replacements."

In addition, it would seem the social media activity on Instagram and Twitter is tracking your health and behaviour. It can be used by data scientists to better understand epidemics as they arise, from diseases such as influenza, Ebola, and dengue fever.

CBDRH, Biostatistician, Andrew Blance, commented, "In the UK, the National Health Service monitored Twitter accounts for keywords like #barf and #vomit to see if they could develop an algorithm to detect outbreaks of the norovirus associated with food poisoning."

As a result, when it comes to potential outbreaks, health services can intervene and implement strategies much more efficiently than if they were to wait around for official hospital records, which can take up to a month to provide any actionable data.

"Once we have a rich picture of the individual, there could potentially be algorithms that predict when you are likely to fall ill, and help you take measures to prevent that," added Blance.

As it stands, anyone who has a smartphone is able to already generate and collect personal health data, which reinforces how we are just scratching at the surface.

"The community is now generating its own data and submitting it for research, and that will be useful in the future, even more so when it's linked with hospital records, disease patterns and peoples' fitness activities," concluded Blance. "As far as you can dream, that's the future, really."

## **Smartphones Are Spies. Here's Whom They Report To.**

By Stuart A. Thompson and Charlie Warzel

Dec. 20, 2019

<https://www.nytimes.com/interactive/2019/12/20/opinion/location-tracking-smartphone-marketing.html>

Your smartphone is probably sending your precise location to companies right now. Their job is to turn your shopping trip or doctor's visit into "Big Data" — another term for corporate intelligence. So far, the companies and individuals profiting from your everyday movements have mostly evaded scrutiny.

As Times Opinion continues reporting on a giant trove of mobile phone location data, the companies and people profiting from the privacy invasion are coming into focus.

So who, exactly, is watching, and why — and where is all that information going?

### **The Players**

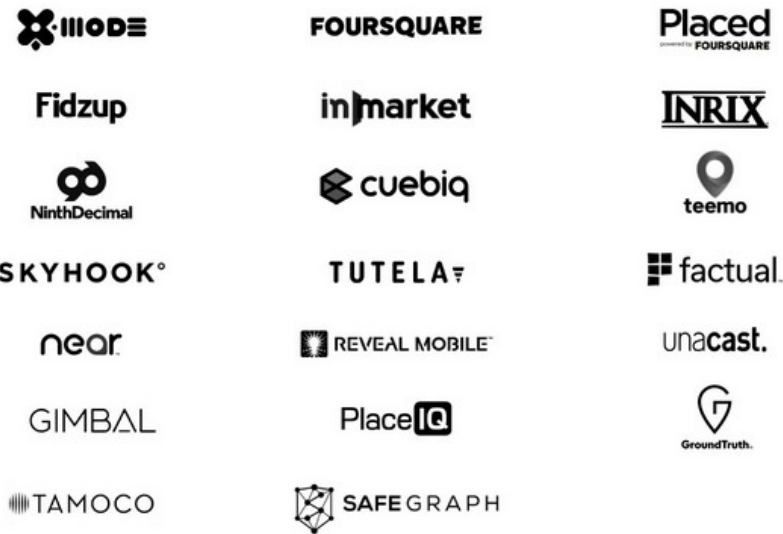
Google Maps is possibly the most popular location-based app in the world, with over one billion users active each month, most of whom are most likely enabling location tracking. Large tech companies like Google and Facebook are more likely to keep the invasive data they collect to themselves for their own internal use, repurposing it to improve their products, for marketing and other analyses.

But many other location data companies aren't household names. Smaller players mostly operate behind the scenes on many of your favorite apps, using software designed to quietly collect location data from your phone's sensors after you consent (more about that in a minute). Many have labyrinthian privacy policies vaguely explaining their permissions but they use technical and nuanced language that may be confusing to average smartphone users.

The industry has evolved to sprout even more companies, specializing in monitoring phones via Bluetooth signals or improving the technology that lets it all happen. In other cases, location data is funneled into marketing companies and used to create targeted advertising. (Companies can work with data derived from GPS sensors, Bluetooth signals and other sources. Not all companies in the location data business collect, buy, sell or work with granular location data.)



A Selection of Companies Working  
in the Location Data Business



Sources: MightySignal, LUMA Partners and AppFigures.

By design, it's often nearly impossible to know which companies receive your location information or what they do with it. Some are startups with only a few dozen employees and modest funding. Others are established players with significant investment.

Because the collection of location data is largely unregulated, these companies can legally get access to phone location sensors and then buy and resell the information they gather in perpetuity. Not all companies do that, but some do. The business opportunities are vast. And investors have noticed. Many advertising executives have independently described the location data industry to us as “the Wild West.”

*Freaked out? Here are three easy steps to protect your phone:*

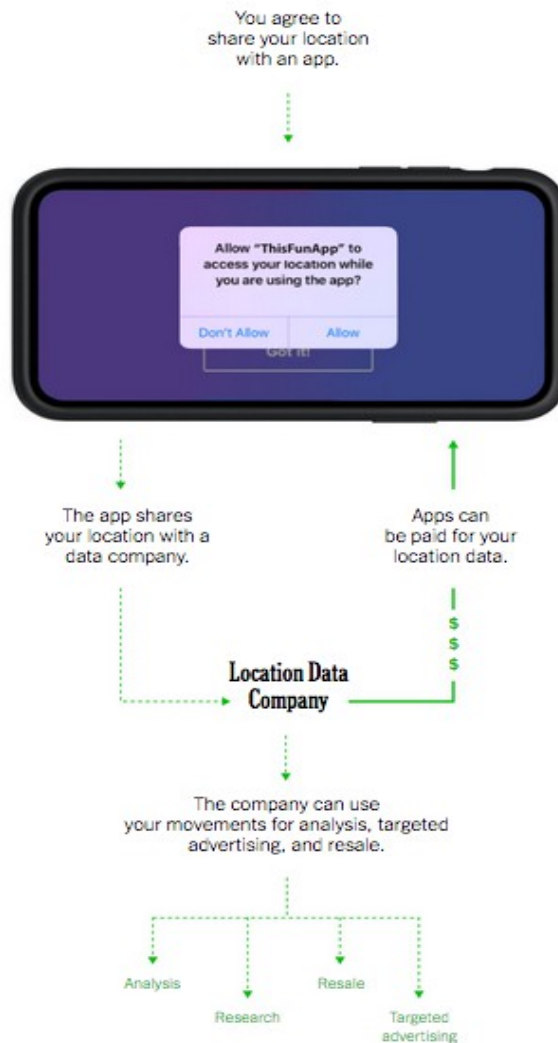
<https://www.nytimes.com/interactive/2019/12/19/opinion/location-tracking-privacy-tips.html>

The advertising ecosystem is also incredibly complex. The number of companies has grown from about 150 in 2011 to over 7,000 this year, according to Marketing Technology Media.

That complexity, according to an ad industry veteran, is by design: “Everybody knows their one little part and basically nothing more. Every company is just one micronode of the ecosystem. Nobody can see the whole thing.”

## The Tech

It's costly and challenging to build apps and large audiences from scratch. To get around this, smaller companies piggyback on bigger app developers, inserting their tracking programs into established apps via something called software development kits (known as S.D.K.s).



Companies often pay the apps for access, doling out as much as \$20 per 1,000 unique users each month or as little as \$2 per 1,000 — depending on how eagerly data companies want the data and how much value they expect to derive from it — according to a former employee of a location data company who was responsible for recruiting apps to use its S.D.K.

“A lot of them were small application developers,” the former employee said. Deals with small companies could be struck in less than a week, with the negotiation focusing almost entirely on the financial compensation, the person said. “They were just cash-driven companies where any incremental amount of revenue was helpful.”

Many S.D.K.s provide useful and sometimes vital services, like login integration or mapping technology. Facebook, Google and Amazon have S.D.K.s inside all kinds of apps. In the case of these tech giants, the S.D.K.s help provide web traffic analytics, facilitate payments or run ads.

In either case, the S.D.K. makers receive user data from that app — potentially over a billion datapoints each day. And once the companies have legally obtained it, there are few legal restrictions on what they can do with it. Some turn around and sell that data for profit.

“It’s the industry standard,” an online ad industry veteran told us, speaking on condition of anonymity. “And every app is potentially leaking data to five or 10 other apps. Every S.D.K.

is taking your data and doing something different — combining it with other data to learn more about you. It’s happening even if the company says they don’t share data. Because they’re not technically sharing it; the S.D.K. is just pulling it out. Nobody has any privacy.”

How is this all allowed? Technically speaking, you consented. Location data companies rely on those “I agree” screens and privacy policies to create the legal and ethical basis for their business. The companies justify owning and monetizing the most intimate details on our daily travels by suggesting our movements are anonymous and impersonal.

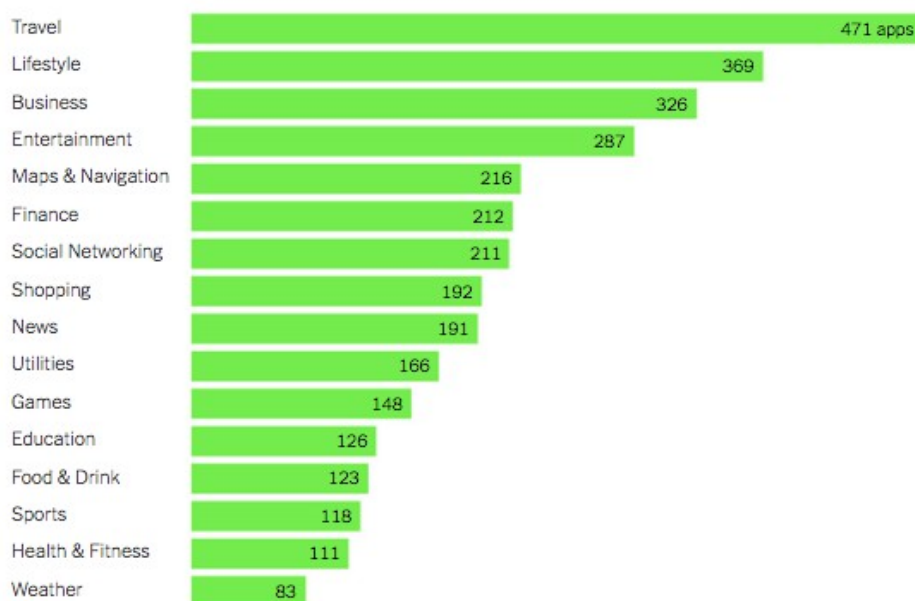
“We don’t have a direct relationship with the app user or the consumer,” said Brian Czarny, chief marketing officer of Factual, a location data company based in Los Angeles, which says it doesn’t sell any of the raw data it collects.

He added: “We don’t even look at it as a user. We look at it as a device.”

## The Apps

It’s hard to know exactly which apps are sharing and profiting from your location data. Even apps that work with location data companies might have specific arrangements that limit how it’s resold or used for analysis and advertising outside the app. This chart, using data from the S.D.K.-tracking company MightySignal, shows the categories of apps most commonly working with S.D.K.s.

**Apps With Location S.D.K.s Installed, by Category**



Note: Some apps appear in more than one category. Excludes apps classified as “other.” Source: Mighty Signal

While this list includes more than 3,400 titles, many apps that collect and share location data don’t send it directly to third parties within the app. It’s ultimately impossible to identify all the apps involved.

Simply by downloading an app and agreeing to the terms of service, you’re potentially exposing your sensitive information to dozens of other technology companies, ad

networks, data brokers and aggregators.

## The Business

Sharing your location data isn't always bad. Many apps that use location do so with clear disclosures and provide useful services. Yet in some cases, companies collect the data seemingly for one purpose but can use it for another.

In a test by Times Opinion earlier this year, the music and podcasting app iHeartRadio asked for location services to "get your favorite DJs." But the app quickly sent the phone's precise geolocation to the data company Cuebiq via its S.D.K. Like other location data companies, Cuebiq uses location data to fuel analysis, like measuring whether people visited a store after seeing an online ad or helping marketers build more detailed profiles for targeted advertising.

In an emailed statement, iHeartRadio said that it complies "with all applicable laws in connection with its use of location data" and that "our privacy policy includes fulsome disclosure around location use." In the latest version of the app, the consent screen includes more details, adding that the company "may also use or share location for advertising and analytics."

In another test, the popular weather app MyRadar sent the phone's precise location to Cuebiq about 20 times while it was open during an eight-minute walk in Brooklyn. While the app included clearer details on its consent screen detailing how location data would be used, it's difficult to evaluate the trade-offs without being able to see how frequent and precise the tracking really is. MyRadar did not respond to a request for comment.



Note: Walking path and timing is inferred. Satellite imagery: Microsoft

Another example is OneSignal, which specializes in mobile and desktop notifications but built a side business by collecting and selling location data. If users agreed to share their location with an app for a local notification, OneSignal could collect it via its S.D.K. and then make money by selling the data to third parties.

The day before we were scheduled to speak with OneSignal about these practices, it

announced it would stop reselling data. (In an interview, it said the change had been planned for some time.) The company's co-founder and chief executive, George Deglin, said that revenue from reselling was relatively small and that the public "is leaning more negative now" over companies profiting from their users' data.

That negativity has grown as Facebook scandals, data leaks and security breaches have made Americans more concerned than ever about what is happening to their data. People might have felt comfortable giving up their location before these breaches, but would they consent today?

Once you've entered the location data marketplace, you're there forever.

Stuart A. Thompson ([stuart.thompson@nytimes.com](mailto:stuart.thompson@nytimes.com)) is a writer and editor in the Opinion section. Charlie Warzel ([charlie.warzel@nytimes.com](mailto:charlie.warzel@nytimes.com)) is a writer at large for Opinion.

Graphics by Stuart A. Thompson. Additional production by Jessia Ma and Gus Wezerek.

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# How to stop your smartphone from tracking your every move, sharing data and sending ads

Kim Komando Special to USA TODAY

Published 5:36 PM EST Mar 7, 2019

Source: <https://eu.usatoday.com/story/tech/columnist/komando/2019/02/14/your-smartphone-tracking-you-how-stop-sharing-data-ads/2839642002/>

Your phone knows where you are standing or sitting at this moment. Most people know that. How else could you use GPS? While location tracking is essential for directions, it also helps big tech sell you things.

“Targeted advertising” is a massive phenomenon. Companies are eager to flood your screen with ads, which are primarily influenced by your day-to-day habits. Facebook, Apple, Microsoft, Amazon, Google and many others make money off mobile ads, and they need this information to power their data-mining machines.

Why is your phone allowed to track you and share that data with unknown third parties? In short, you gave it permission. Typical data-sharing policies are buried within pages and pages of privacy policies and terms of agreements.

Companies usually have a reasonable explanation, such as Apple tracking personal calls and emails to prevent fraud, which many consider an invasion of privacy.

No matter what device you use, accessing the internet subjects you to behavioral tracking. If this practice bothers you, all hope is not lost.

**Google isn't the only way to search:** Here are 7 services you should try instead

**Get 'smart' about your thermostat:** What you need to know about Nest, Ecobee

**Great Google tricks:** 15 amazing tips you never knew before now

Here are some ways you can take action:

## 1. Tweak your phone's location settings

You can prevent iOS and Android from tracking you, but this process isn't intuitive; the feature is buried inside privacy settings, and its default is to record your daily routine. Known as "Frequent Locations," it keeps track of where you are and how long you stay there. It even knows where you live and work based on how long you're there and the number of times you go.

If you find this unsettling, turn the feature off. Here are the basic steps, but depending on your specific model and operating system, you may need to look around a bit.

Turn off location settings on Apple Devices:

1. Click "Settings"
2. Go to "Privacy"

3. Select "Location Services"
4. Scroll down to "System Services"
5. Choose "Significant Locations" to see the logged record of where you've been; de-select this to turn it off

You can also clear your history here by clicking "Clear History."

### **Change location settings on Android Devices:**

1. Open the App Drawer and go to "Settings"
  2. Scroll down and tap "Location"
  3. Scroll down and tap "Google Location Settings"
  4. Tap "Location Reporting" and "Location History" and switch the slider to off
  5. To delete your device's location cache, tap "Delete Location History" at the bottom of the screen under "Location History"
  6. Repeat this process for each Google Account you have on your Android device
- A woman walking on a beach looking at an iPhone X.  
Apple.

## **2. Limit ad tracking**

Ending location tracking may sound extreme, which is why you may prefer to combat the ads themselves. iOS and Android also provide built-in options to minimize and limit ad tracking.

These tools will not wholly stop companies from tracking your phone activities, and they won't limit the number of ads you see, but they will allow you to reset your advertising ID and unlink any targeted advertising profiles that are associated with your particular gadget.

Here's how to limit ad tracking on both iOS and Android:

iPhone, iPad, or iPod Touch - Go to Settings >> Privacy >> Advertising >> Toggle "Limit Ad Tracking" to On. You can also reset your Advertising Identifier in this section to unlink any previous data associated with your ID.

Android – Go to Settings >> Google >> Ads >> Toggle on "Opt out of ads personalization"

3. Stop Google from tracking your every move

Google services have recently come under fire for storing your location data – even if you've tweaked the privacy settings on your iPhone or Android gadgets.

To turn off Google's location tracking for good, try these settings:

Turn off Web and App Activity:

1. Sign in to your Google Account.
2. Click on "Your personal info" in the "Personal info & Privacy" section.
3. On the left-hand pane, click on "Manage your Google Activity" and select "Go To Activity Controls."

Here you can turn off the different types of data that are being saved to your Google account.

Pausing "Location History" doesn't completely turn off Google's location markers. Although it stops Google from adding your movements to your "Timeline," location data is still being saved on your "Web and App Activity."

This fun fact is important. To prevent location markers from being saved, you have to pause your "Web and App Activity" toggle, too. When this feature is paused, activity from all of your Google services won't be saved on your account.

#### **4. Use a private browser on your phone**

Many computer users are familiar with private web browsers. Lesser well-known are the browsers that allow you to search the internet on a mobile device anonymously.

One such app is Mozilla's free Firefox Focus app. This anonymous mobile web browser blocks advertising, analytics and social trackers by default. It also erases passwords and browsing history after each session.

The mobile versions of Google's Chrome and Microsoft's Edge also have incognito and InPrivate modes you can use.

If you don't want a mobile browser that's associated with the big data brokers, you can try the third-party app Dolphin browser.

If you're on a Samsung smartphone, you can also use the company's Samsung Internet app. This browser has a built-in ad tracking blocker that will keep other sites from tracking your online activity.

If you don't like the idea of Google recording all your search terms, alternative engines such as Yippy, DuckDuckGo and Ixquick don't track you as aggressively.

#### **5. Check your online accounts**

The moment you create an account with a major company (e.g. Google, Microsoft or Facebook) you begin feeding them data about your location, personality and preferences. Their algorithms will track your every click, and data will be used for targeted ads or "relevant" posts.

Thankfully, these companies and most advertising firms give you tools to opt out of personalized ad tracking.

Google and Microsoft, for example, have account dashboards for privacy controls and for



checking what it knows about you. Google revamped its ad settings to make it easier for you to understand and limit ad tracking.

Facebook likewise has options for turning off behavioral tracking to keep it from following you around the web. The company is also currently auditing its third-party apps, and they're now more accessible to view and control.

## **6. Opt out of ads**

Believe it or not, you have the power to just opt out of interest-based advertising – or at least most of it. The Digital Advertising Alliance has a consumer choice page that lets you see which of its participating partners is currently using customized ads on your computer.

When you first visit the website, the Alliance will scan your computer. Once the scan is complete, you'll be shown a list of these partners.

From there, you can learn more about the practices these companies use for interest-based ads, and opt-out using "opt-out cookies" that are stored in your browser with your preferences.

It's important to note that doing this won't remove all of the ads that you see online. Advertisers just won't be able to serve you targeted ads.

## **7. Check your virtual assistants**

With the rise of virtual assistants like Siri and Google Assistant, our smartphones are no longer used strictly for calls and chats — we can now use our voices to command these gadgets themselves.

However, when you utter these virtual assistants' wake words, the audio file of your voice command is uploaded and saved to Apple, Amazon or Google's servers for processing.

Chances are, as with any other tracking information, this data is likely anonymized and run through algorithms that look for behavior and patterns that can be used for targeted advertising.

## **8. Control permissions on your apps**

Before you install apps, always check the permissions they will require on their Google Play or Apple App Store app page. Android phones will also give you a rundown of the permission requests upon installation of an app. iOS apps will typically show you a permission access pop-up upon using a feature that requires specific access to your gadget.

Sometimes apps ask for more information than they need. That information can then be sent to companies who might use it for advertising.

This is why checking your app permissions regularly is good practice. Not only will it give you more privacy control and stop apps from potentially from spying and abusing your trust, but it can also weed out apps that are continually running in the background, which can, in turn, improve your gadget's battery life.

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