

# **RSA**®Conference2020

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**HUMAN**  
ELEMENT

SESSION ID: HT-R02

## Creepy Leaky Browsers



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#RSAC

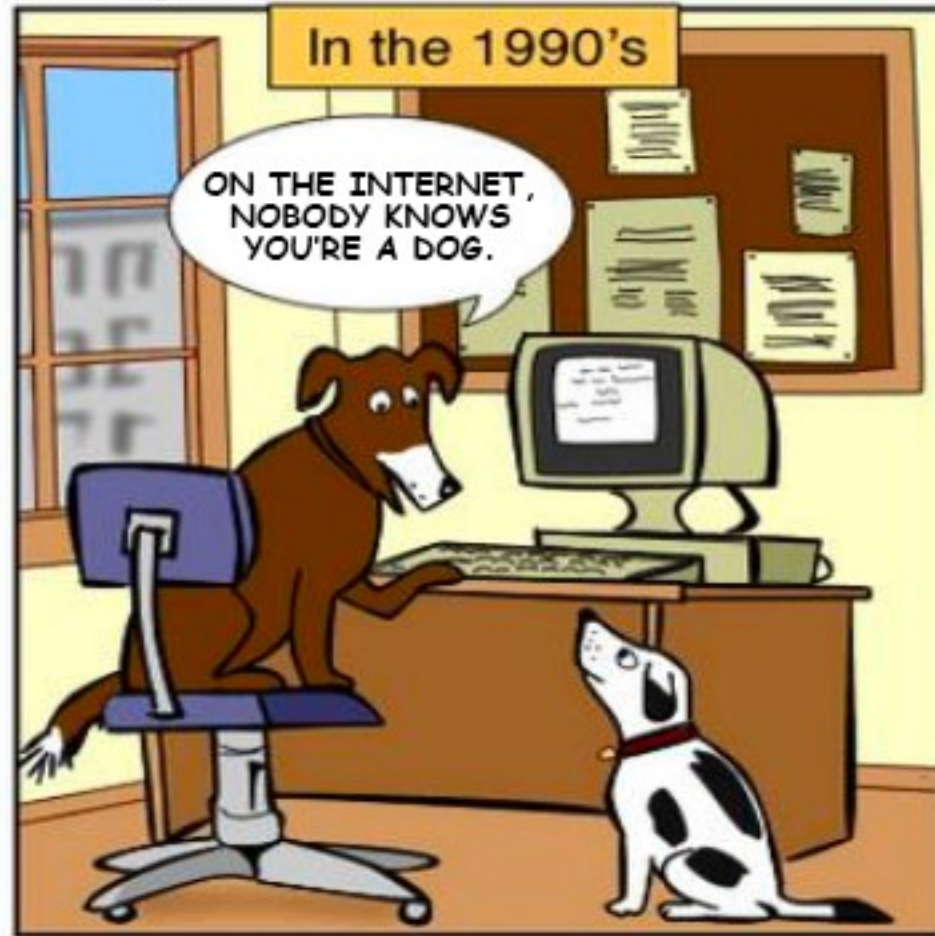
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# Creepy Leaky Browsers

## Part 1: Browser Fingerprinting & Why it Matters

# Then... and now.

## The Joy of Tech™



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joyoftech.com



# What is Browser Fingerprinting?

- A combination of persistent and non-persistent identifiers gathered passively through application programming interfaces built into modern web browsers.
- APIs developed by standards bodies such as W3C define what data attributes browsers should support in order to facilitate seamless cross-platform experiences.



# Why Are Browser Fingerprints Used?



**Digital Marketing** – Online advertisers and merchants utilize fingerprints to target individuals online with digital marketing campaigns.



**User Experience** – Web developers and designers use fingerprints for analytics to build sites that provide a consistent user experience across platforms.



**Return Device Recognition** – Many organizations (B2B & B2C) utilize browser fingerprints to recognize users that are returning to use their product or service online.



**Fraud Prevention** – Banks & Merchants use browser fingerprints to detect and mitigate fraud attacks against their customers.

# Examples of Browser Fingerprint Attributes

## Cookie Based Identifiers

- Session, First Party, Third Party

## Hardware Based Identifiers

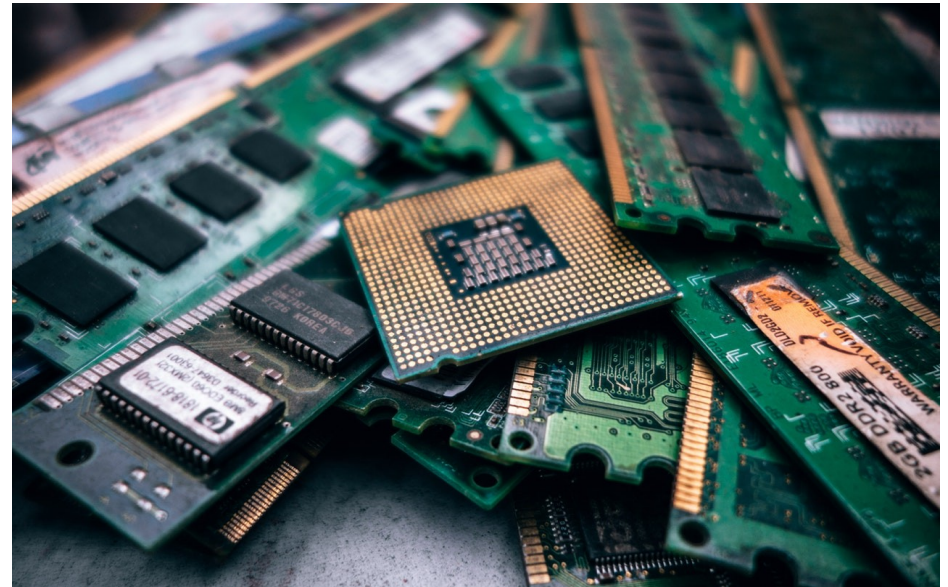
- CPU, GPU, RAM, Screen Res, Sensors

## Network Information

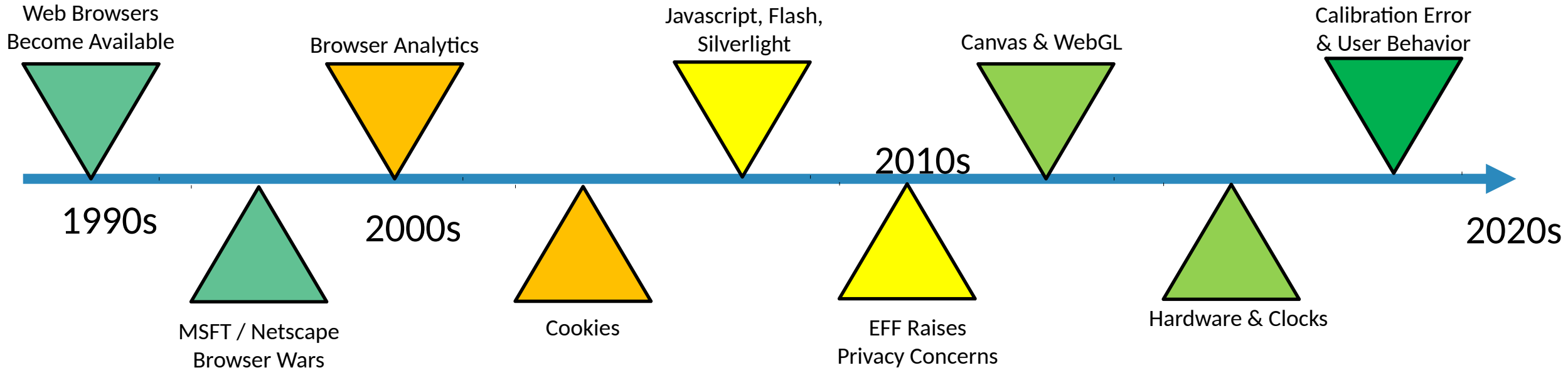
- WAN, LAN, DNS, ISP, Connection Type

## Browser Information

- Type, OS, Version, Javascript, Location, Fonts



# History of Browser Fingerprinting



# Ethics & Privacy

Like any other tool, browser fingerprints can be used for good or bad.

Do the right thing...

- Persistently tracking & identify users for purposes of targeted advertising.  
☐ Is this ethical? Is this invasive?
- Passively fingerprinting devices for purposes of account security & fraud prevention.  
☐ Is this ethical? Is this invasive?
- Persistently tracking users for purposes of data harvesting & re-sale.  
☐ Is this ethical? Is this invasive?



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# Creepy Leaky Browsers

## Part 2: Data Collection & Browser Comparison

# Technology Deep Dive – Network Information



## IP Address Location :

Country	 United States (US)
State/Region	California (CA)
City	San Jose
ISP	VIANET-ASN
ASN	7091
Timezone	America/Los_Angeles
Local Time	Wed, 12 Feb 2020 11:46:44 -0800
Latitude/Longitude	37.2125,-121.8641


## TCP/IP Fingerprint :

OS	Mac OS X
Link	OpenVPN TCP bs128 SHA1 Izo
MTU	1340
Distance	8 Hops

## WebRTC Leak Test :

Local IP address	 192.168.67.18
Public IP address	 157.22.52.100

## DNS Leak Test :

Test Results	Found 1 Server, 1 ISP, 1 Location		
Your DNS Servers	IP Address :	ISP :	Location :
	 157.22.52.100	VIANET-ASN	United States, San Jose

## TLS Fingerprint :

JA3 Hash	0BE8FDD9423BE87F8FCF9A7349F3AD2D
JA3 Fingerprint	772,4865-4866-4867-49195-49199-49196-49200-52393-52392-49171-49172-156-157-47-53-10,0-23-65281-10-11-35-16-5-13-18-51-45-43-27-21,29-23-24,

## Handshake :

TLS Protocol	TLS 1.3 [HTTP/2.0]
Cipher Suite	0x1302 TLS_AES_256_GCM_SHA384

Data shown was collected using  
<https://browserleaks.com>



# Technology Deep Dive – Hardware Information

## Screen Object :

Screen Resolution	1600×900 (Letterboxing) 24-bit TrueColor (viewport: 1585×740)
-------------------	---

## Web Audio API :

API Status	✓ Enabled
State	running
Sample Rate	48000
Max Channel Count	2
Number of Inputs	1
Number of Outputs	0
Channel Count	2
Channel Count Mode	explicit
Channel Interpretation	speakers
FFT Size	2048
Frequency Bin Count	1024
Min Decibels	-100
Max Decibels	-30
Smoothing Time Constant	0.8

## Navigator Object :

platform	MacIntel
oscpu	undefined
hardwareConcurrency	12
deviceMemory	8
maxTouchPoints	0
activeVRDisplays	undefined
webdriver	undefined

## Web Bluetooth API :

API Status	✓ Enabled
Bluetooth Adapter	true

## Battery Status API :

API Status	✓ Enabled
charging	true
chargingTime	0
dischargingTime	Infinity
level	1

## WebRTC Media Devices :

Device Enumeration	✓ True
Has Microphone	✓ True
Has Camera	✓ True

Data shown was collected using  
<https://browserleaks.com>



# Technology Deep-Dive – Environmental Settings

## Date/Time :

System Time	Wed Feb 12 2020 12:45:10 GMT-0800 (Pacific Standard Time)
toLocaleString	2/12/2020, 12:45:10 PM
toLocaleFormat	<i>undefined</i>

## Internationalization API :

DateTimeFormat	Wednesday, February 12, 2020, 12:45:10 PM Pacific Standard Time
hourCycle	h12
locale	en-US
calendar	gregory
numberingSystem	latn
timeZone	America/Los_Angeles
year	numeric
month	numeric
day	numeric

## Navigator Object :

language	en-US
languages	["en-US","en"]
onLine	true
doNotTrack	1
cookieEnabled	true

## JS Fonts (unicode) :

Fingerprint	45B43189																																																	
Report	✓ Unicode Glyphs Measurement																																																	
	<table><tr><td>glyph</td><td>default</td><td>sans-serif</td><td>serif</td><td>monospace</td><td>cursive</td><td>fantasy</td></tr><tr><td>U+20B9</td><td>909,2240</td><td>831,1840</td><td>909,2240</td><td>781,1820</td><td>767,2532</td><td>961,2661</td></tr><tr><td>U+2581</td><td>1600,2240</td><td>1600,2240</td><td>1600,2240</td><td>783,1527</td><td>1600,2532</td><td>1600,2661</td></tr><tr><td>U+20BA</td><td>889,1872</td><td>889,1840</td><td>889,1872</td><td>723,1516</td><td>889,2532</td><td>889,2469</td></tr><tr><td>U+A73D</td><td>1183,2134</td><td>1183,2134</td><td>1183,2134</td><td>961,1734</td><td>1183,2532</td><td>1183,2632</td></tr><tr><td>U+FFFD</td><td>1600,1947</td><td>1600,1915</td><td>1600,1947</td><td>783,1527</td><td>963,2532</td><td>1600,2512</td></tr><tr><td>U+20B8</td><td>905,1946</td><td>889,1840</td><td>905,1946</td><td>735,1576</td><td>905,2532</td><td>905,2511</td></tr></table>	glyph	default	sans-serif	serif	monospace	cursive	fantasy	U+20B9	909,2240	831,1840	909,2240	781,1820	767,2532	961,2661	U+2581	1600,2240	1600,2240	1600,2240	783,1527	1600,2532	1600,2661	U+20BA	889,1872	889,1840	889,1872	723,1516	889,2532	889,2469	U+A73D	1183,2134	1183,2134	1183,2134	961,1734	1183,2532	1183,2632	U+FFFD	1600,1947	1600,1915	1600,1947	783,1527	963,2532	1600,2512	U+20B8	905,1946	889,1840	905,1946	735,1576	905,2532	905,2511
glyph	default	sans-serif	serif	monospace	cursive	fantasy																																												
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U+FFFD	1600,1947	1600,1915	1600,1947	783,1527	963,2532	1600,2512																																												
U+20B8	905,1946	889,1840	905,1946	735,1576	905,2532	905,2511																																												

## JS Fonts (classic) :

Fingerprint	385AAB3C9FB8267B5ACBAE3008D1A015												
Report	✓ 22 fonts and 26 unique metrics found in the list of 512 fonts												
	<p>Fallback Metrics/Fonts:</p> <table> <tbody> <tr> <td>1989,151</td><td>default</td></tr> <tr> <td>2012,147</td><td>sans-serif</td></tr> <tr> <td>2022,147</td><td>serif</td></tr> <tr> <td>1842,148</td><td>monospace</td></tr> <tr> <td>1949,203</td><td>cursive</td></tr> <tr> <td>1910,197</td><td>fantasy</td></tr> </tbody> </table>	1989,151	default	2012,147	sans-serif	2022,147	serif	1842,148	monospace	1949,203	cursive	1910,197	fantasy
1989,151	default												
2012,147	sans-serif												
2022,147	serif												
1842,148	monospace												
1949,203	cursive												
1910,197	fantasy												

## HTML5 Features Detection 314 of 314 features found

### Feature Description :

### Test Result :

hashchange Event	✓ true
History API	✓ true
HTML5 Audio Element	✓ true
Audio Loop Attribute	✓ true
HTML5 Audio ogg vorbis	? probably
HTML5 Audio mp3	? probably

Data shown was collected using  
<https://browserleaks.com>





# Technology Deen-Dive – Graphics Processing

## WebGL Support Detection :

This browser supports WebGL	✓ True
This browser supports WebGL 2	✓ True (88 of 88 new functions implemented) <a href="#">more</a>


## WebGL Context Info :

Supported Context Name(s)	<b>webgl2</b> , <a href="#">webgl</a> , <a href="#">experimental-webgl</a>
GL Version	WebGL 2.0 (OpenGL ES 3.0 Chromium)
Shading Language Version	WebGL GLSL ES 3.00 (OpenGL ES GLSL ES 3.0 Chromium)
Vendor	WebKit
Renderer	WebKit WebGL
Antialiasing	True
ANGLE	False
Major Performance Caveat	False

## Debug Renderer Info :

Unmasked Vendor	! ATI Technologies Inc.
Unmasked Renderer	! AMD Radeon Pro 560X OpenGL Engine

## WebGL Fingerprint :

WebGL Report Hash	4EBE36E9671940A9F2EF9E9E4AFD6269
WebGL Image Hash	64EE65DF39A579A4A5804FAFD339860E
WebGL Image	

## Canvas Support in Your Browser :

Canvas (basic support)	✓ True
Text API for Canvas	✓ True
Canvas toDataURL	✓ True

## Database Summary :

Unique User-Agents	528769
Unique Fingerprints	13830

## Your Fingerprint :

Signature	✓ 927DA0D7
Uniqueness	99.98% (102 of 528769 user agents have the same signature)

# Technology Deep Dive – Sensor Data

## "ambient-light"

A [mock sensor type](#) associated with the usage of the [AmbientLightSensor](#) interface.

## "accelerometer"

A [mock sensor type](#) associated with the usage of the [Accelerometer](#) interface.

## "linear-acceleration"

A [mock sensor type](#) associated with the usage of the [LinearAccelerationSensor](#) interface.

## "gravity"

A [mock sensor type](#) associated with the usage of the [GravitySensor](#) interface.

## "gyroscope"

A [mock sensor type](#) associated with the usage of the [Gyroscope](#) interface.

## "magnetometer"

A [mock sensor type](#) associated with the usage of the [Magnetometer](#) interface.

## "uncalibrated-magnetometer"

A [mock sensor type](#) associated with the usage of the [UncalibratedMagnetometer](#) interface.

## "absolute-orientation"

A [mock sensor type](#) associated with the usage of the [AbsoluteOrientationSensor](#) interface.

## "relative-orientation"

A [mock sensor type](#) associated with the usage of the [RelativeOrientationSensor](#) interface.

## "geolocation"

A [mock sensor type](#) associated with the usage of the [GeolocationSensor](#) interface.

## "proximity"

A [mock sensor type](#) associated with the usage of the [ProximitySensor](#) interface.

```
[Constructor(optional GeolocationSensorOptions options = {}),
SecureContext,
Exposed=(DedicatedWorker, Window)]
interface GeolocationSensor : Sensor {
    static Promise<GeolocationSensorReading> read(optional ReadOptions readOptions = {});
    readonly attribute unrestricted double? latitude;
    readonly attribute unrestricted double? longitude;
    readonly attribute unrestricted double? altitude;
    readonly attribute unrestricted double? accuracy;
    readonly attribute unrestricted double? altitudeAccuracy;
    readonly attribute unrestricted double? heading;
    readonly attribute unrestricted double? speed;
};
```

```
[SecureContext, Exposed=Window]
interface Accelerometer : Sensor {
    constructor(optional AccelerometerSensorOptions options = {});
    readonly attribute double? x;
    readonly attribute double? y;
    readonly attribute double? z;
};
```

Data shown was collected  
from <https://w3.org>





# Browser Comparison

		Mac OSX			Windows 10			Android 10		
		Firefox OSX	Chrome OSX	Safari OSX	Firefox Win10	Chrome Win10	Edge Win10	Chrome on Android	Firefox on Android	Edge on Android
Navigator Object	User Agent	Mozilla/5.0 (Macintosh; Intel Mac OS X 10.15; rv:71.0) Gecko/20100101 Firefox/71.0	Mozilla/5.0 (Macintosh; Intel Mac OS X 10_15_2) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/79.0.3945.88 Safari/537.36	Mozilla/5.0 (Macintosh; Intel Mac OS X 10_15_2) AppleWebKit/605.1.15 (KHTML, like Gecko) Version/13.0.4 Safari/605.1.15	Mozilla/5.0 (Windows NT 10.0; Win64; x64; rv:71.0) Gecko/20100101 Firefox/71.0	Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/79.0.3945.88 Safari/537.36	Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/70.0.3538.102 Safari/537.36 Edge/18.18362	Mozilla/5.0 (Linux; Android 10; Pixel 3a XL) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/79.0.3945.93 Mobile Safari/537.36	Mozilla/5.0 (Android 10; Mobile; rv:68.0) Gecko/68.0 Firefox/68.0	Mozilla/5.0 (Linux; Android 10; Pixel 3a XL) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/73.0.3683.90 Mobile Safari/537.36 EdgA/42.0.4.4062
	App Version	5.0 (Macintosh)	5.0 (Macintosh; Intel Mac OS X 10_15_2) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/79.0.3945.88 Safari/537.36	5.0 (Macintosh; Intel Mac OS X 10_15_2) AppleWebKit/605.1.15 (KHTML, like Gecko) Version/13.0.4 Safari/605.1.15	5.0 (Windows)	5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/79.0.3945.88 Safari/537.36	5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/70.0.3538.102 Safari/537.36 Edge/18.18362	5.0 (Linux; Android 10; Pixel 3a XL) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/79.0.3945.93 Mobile Safari/537.36	5.0 (Android 10)	5.0 (Linux; Android 10; Pixel 3a XL) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/73.0.3683.90 Mobile Safari/537.36 EdgA/42.0.4.4062
	App Name	Netscape	Netscape	Netscape	Netscape	Netscape	Netscape	Netscape	Netscape	Netscape
	App Code Name	Mozilla	Mozilla	Mozilla	Mozilla	Mozilla	Mozilla	Mozilla	Mozilla	Mozilla
	product	Gecko	Gecko	Gecko	Gecko	Gecko	Gecko	Gecko	Gecko	Gecko
	product sub	20100101	20030107	20030107	20100101	20030107	20030107	20030107	20181001000000	20030107
	vendor	empty	Google Inc.	Apple Computer, Inc.	empty	Google Inc.	empty	Google Inc.	empty	Google Inc.
	vendor sub	empty	empty	empty	empty	empty	empty	empty	empty	empty
	platform	MacIntel	MacIntel	MacIntel	win32	win32	Win32	Linux armv8l	Linux aarch64	Linux aarch64
	oscpu	Intel Mac OS X 10.15	n/a	n/a	Windows NT 10.0; Win64; x64	n/a	n/a	n/a	Linux aarch64	n/a
	hardware concurrency	6	12	n/a	12	12	12	8	8	8
	deviceMemory	N/A	8	n/a	n/a	8	n/a	4	n/a	4

Data shown was collected using  
<https://browserleaks.com>



# Browser Comparison

		Mac OSX			Windows 10			Android 10		
		Firefox OSX	Chrome OSX	Safari OSX	Firefox Win10	Chrome Win10	Edge Win10	Chrome on Android	Firefox on Android	Edge on Android
Battery API	Status	FALSE	TRUE	FALSE	FALSE	TRUE	FALSE	TRUE	FALSE	TRUE
	Battery is Charging	n/a	FALSE	n/a	n/a	TRUE	n/a	FALSE	n/a	FALSE
	Battery Charging Time	n/a	Infinity	n/a	n/a	Infinity	n/a	infinity	n/a	Infinity
	Battery Discharging Time	n/a	16800	n/a	n/a	Infinity	n/a	2	n/a	2
	Battery Level	n/a	84%	n/a	n/a	31%	n/a	65%	n/a	65%
Network API	Status	FALSE	W3C	FALSE	FALSE	W3C	FALSE	W3C	W3C	W3C
	effectiveType	n/a	4G	n/a	n/a	4g	n/a	4g	n/a	4g
	rtt	n/a	50	n/a	n/a	50	n/a	150	n/a	150
	downlink	n/a	1.45	n/a	n/a	1.6	n/a	1.6	n/a	10
	saveData	n/a	FALSE	n/a	n/a	FALSE	n/a	FALSE	n/a	FALSE
Web Bluetooth API	Status	FALSE	TRUE	FALSE	FALSE	TRUE	FALSE	TRUE	FALSE	TRUE
	Bluetooth Adapter	n/a	available	n/a	n/a	not available	n/a	available	n/a	?
Web Audio API	Status	suspended	suspended	suspended	suspended	running	running	running	suspended	running
	Sample Rate	44100	44100	44100	48000	48000	48000	48000	48000	48000
	Max Channel Count	2	2	0	2	2	2	2	2	2
	# of Inputs	1	1	1	1	1	1	1	1	1
	# of Outputs	0	0	0	0	0	0	0	0	0
	Channel Count	2	2	2	2	2	2	2	2	2
	Channel Mode	explicit	explicit	explicit	explicit	explicit	explicit	explicit	explicit	explicit
	Channel Interpretation	speakers	speakers	speakers	speakers	speakers	speakers	speakers	speakers	speakers
	FFT Size	2048	2048	2048	2048	2048	2048	2048	2048	2048
	Frequency Bin Count	1024	1024	1024	1024	1024	1024	1024	1024	1024
	Min Decibels	-100	-100	-100	-100	-100	-100	-100	-100	-100
	Max Decibels	30	-30	-30	-30	-30	-30	-30	-30	-30



# Browser Comparison

		Mac OSX			Windows 10			Android 10		
		Firefox OSX	Chrome OSX	Safari OSX	Firefox Win10	Chrome Win10	Edge Win10	Chrome on Android	Firefox on Android	Edge on Android
WebGL Support	WebGL	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
	WebGL 2	TRUE	TRUE	TRUE	TRUE	FALSE	FALSE	TRUE	TRUE	TRUE
	WebGL 2 Report	88 / 88	88/88	88 / 88	88/88	n/a	n/a	88 / 88	88 / 88	88 / 88
WebGL Context	Supported Contexts	webgl2, webgl, experimental-webgl	webgl2, webgl, experimental-webgl	webgl2, webgl, experimental-webgl	webgl2, webgl, experimental-webgl	webgl, experimental-webgl	webgl, experimental-webgl	webgl2, webgl, experimental-webgl	webgl2, webgl, experimental-webgl	webgl2, webgl, experimental-webgl
	GL Version	WebGL 2.0	WebGL 2.0	WebGL 2.0 (OpenGL ES 3.0 Chromium)	WebGL 2.0 (OpenGL ES 3.0 Chromium)	WebGL 1.0	WebGL 1.0	WebGL 2.0 (OpenGL ES 3.0 Chromium)	WebGL 2.0	WebGL 2.0
	Shading Language Version	WebGL GLSL ES 3.00	WebGL GLSL ES 3.00	WebGL GLSL ES 3.00 (OpenGL ES GLSL ES 3.0 Chromium)	WebGL GLSL ES 3.00 (OpenGL ES GLSL ES 3.0 Chromium)	WebGL GLSL ES 1.0 (1.20)	WebGL GLSL ES 1.0	WebGL GLSL ES 3.00 (OpenGL ES GLSL ES 3.0 Chromium)	WebGL GLSL ES 3.00	WebGL GLSL ES 3.00
	Vendor	Mozilla	Mozilla	WebKit	WebKit	Webkit	Microsoft	WebKit	Mozilla	Mozilla
	Renderer	Mozilla	Mozilla	WebKit WebGL	WebKit WebGL	Webkit WebGL	Microsoft Edge	WebKit WebGL	Mozilla	Mozilla
	Antialiasing	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	FALSE
	ANGLE	FALSE	True, Direct3D 11	FALSE	TRUE, Direct3D 11	FALSE	FALSE	FALSE	FALSE	FALSE
	Major Performance Caveat	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE
Debug Renderer	Unmasked Vendor	ATI Technologies Inc.	Google Inc.	ATI Technologies Inc.	Google Inc.	ATI Technologies Inc.	Microsoft	Qualcomm	Qualcomm	Qualcomm
	Unmasked Renderer	AMD Radeon Pro 560X OpenGL Engine	ANGLE (Radeon Pro 560X Direct3D11 vs_5_0 ps_5_0)	AMD Radeon Pro 560X OpenGL Engine	ANGLE (Radeon Pro 560X Direct3D11 vs_5_0 ps_5_0)	AMD Radeon Pro 560X OpenGL Engine	ANGLE (Radeon Pro 560X Direct3D11 vs_5_0 ps_5_0)	Adreno (TM) 615	Adreno (TM) 615	Adreno (TM) 615

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# Creepy Leaky Browsers

## Part 3: Examples & Recommendations



# Privacy - Hiding In the Herd





# Privacy - Being “Invisible”

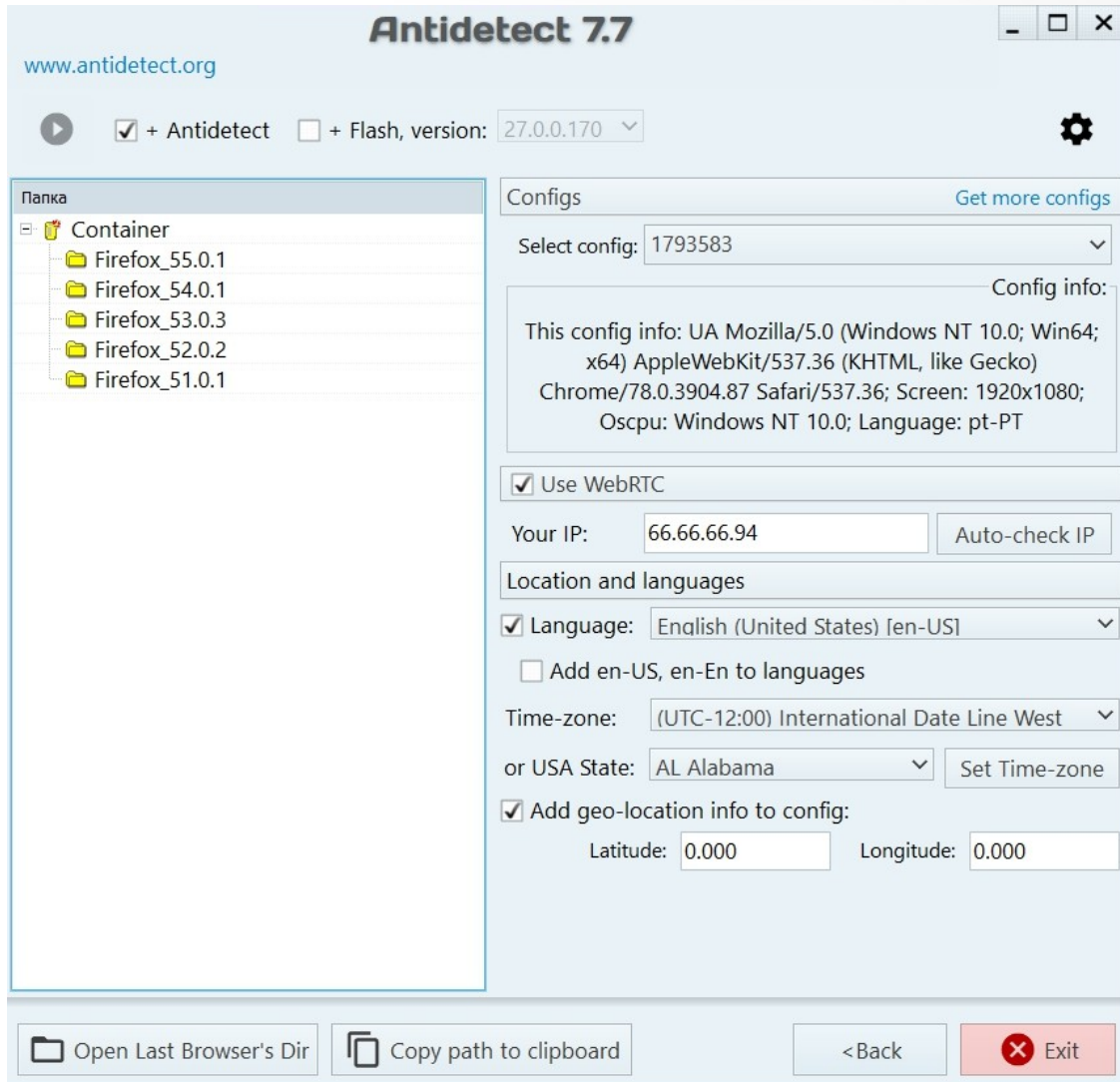




# Privacy – Wolves Among the Sheep



# Tools Bad Guys Use - Antidetect



## Antidetect 8

Latest version from **December 2019**

**Private software.** Powerful chrome antidetect. Fonts generator. Canvas cloud fingerprint technology. Free configs. Personal support for you. Price is \$2999. Requires \$100 monthly payment for service. Please don't buy before you know what is it. Contact support for more details.

**To have the best fingerprint-bypass tool its like to print your own money (C)**

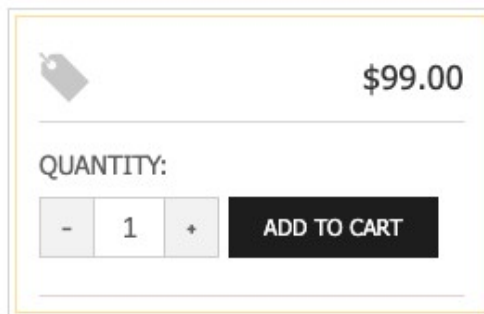


# Tools Bad Guys Use - FraudFox

## FRAUDFOX VM

**FraudFox** is the all-in-one tool for user-agent and device spoofing and perhaps the most advanced and fully detailed virtual machine on its class ever created. More than simple user-agent editing, **FraudFox** offers a lot more features such as device details manipulation via the VM console, changing the network footprint via obfuscate button, and a lot more.

Category: **SUBSCRIPTION** Tags: **anti fingerprint**, **antidetec**, **fraudfox**, **fraudfox vm**, **spoof id**



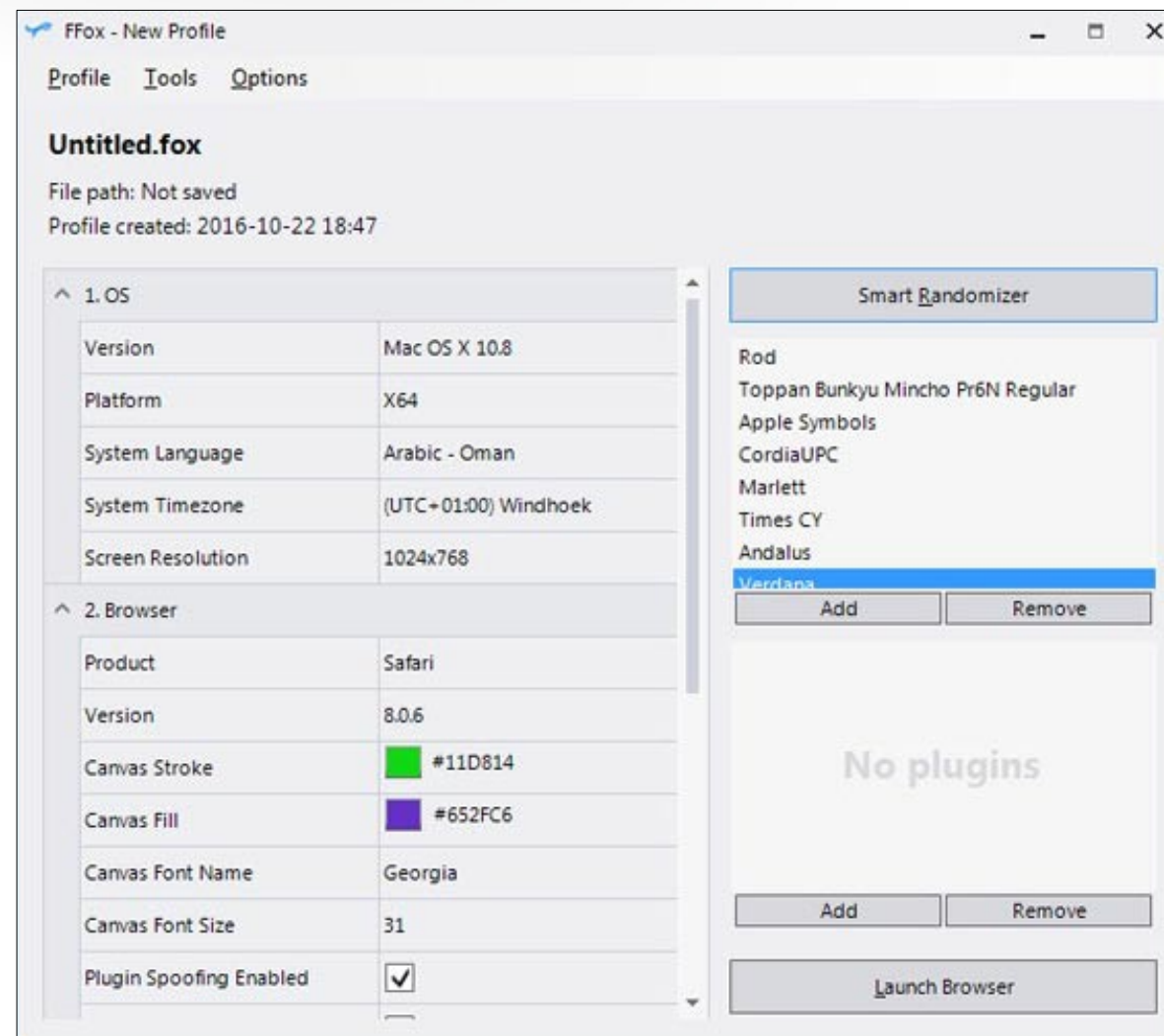
## POPULAR ITEMS THIS WEEK



PAYPAL MIDDLEMAN  
ACCOUNT (GB)  
\$5.00



PAYPAL MIDDLEMAN  
ACCOUNT (FRANCE)  
\$5.00



# Tools Bad Guys Use - Sphere

Session setup

Privacy change name

NEW Identity name

☒ Load start page after setup

comments

Network connectivity settings

SSH Tunnel 108.61.171.250 22 testftp testftp Custom DNS

Timezone and language settings

+0200 UTC-02:00 DE de-DE,de;q=0.8,en;q=0.6

☒ Save and encrypt cookie before exit

☒ Enable and store local data

☐ Use dynamic fingerprint

Delete Save

My identities

Search identity  ☐ Search word contains

#	Identity name ^	Platform	Proxy	Comments	Created	Last used
<input type="checkbox"/>	Anonymity	MacIntel	No proxy		2018-06-06 12:32:40	2018-6-6 12:32:42 / used 1 day(s)
<input type="checkbox"/>	Free	Linux i686	100.37.253.46	100.37.253.46:2222 user:live	2018-06-06 11:58:25	2018-6-28 10:05:39 / used 2 day(s)
<input type="checkbox"/>	Freedom	Win32	96.244.139.130		2018-06-06 12:45:30	2018-6-28 11:05:45 / used 2 day(s)
<input checked="" type="checkbox"/>	Privacy	MacIntel	108.61.171.250		2018-06-06 05:55:07	2018-6-6 11:55:39 / used 1 day(s)
<input type="checkbox"/>	Safety	Win32	158.255.3.112	158.255.3.112:56035 buyer_newclick_gmail_com:3rOsGM	2018-06-06 12:39:29	2018-7-2 02:12:02 / used 3 day(s)



## Hundreds of new identities just in one click

The browser has systems for protection and fingerprint substitution (GPU, Audio, Canvas, Plugins, Fonts, ClientRects, Ubercookies) automatically changing them for each new identity. Nobody can recognize configuration of your real computer if you surf with Sphere – it protects you against any identification attempt.



## OTR-mode

Sphere operates in Off-the-Record mode – during software operation all current files and data are saved in RAM till its closure. Thus, it is impossible to get access to information about visited sites and activities in them even using spying solutions (viruses) installed directly on the computer.



## Anonymity in the Internet

The software allows you easily substitute your IP-address using, e.g., TOR. The users who do not trust an onion network can make use of multiflow SOCKS and SSH connections. You are everywhere and nowhere at the same time.












# Recommendations – For Industry



- Collaborate
- Develop Standards
- Minimalistic Approach
- Work With Browser Manufacturers
- “Do the right thing”

# Recommendations – For Users

- Keep Current
- Identify Your Footprint
- Consider Using 3<sup>rd</sup> Party Tools
- Opt-out When Appropriate
- Randomize Advertiser IDs

Extension	Description
 uBlock Origin	An efficient ad and tracker blocker with a small performance footprint!
 Ghostery	Protect your privacy by blocking trackers on the Web and by learning who is watching you!
 HTTPS Everywhere	Encrypt the web! Enable HTTPS automatically on websites that are known to support it. A project by the EFF (Electronic Frontier Foundation). This extension includes an option to verify SSL certificates directly by <a href="#">the EFF SSL Observatory</a> .
 Lightbeam	Visualize in details the servers you are contacting when you are surfing on the Internet! Developed by Mozilla. <a href="#">Presentation of Lightbeam</a> by Gary Kovacs, former CEO of Mozilla, in a TED talk.
 AdBlock Plus	Block advertisements, trackers and more! We recommend the use of additional lists like the <a href="#">Fanboy Complete AdBlock list</a> .
 Disconnect	Stop tracking by third-party sites and visualize who is tracking you!
 Privacy Badger	Block spying ads and invisible trackers! A project by the EFF (Electronic Frontier Foundation).
 NoScript	Take control of what is running in your browser by blocking unwanted scripts!
 Self-Destructing Cookies	Remove cookies that are no longer used as soon as you close a tab!

<https://amiunique.org/tools>

# Recommendations – For Browser Vendors

- Be Proactive, Not Reactive
- Work with Industry
- Advanced Notification
- Consider Fraud Prevention
- Consider Conflicts of Interest





# Thank You

