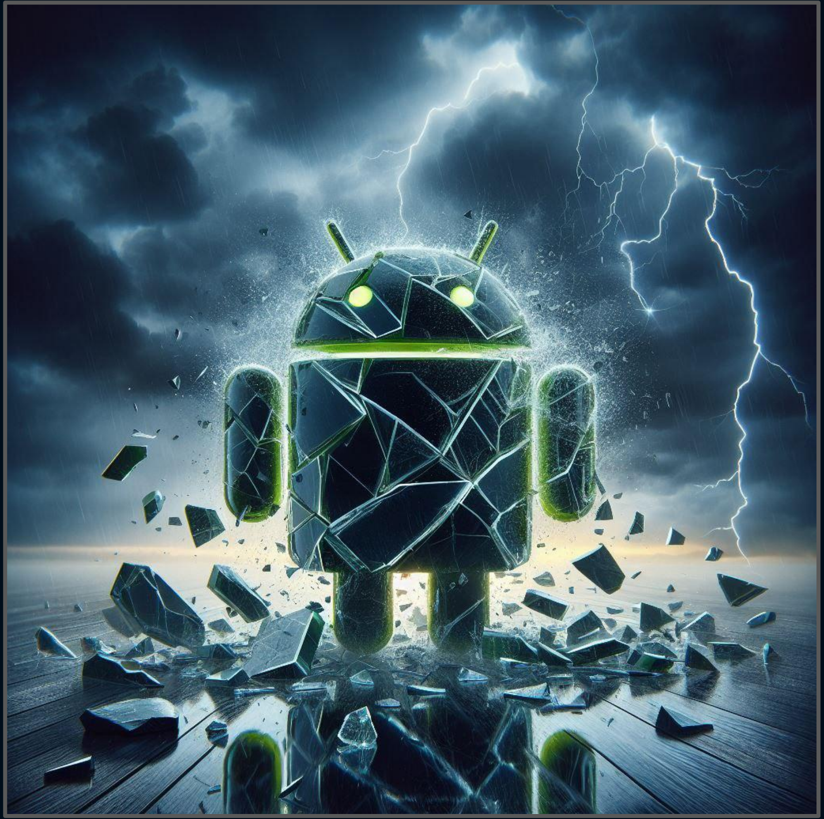
Android Automotive,
the Real Android Fragmentation

Juhani Lehtimäki

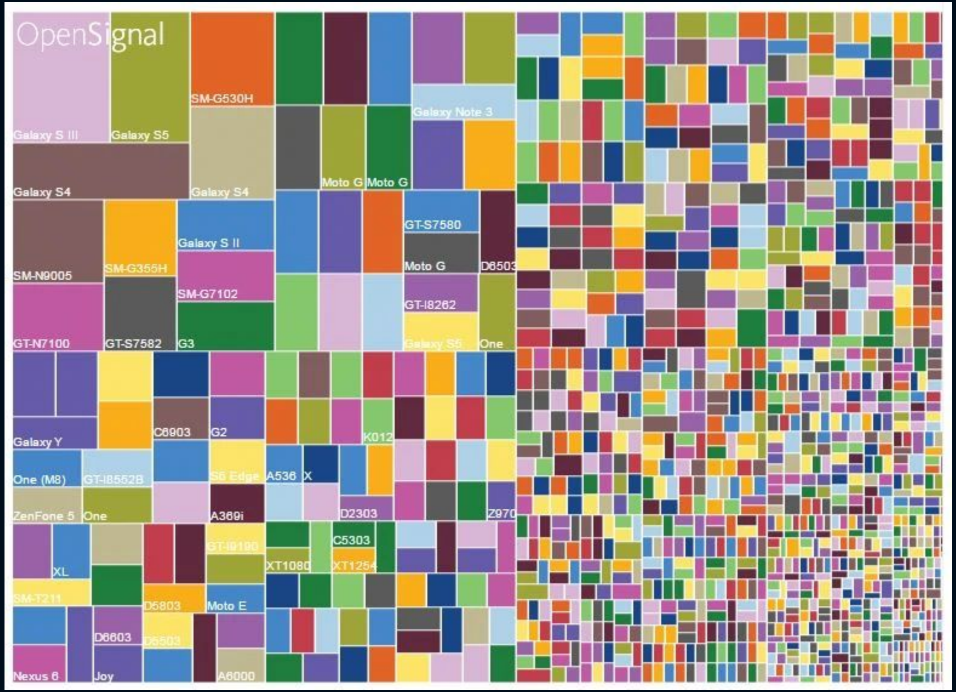
Snapp Automotive

This presentation contains AI generated images

What is Fragmentation?



Remember this?



Android version

Input method

Screen size

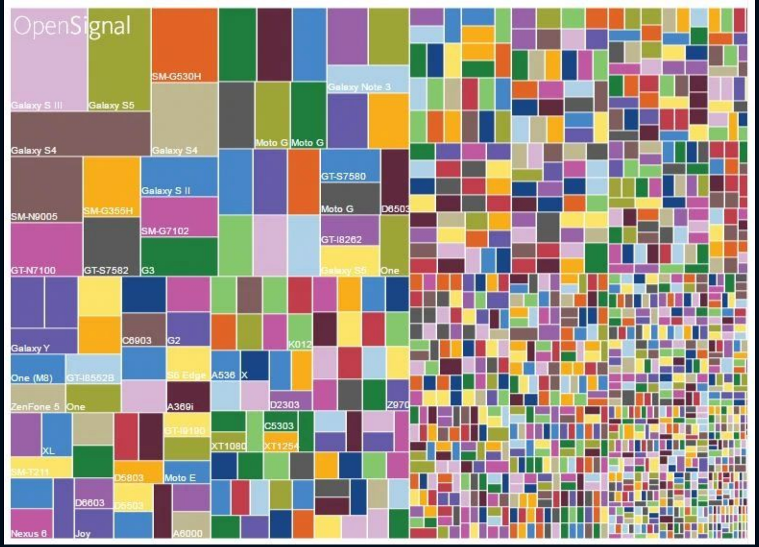
Screen density

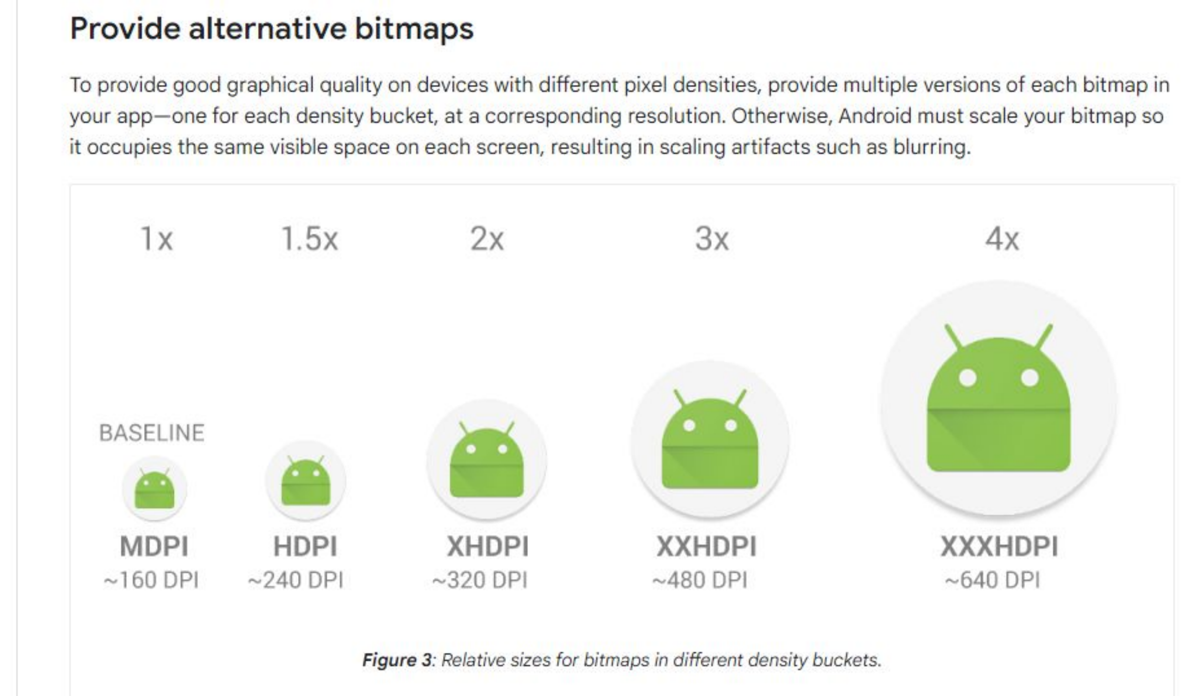
CPU/GPU power

Camera specs

Connectivity

Why wasn’t this a problem?

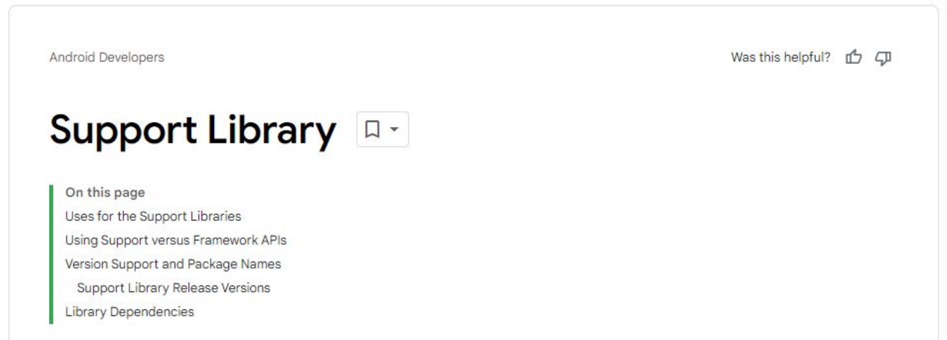




Provide alternative bitmaps

To provide good graphical quality on devices with different pixel densities, provide multiple versions of each bitmap in your app—one for each density bucket, at a corresponding resolution. Otherwise, Android must scale your bitmap so it occupies the same visible space on each screen, resulting in scaling artifacts such as blurring.

***Figure 3**: Relative sizes for bitmaps in different density buckets.*



Android Developers

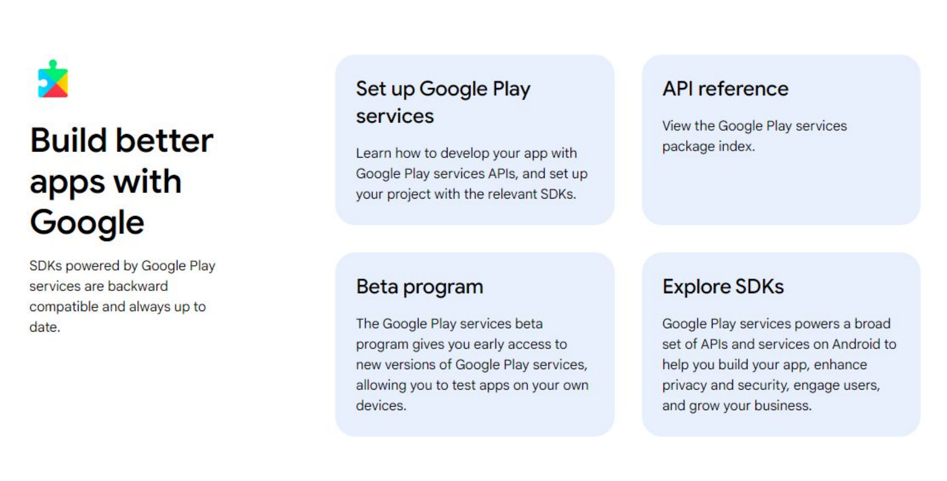
Was this helpful?

Support Library

On this page

- Uses for the Support Libraries
- Using Support versus Framework APIs
- Version Support and Package Names
  - Support Library Release Versions
- Library Dependencies

and



Build better apps with Google

SDKs powered by Google Play services are backward compatible and always up to date.

Set up Google Play services

Learn how to develop your app with Google Play services APIs, and set up your project with the relevant SDKs.

API reference

View the Google Play services package index.

Beta program

The Google Play services beta program gives you early access to new versions of Google Play services, allowing you to test apps on your own devices.

Explore SDKs

Google Play services powers a broad set of APIs and services on Android to help you build your app, enhance privacy and security, engage users, and grow your business.

Automotive. Hello World.

Historically

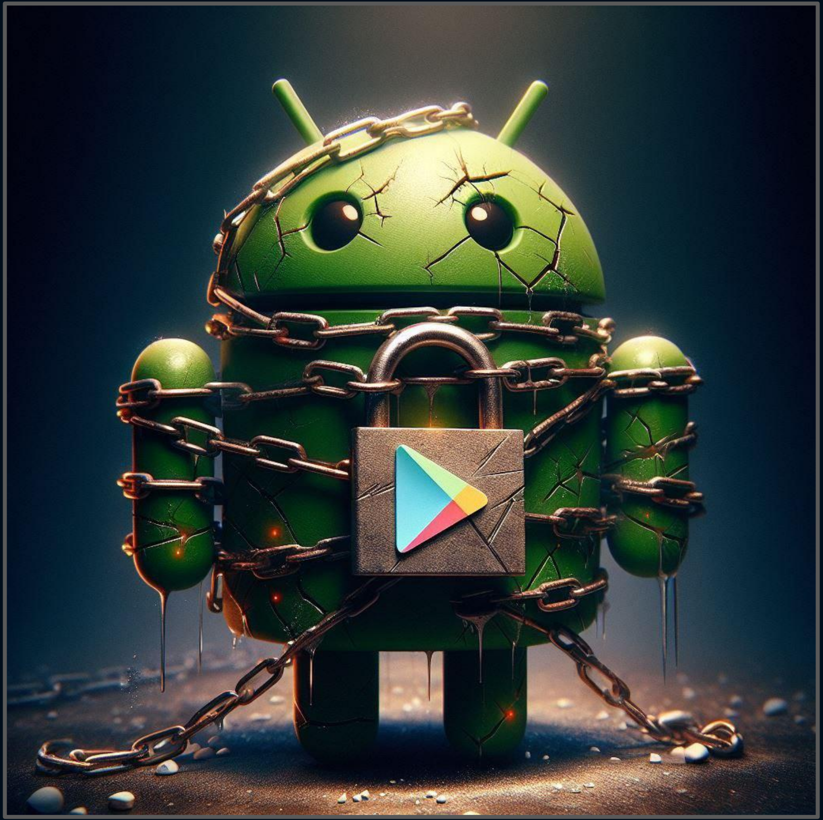
Automotive + Android = Apps?

Android the OS

vs.

Android App Ecosystem

GAS is (might be) a trap



BMW

Real Fragmentation

=

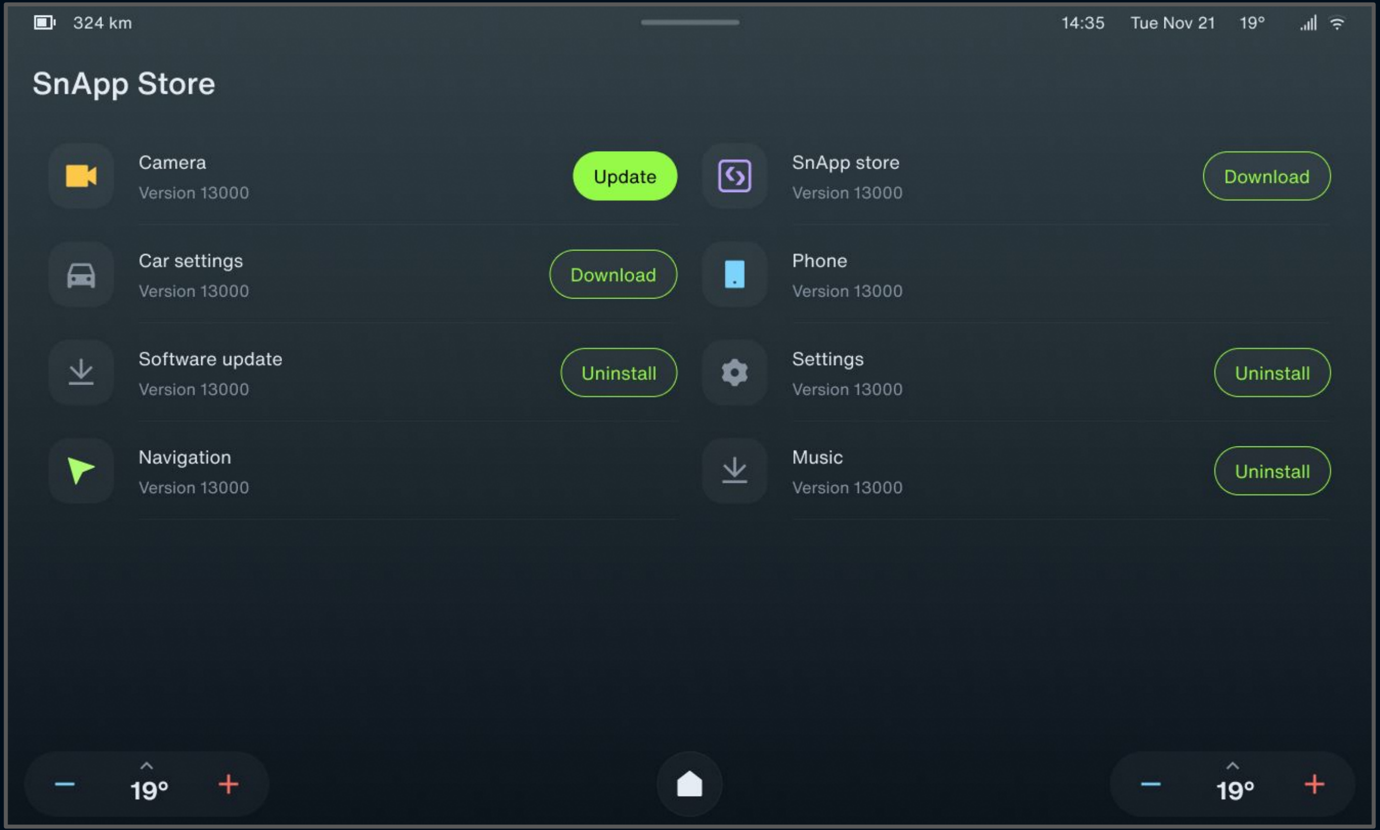
same code not working across
similar devices

HARMAN

IgniteStore

faurecia aptoide

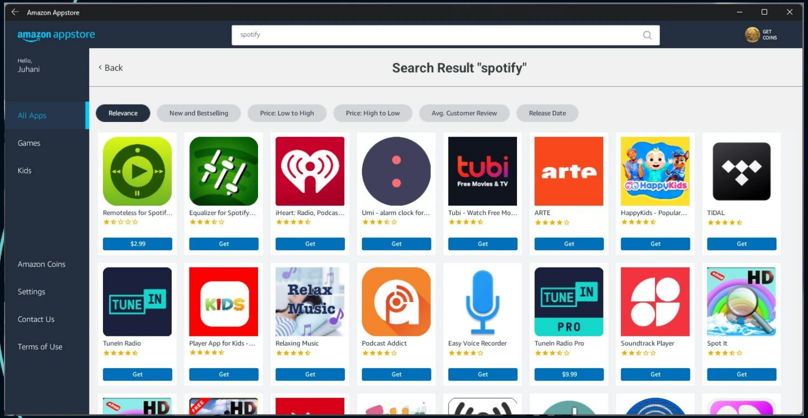
Automotive App Store

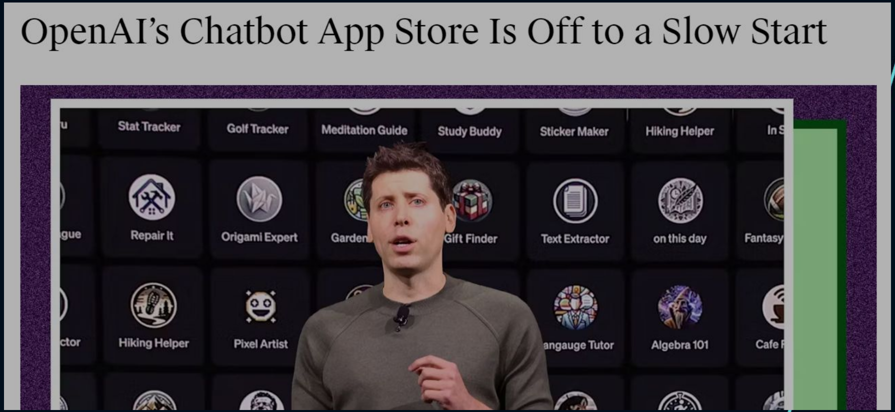


SnApp Store

App	Version	
Camera	Version 13000	Update
SnApp store	Version 13000	Download
Car settings	Version 13000	Download
Phone	Version 13000	
Software update	Version 13000	Uninstall
Settings	Version 13000	Uninstall
Navigation	Version 13000	
Music	Version 13000	Uninstall

Ecosystems are hard



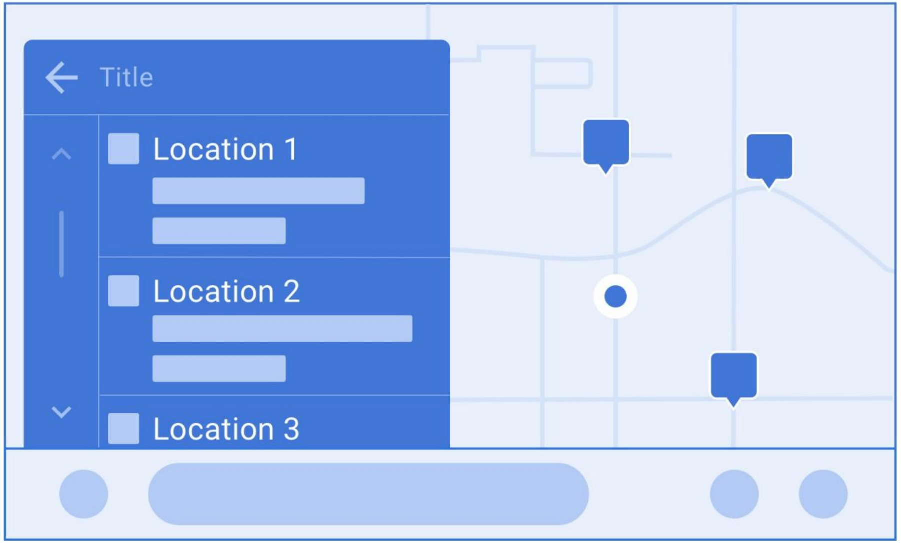


OpenAI's Chatbot App Store Is Off to a Slow Start

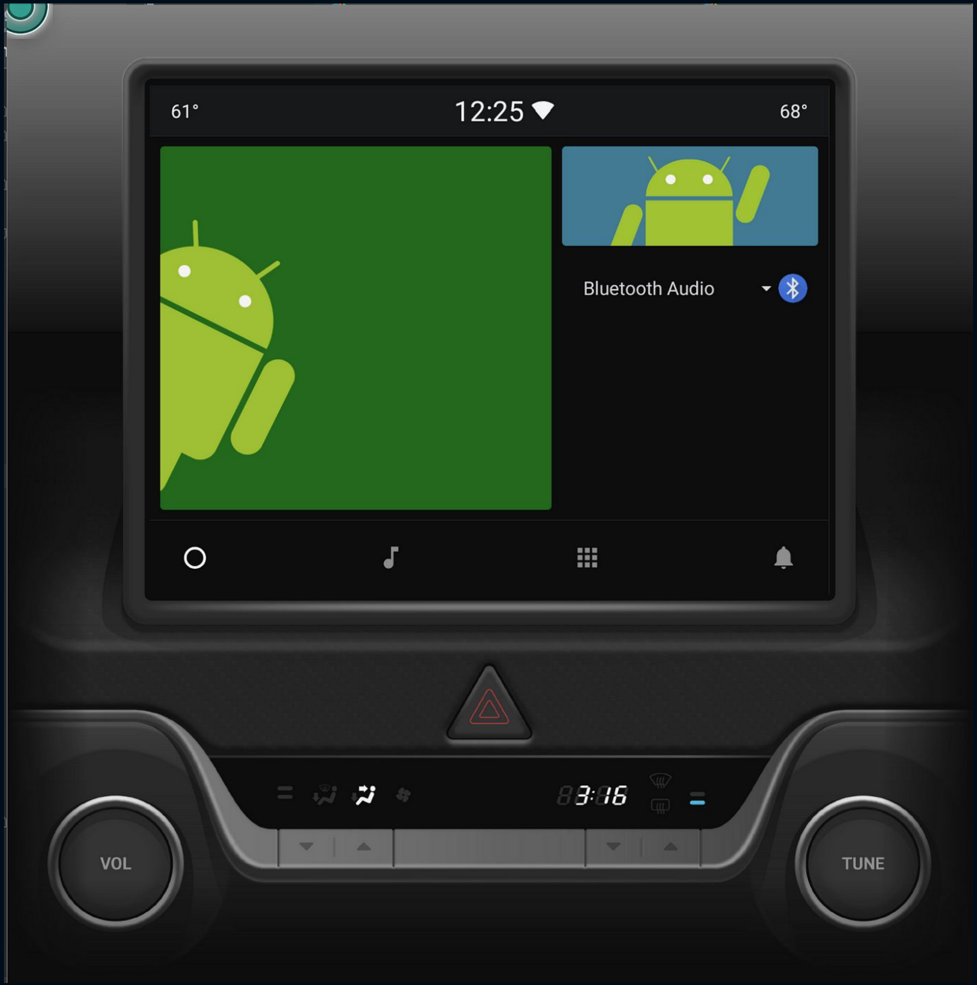
Building apps for cars, in real life

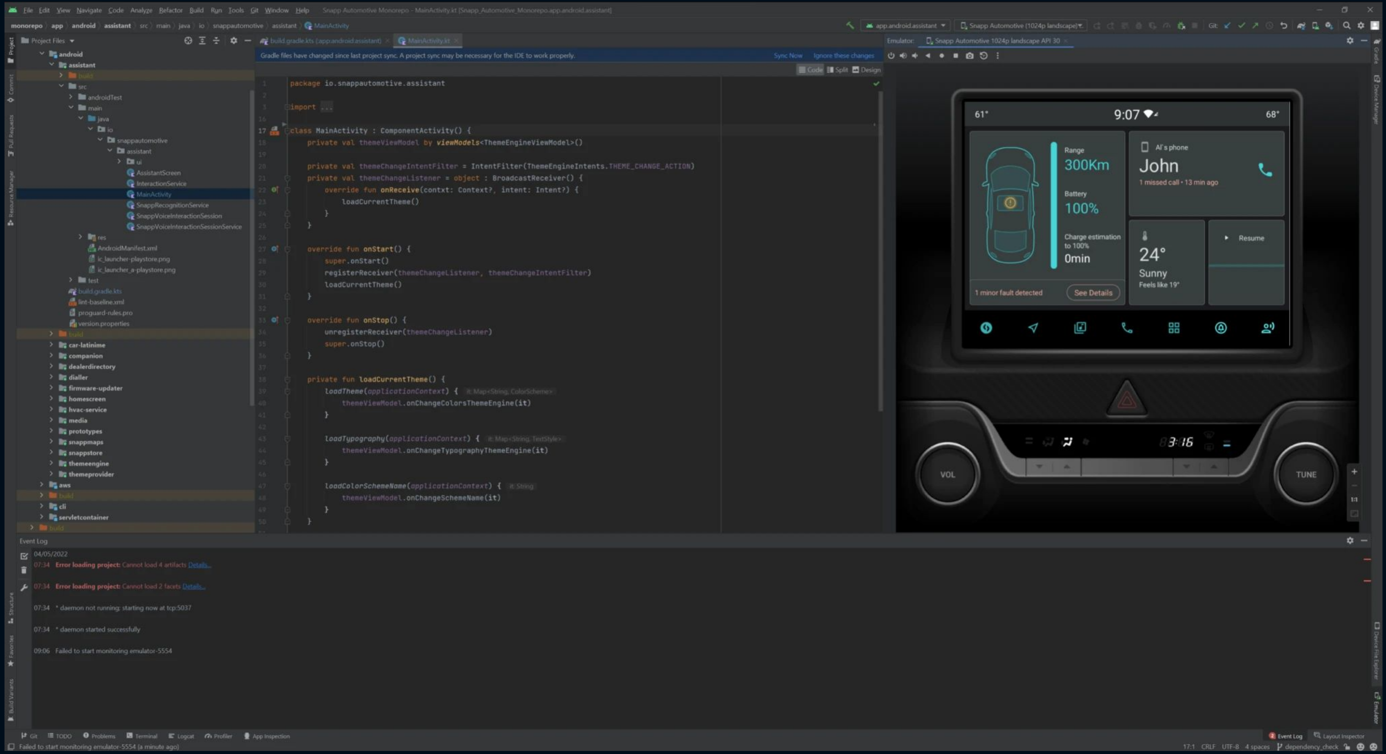
Place List template

Presents an ordered list of up to 6 locations



androidauto


61°
12:25
68°
Bluetooth Audio
3:16
VOL
TUNE

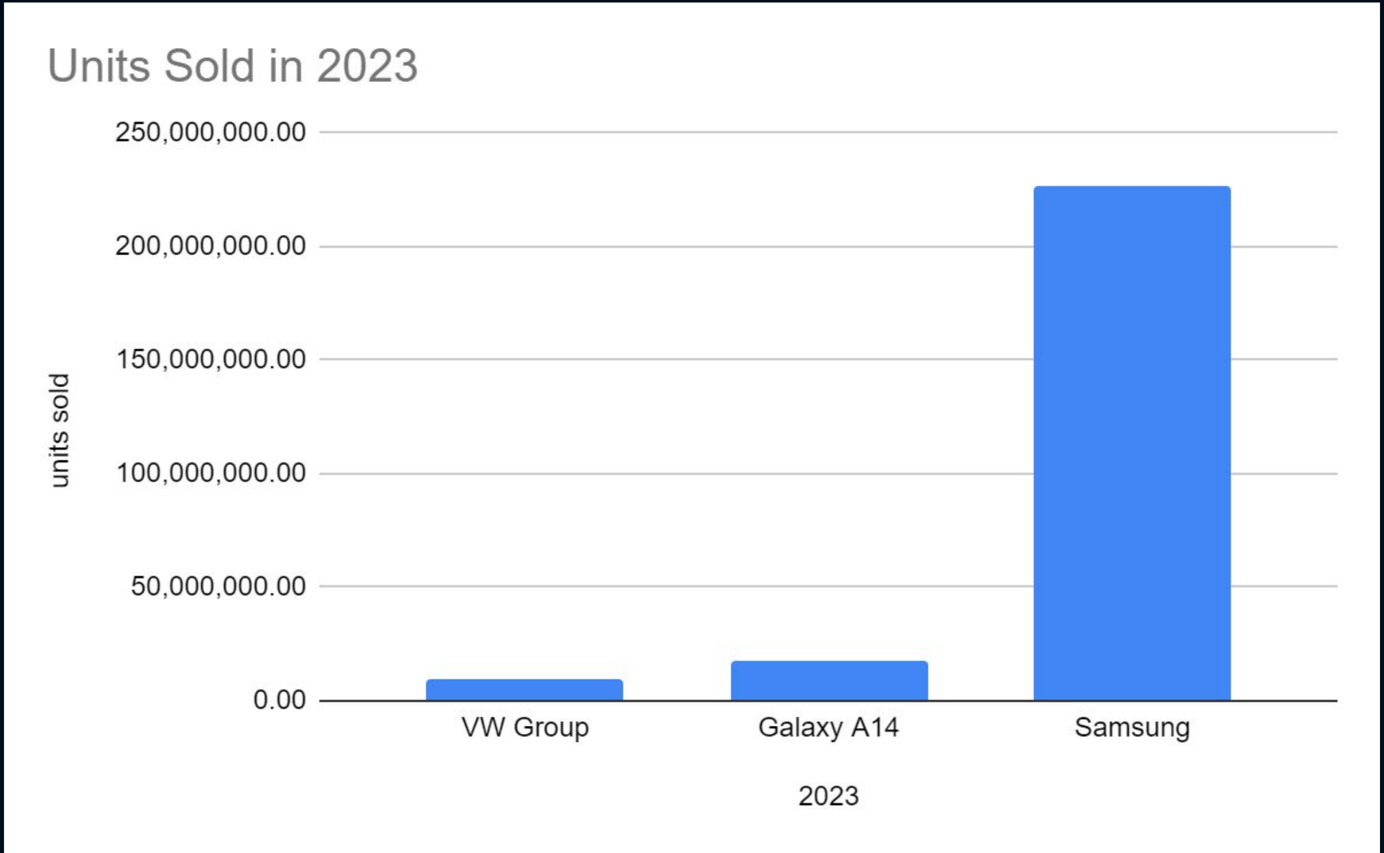

Snapp Automotive Monorepo - MainActivity.kt [Snapp_Automotive_Monorepo.app.android.assistant]
monorepo › app › android › assistant › src › main › java › io › snappautomotive › assistant › MainActivity
build.gradle.kts (:app:android:assistant)
MainActivity.kt
Emulator: Snapp Automotive 1024p landscape API 30
Code
Split
Design
Sync Now
Ignore these changes
61°
9:07
68°
Range
300Km
Battery
100%
Charge estimation to 100%
0min
1 minor fault detected
See Details
Al's phone
John
1 missed call • 13 min ago
24°
Sunny
Feels like 19°
Resume
VOL
TUNE
Git
TODO
Problems
Terminal
Logcat
Profiler
App Inspection
Event Log
Layout Inspector

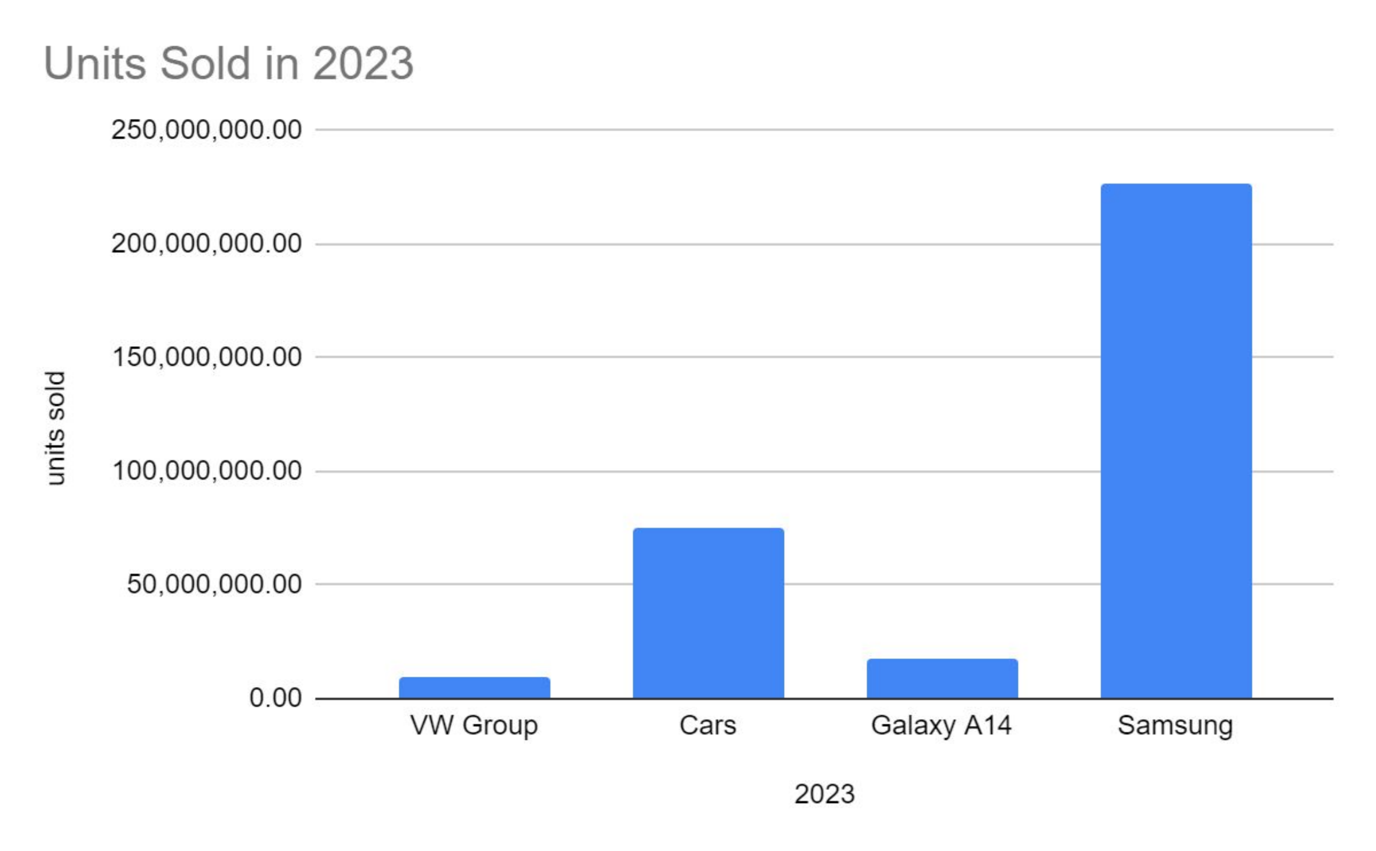
Gradle files have changed since last project sync. A project sync may be necessary for the IDE to work properly.

```kotlin
package io.snappautomotive.assistant

import ...

class MainActivity : ComponentActivity() {
    private val themeViewModel by viewModels<ThemeEngineViewModel>()

    private val themeChangeIntentFilter = IntentFilter(ThemeEngineIntents.THEME_CHANGE_ACTION)
    private val themeChangeListener = object : BroadcastReceiver() {
        override fun onReceive(contxt: Context?, intent: Intent?) {
            loadCurrentTheme()
        }
    }

    override fun onStart() {
        super.onStart()
        registerReceiver(themeChangeListener, themeChangeIntentFilter)
        loadCurrentTheme()
    }

    override fun onStop() {
        unregisterReceiver(themeChangeListener)
        super.onStop()
    }

    private fun loadCurrentTheme() {
        loadTheme(applicationContext) { it: Map<String, ColorScheme>
            themeViewModel.onChangeColorsThemeEngine(it)
        }

        loadTypography(applicationContext) { it: Map<String, TextStyle>
            themeViewModel.onChangeTypographyThemeEngine(it)
        }

        loadColorSchemeName(applicationContext) { it: String
            themeViewModel.onChangeSchemeName(it)
        }
    }
```

```
Event Log
04/05/2022
07:34  Error loading project: Cannot load 4 artifacts Details...

07:34  Error loading project: Cannot load 2 facets Details...

07:34  * daemon not running; starting now at tcp:5037

07:34  * daemon started successfully

09:06  Failed to start monitoring emulator-5554
```

Failed to start monitoring emulator-5554 (a minute ago)


Units Sold in 2023
units sold
250,000,000.00
200,000,000.00
150,000,000.00
100,000,000.00
50,000,000.00
0.00
VW Group
Galaxy A14
Samsung
2023


Units Sold in 2023
250,000,000.00
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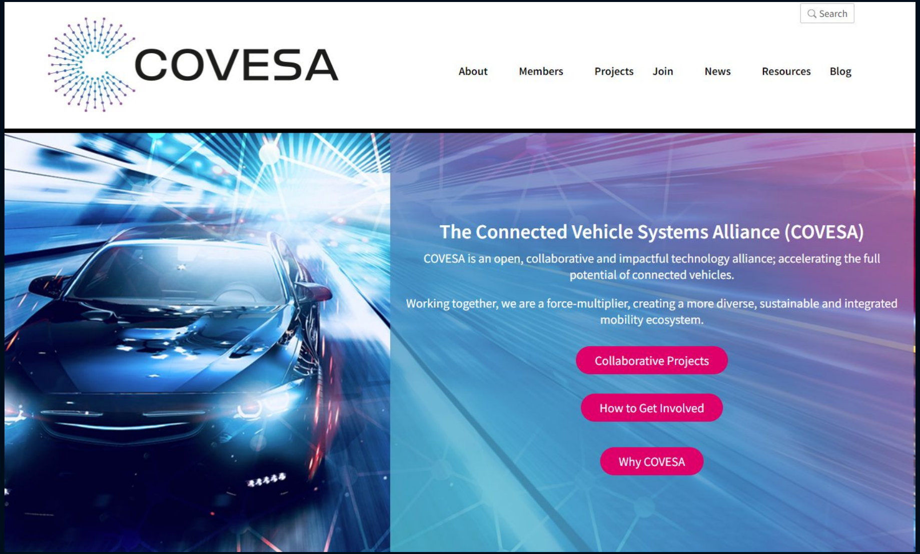
150,000,000.00
100,000,000.00
50,000,000.00
0.00
units sold
VW Group
Cars
Galaxy A14
Samsung
2023

What is Google Doing?

Projected modes
Android Auto & CarPlay

Vibrant ecosystems drive innovation

COVESA, an alternative for Google?



The Connected Vehicle Systems Alliance (COVESA)

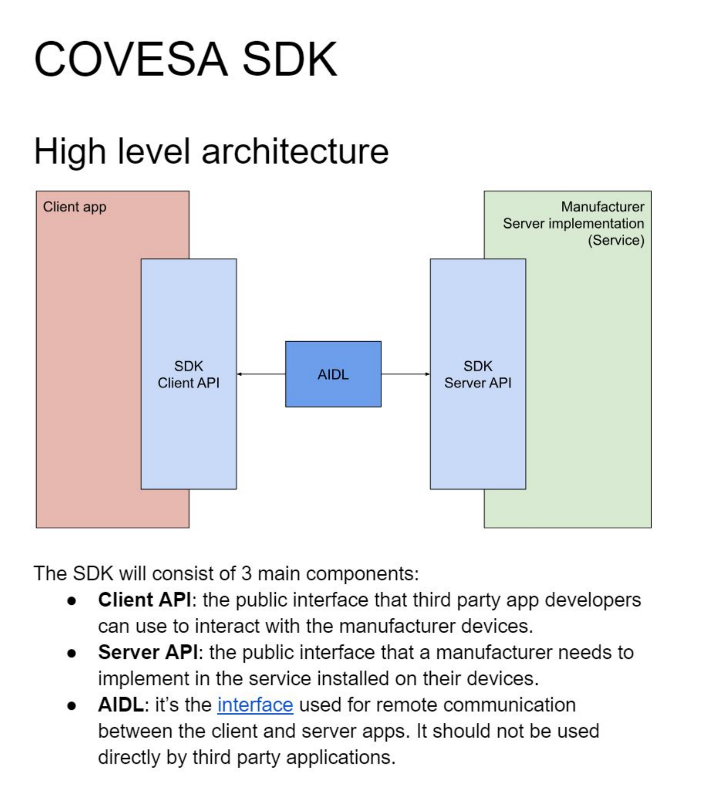
COVESA is an open, collaborative and impactful technology alliance; accelerating the full potential of connected vehicles.

Working together, we are a force-multiplier, creating a more diverse, sustainable and integrated mobility ecosystem.

https://covesa.global/

Image source: https://www.worldatlas.com/animals/sea-snail.html

COVESA SDK



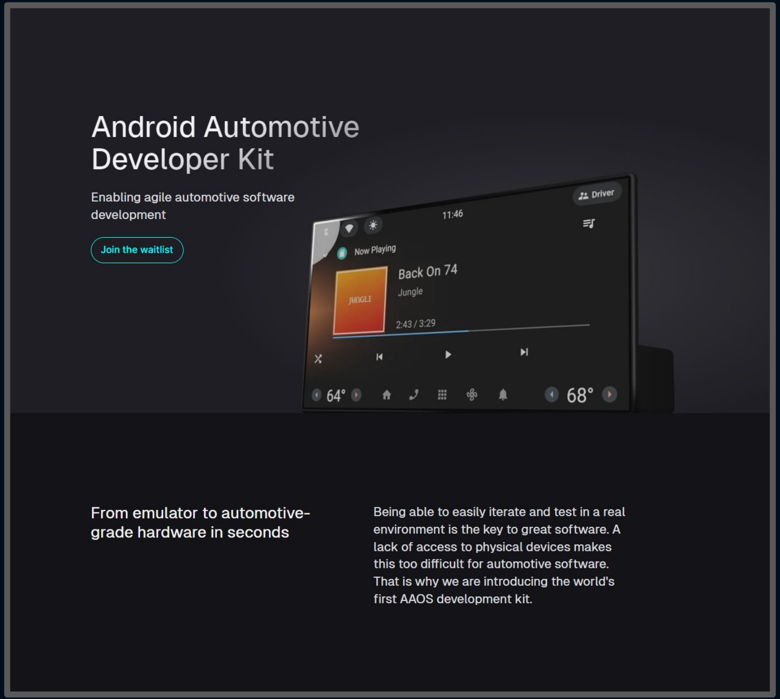
COVESA SDK

High level architecture

Client app
Manufacturer Server implementation (Service)
SDK Client API
AIDL
SDK Server API

The SDK will consist of 3 main components:

- **Client API**: the public interface that third party app developers can use to interact with the manufacturer devices.
- **Server API**: the public interface that a manufacturer needs to implement in the service installed on their devices.
- **AIDL**: it's the interface used for remote communication between the client and server apps. It should not be used directly by third party applications.



Android Automotive Developer Kit

Enabling agile automotive software development

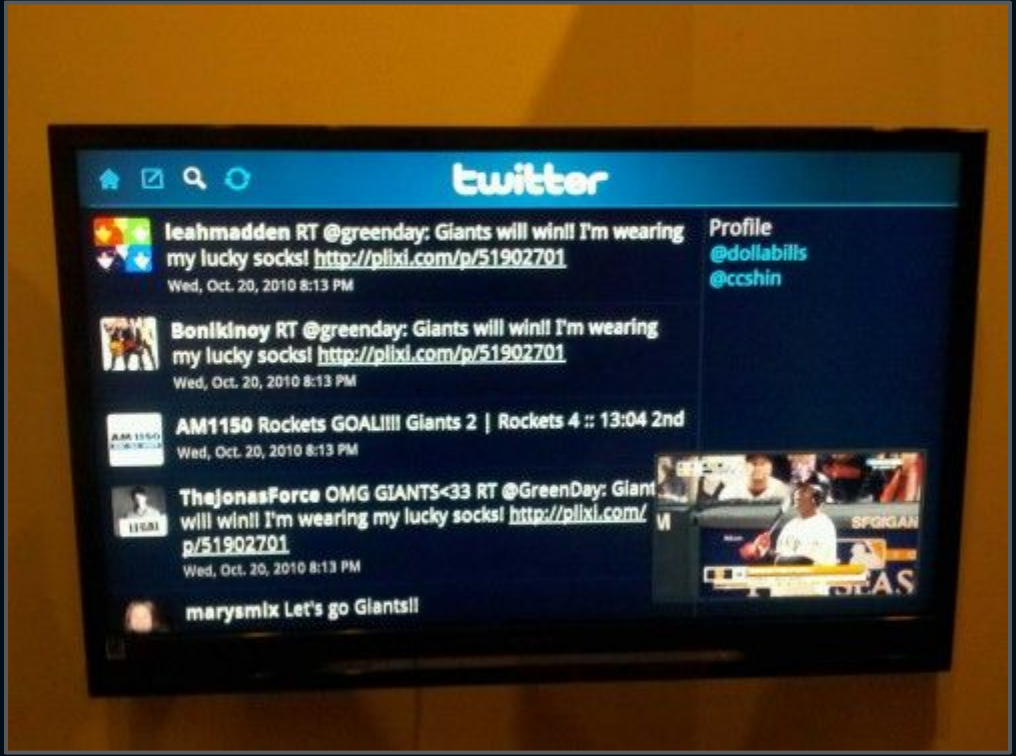
Join the waitlist

From emulator to automotive-grade hardware in seconds

Being able to easily iterate and test in a real environment is the key to great software. A lack of access to physical devices makes this too difficult for automotive software. That is why we are introducing the world's first AAOS development kit.

www.snappautomotive.io/developer-kit

Do cars need apps?



leahmadden RT @greenday: Giants will win!! I'm wearing my lucky socks! http://plixi.com/p/51902701
Wed, Oct. 20, 2010 8:13 PM

Bonikinoy RT @greenday: Giants will win!! I'm wearing my lucky socks! http://plixi.com/p/51902701
Wed, Oct. 20, 2010 8:13 PM

AM1150 Rockets GOAL!!!! Giants 2 | Rockets 4 :: 13:04 2nd
Wed, Oct. 20, 2010 8:13 PM

TheJonasForce OMG GIANTS<33 RT @GreenDay: Giant will win!! I'm wearing my lucky socks! http://plixi.com/p/51902701
Wed, Oct. 20, 2010 8:13 PM

marysmix Let's go Giants!!

“Our goal is to have 500.000 apps available in our cars”

-an unnamed car company manager

“Tailored for commuters, this service ensures safe ordering when parked or stopped. 🛑 such as when charging their electric vehicle 🔌 or refueling at a petrol station ⛽ ”

-Paul Singer

- Safely done during driving
- Improved by using vehicle data
- A good reason why in-car instead of a phone

www.snappautomotive.io

/blog/android-automotive-the-real-android-fragmentation

Speculation

Speculation

Thank you!

Juhani Lehtimäki

Snapp Automotive

juhani@snappautomotive.io