MAKE YOUR CAR SELF-DRIVING USING OPEN-SOURCE SOFTWARE

George Hotz
comma.ai
What does a jailbreak do?

Add functionality the manufacturer didn’t include
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Car Networks
CAN Protocol 101
panda (interface)

github.com/commaai/panda
Reverse Engineer in cabana
DBC (Protocol Definition) Files

A Steering Sensor Message

ID = 342 = 0x156

STEER ANGLE starts at bit 7 and is 16 bits long

It is signed, scale of -0.1, and range -500, 500
opendbc

- Acura
- Ford
- GM
- Honda
- Hyundai
- Subaru
- Tesla
- Toyota
- VW
Drive by Wire (Honda)

- Message 0x30C: Speed Control
- Message 0x1FA: Brake Amount, Pump, Lights
- Message 0xE4: Apply steering torque
Driving is a *dance*
We need compute (EON)

Okay...it’s a phone in a case
And **NEOS** (Android fork)

**NEOS**
OS for the NEO robotics platform

[https://github.com/commaai/neo](https://github.com/commaai/neo)

**Repositories** 11  **People** 0

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**android_kernel_oneplus msm8996**
Forked from CyanogenMod/android_kernel_oneplus msm8996

- C
- GPL-2.0
- Updated on May 17

**android_frameworks_base**
Forked from CyanogenMod/android_frameworks_base

- Java
- 1,394
- Updated on Dec 13, 2016

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**SSH, tmux, and bash!**
Open Source Driving Agent
openpilot emulates ECUs

...and replaces them with better versions
hundreds of openpilot users today

Driving with OpenPilot 0.3.7
pjiao • 644 views • 1 month ago
Testing OpenPilot version 0.3.7 in a 2016 Civic Touring.

Openpilot 0.3.3
Jeffrey Peacock • 882 views • 3 months ago

Openpilot 0.3.2 at Night
Vasily Tarasov • 1.3K views • 4 months ago
Source code and installation guidelines for Chevy Volt 2017 Premier:
https://github.com/commai/openpilot/pull/104.

Open Source self-driving car (Comma ai/openpilot) with a 2015 Honda CR-V Touring
John J • 1.8K views • 4 months ago
Courtesy of Comma.ai.
all *mapping* the world for driving
3D maps without LIDAR
3000 ORB features @ 20 FPS
Snapdragon 820 Mobile SoC
but the DSP only runs signed code...

http://freethedsp.com/
Community

slack.comma.ai
Long Term Victory!

Cars are replaced ~9 years

And there’s no OTA updates!
Questions?