


O'PAVES

An open platform for autonomous vehicle tinkerers

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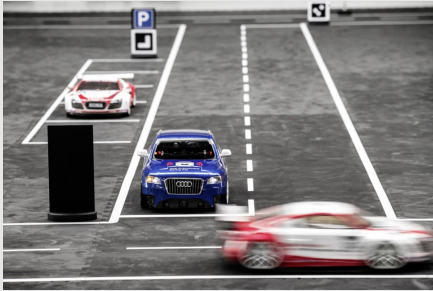
 Hackaday.io: Fabien.C

What is this project?

Open Platform for Autonomous VEHICLEs (O'PAVES)

Video demo!

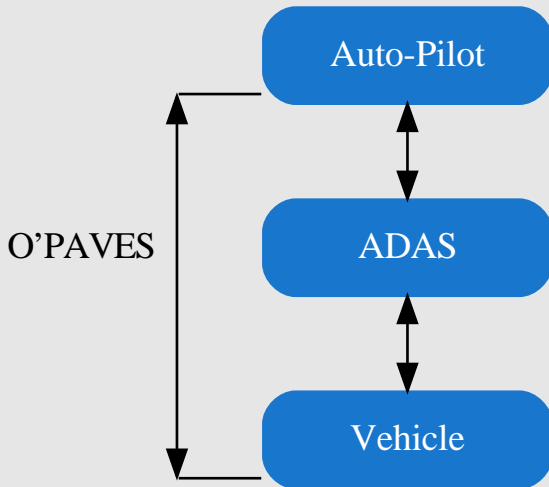
Autonomous vehicle competitions 1/2



Autonomous vehicle competitions 2/2



Advanced Driver Assistance System



For whom?

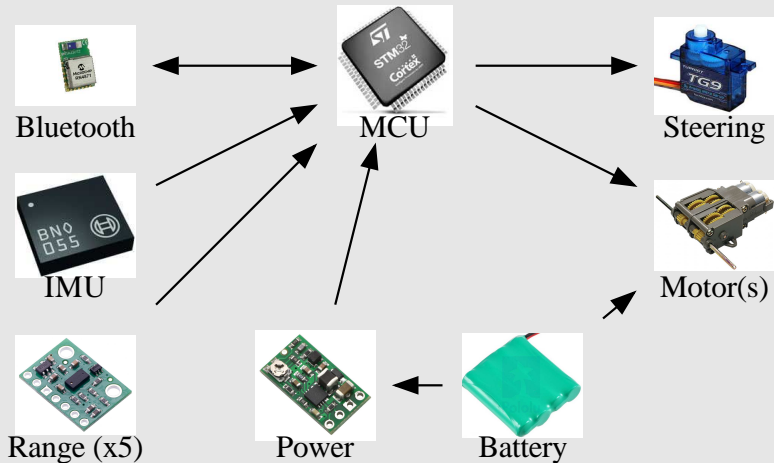
- O'PAVES as a prototyping platform:
 - Students
 - Researchers
 - Hobbyists/Hackers/Makers
- OPAVES as an AdaCore tool demonstrator:
 - Customers and prospects
 - Trade shows visitor

Hardware

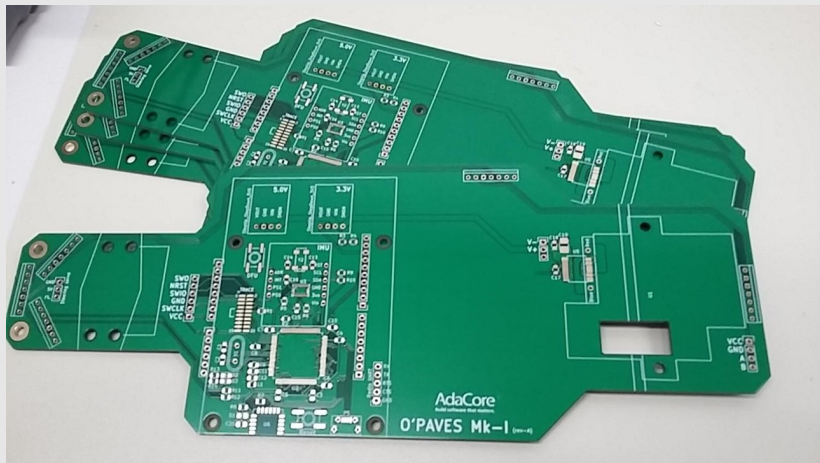
Hardware Requirements

- Capable of addressing the classical autonomous vehicle challenges
 - Lane following
 - Collision avoidance
 - Autonomous parking
- Affordable
- Easy to buy and/or build

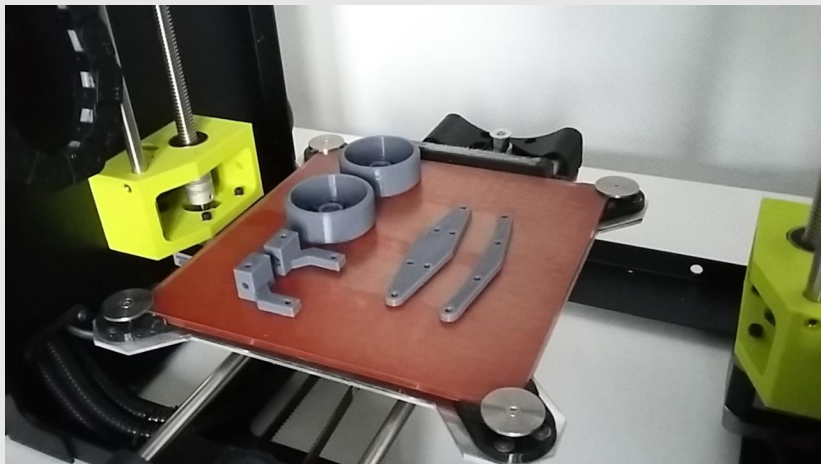
Components



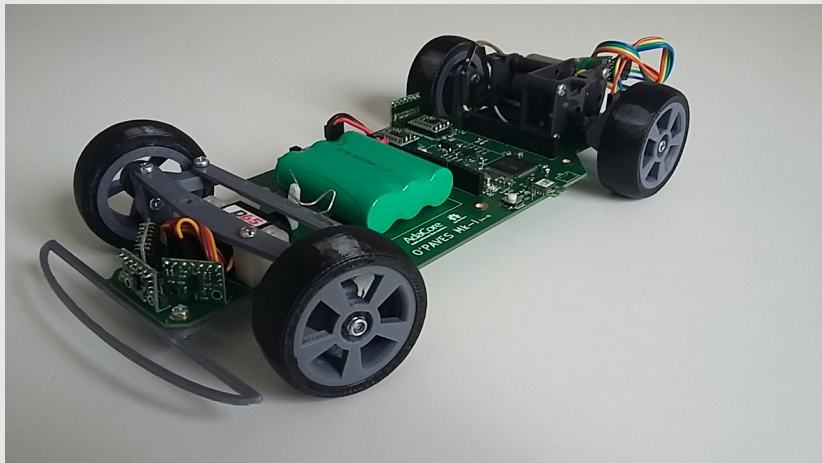
PCB Frame



3D Printed Parts



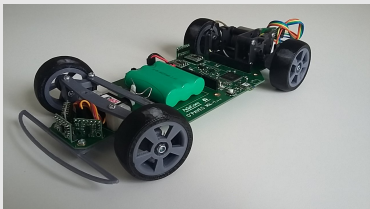
First Prototype



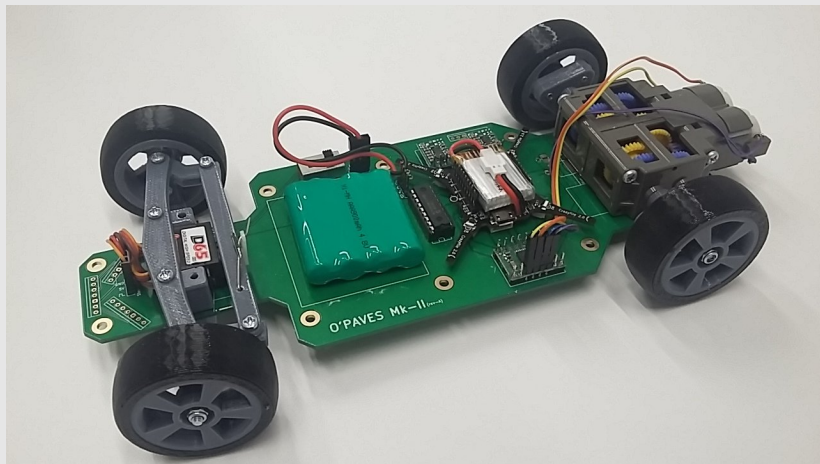
First prototype vs requirements

- Capable of addressing the challenges - YES
- Affordable - YES
- Easy to buy and/or build - Not really...

New Version

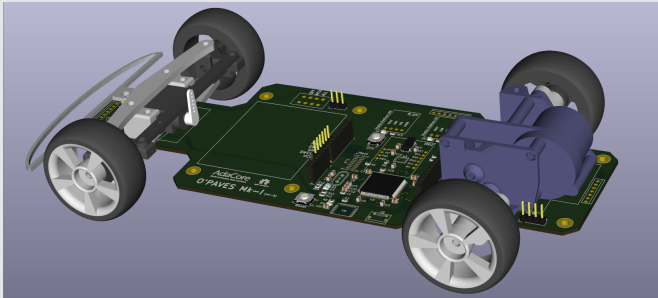


New Version



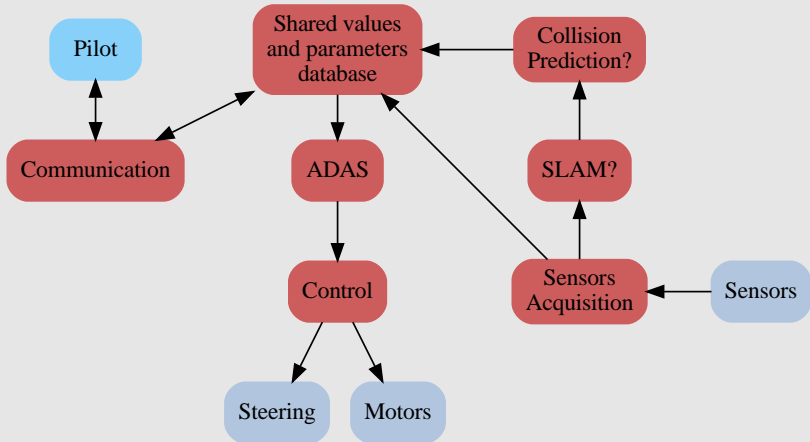
Open-Source Hardware

- Released under the CERN Open Hardware License
- Designed with open-source software:
 - KiCad
 - FreeCAD
- Repository: <https://github.com/AdaCore/OPAVES>

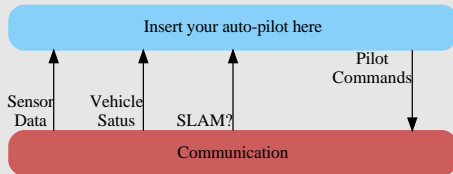


Software

Software Architecture



Auto-pilot interface



- Ada and SPARK: programming languages
- Ada_Drivers_Library: Drivers for micro-controllers
- Certyflie: Flight controller written in Ada and SPARK
- GNATprove: Formal proof of the the SPARK code
- GNATcoverage: Source coverage analysis (up to MCDC)

Costs

PCB (by 10)	~\$50
Misc Components	~\$110
Crazyflie 2.0	\$180
Total	~\$380¹

¹That's less than a Tesla

Fork it, Build it, Use it, Improve it

Build it and make your own autonomous car!

Potential improvements:

- Hardware
 - Encoders on the motors
 - Change the PCB to make it compatible with your favorite dev board
- Software
 - Active differential
 - Actually use the sensors available

Follow the project on:

- GitHub: github.com/AdaCore/OPAVES
- Hackaday: hackaday.io/project/17555-opaves
- Twitter: @OpenPAVES