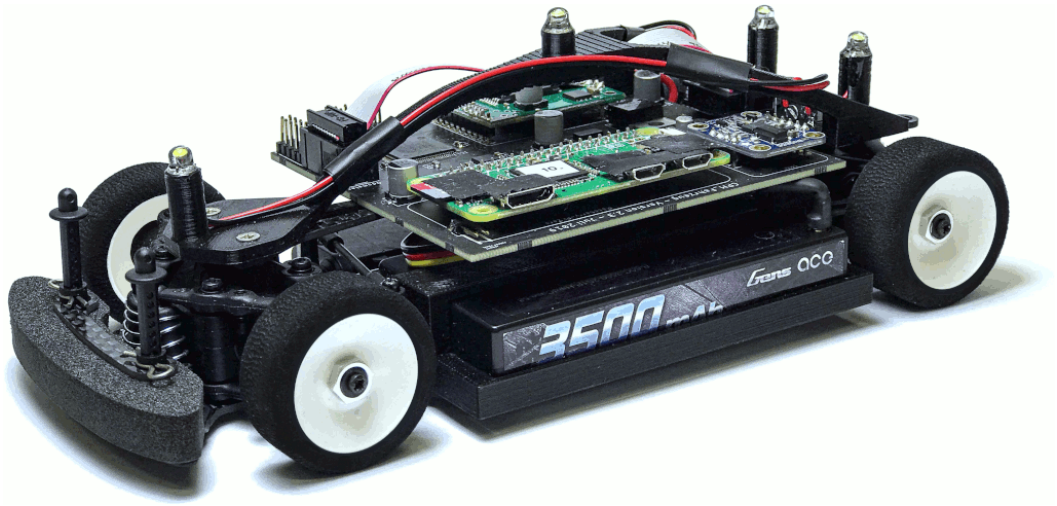
Vehicle Overview

The µCars are connected and automated model-scale vehicles (with a scale of 1:18) with Ackermann steering geometry developed for experiments in research and education. The vehicle is open-source, moderately costed, and highly flexible, which allows for many applications. It obtains its pose (position and orientation) via WLAN from the IPS and is equipped with an inertial measurement unit and an odometer. The Car is based on the XRAY M18 PRO LiPo Kit (PN 380003). It is combined with other off-the-shelf components and custom electronics.

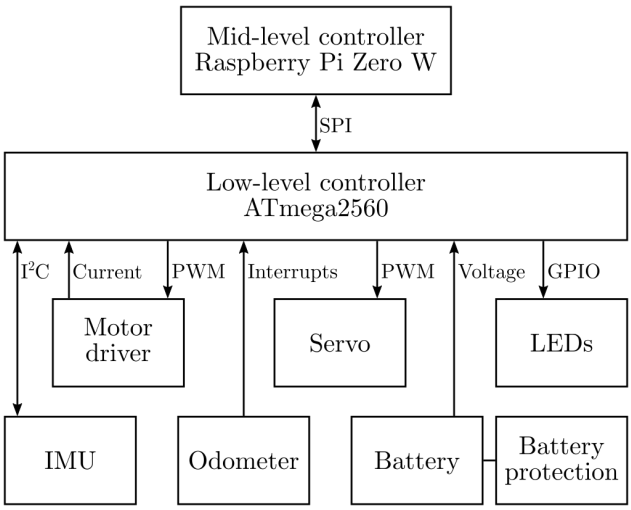


Specifications

Physical representation	Value
Vehicle length	220 mm
Vehicle width	107 mm
Vehicle height	70 mm
Wheelbase	150 mm
Min. radius of curvature for steering	0.3 m
Max. steering angle	35 deg
Max. speed (limited by software)	2.3 m/s
Weight	500 g
Weight distribution front:back	0.48:0.52
Weight distribution left:right	0.56:0.44

Hardware

Architecture



Components

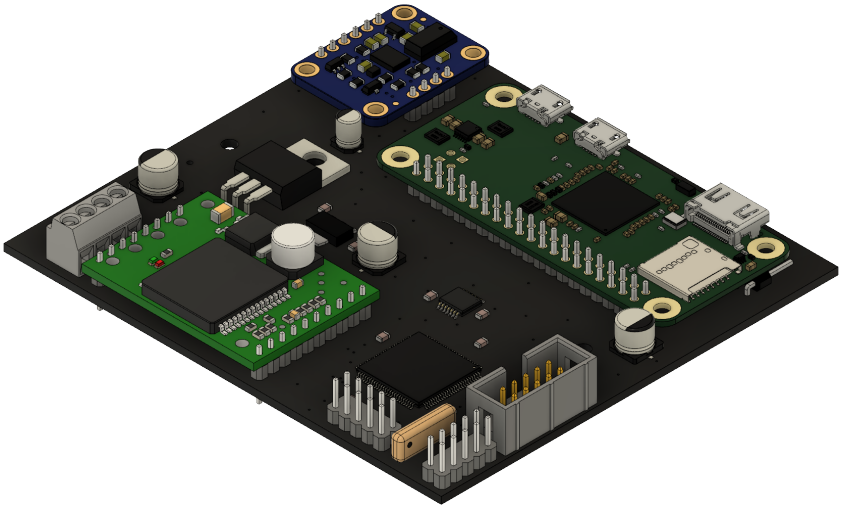
Off-the-shelf components:

- Gens Ace 3500 mAh 7.4V 2S LiPo Battery Pack
- Hitec Servo D89MW
- Motor Johnson NF113LG-011
- Pololu VNH5019 Motor Driver Carrier
- Adafruit BNO055 Absolute Orientation Sensor
- Raspberry Pi Zero W
- Microchip AVR ATmega2560

Custom electronics:

- For connecting COTS components
- Battery protection
- Magnetic odometer
- Position LEDs
- Switch, fuse, charging connector

All components are connected via a printed circuit board.



References

Vehicle Assembly

PCB Assembly