

All about Junior

The body

Make and model: 2006 Volkswagen Passat wagon

Engine: 4-cylinder turbo diesel injection

Transmission: Six-speed direct shift gearbox

Engine cubic capacity: 1968cc

Fuel Consumption: City: 25.5 mpg (9.2l/100km)

Highway: 42.7 mpg (5.5l/100km)

Combined: 34.6 mpg (6.8l/100km)

Power: 140 hp (103kW) at 4000rpm

Torque: 236 lb ft (320Nm) at 1800-2500 rpm

Top speed: 126miles/h (203km/h)

Acceleration 0-100km/h: 10.1sec

Power is provided by the engine through a high-current prototype alternator and a battery-backed, electronically-controlled power system.

The senses

Position: Junior's position and orientation are determined by a cutting-edge Applanix POS LV 420 system that is optimized for adverse GPS environments. The system provides real time integration of multiple dual-frequency GPS receivers, a high-performance inertial measurement unit (IMU), wheel odometry, and Omnistar's satellite-based Virtual Base Station (VBS) service. Real time accuracy exceeds 35cm and 1/50th of a degree.

Sight: is provided by several state-of-the-art sensors. A Velodyne HD Lidar looks in every direction at once. It combines 64 individual lasers into millions of 3D points per second at up to 50m range. An Ibeo ALASCA XT Lidar handles long ranges, with four scanning planes reaching as far as 200m. A Point Grey Ladybug 2 provides six video cameras that produce near-high-definition video in every direction. SICK Lidar scanners (which Stanley used in 2005) are used for precision navigation at low speeds.

The brains

Hardware: Provided by rackmount servers equipped with Intel's latest Dual and Quad Core processors. Data is processed from instruments as frequently as 200 times a second.

Software: Integrated, custom-coded modules include a planner (making decisions, choosing routes), a mapper (transforming sensor readings into environment understanding), a localizer (refining GPS position by visual observations), and a controller (actuating the planner decisions on the car).

