

# Autonomous Cars

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January 16, 2017

## 1 Introduction

An autonomous car (driverless car, self-driving car, robotic car) is a vehicle that is capable of sensing its environment and navigating without human input.

Autonomous cars can detect surroundings using technologies such as radar, GPS and computer vision. Advanced control systems interpret sensory information to identify appropriate navigation paths, obstacles and also other cars.

## 2 History

Experiments have been conducted on automating cars since at least the 1920s. The first autonomous cars appeared in the 1980s. Since then, numerous major companies and research organisations have developed working prototype autonomous vehicles. As of 2013, four U.S. states have passed laws permitting autonomous cars and cities in Europe allowed testing in traffic.

## 3 Classification

The Society of Automotive Engineers (SAE) defined 6 levels of automated vehicles:

- Level 0: No vehicle control, but may issue warnings.
- Level 1: Vehicle assists the driver.
- Level 2: System controls accelerating and breaking.
- Level 3: Self-driving within known environments.
- Level 4: System controls the vehicle in most environments.
- Level 5: Other than setting the destination and starting the system, no human intervention is required.

## 4 Waymo

Above all the autonomous cars on the market, Google's self-driving car **Waymo** is probably the best known example. Their first driver-less car was built in 2009 had a huge influence on the market and also created a lot of ethical questions.

## 5 Risks

- Cars can be hacked
- Loss of driving-related jobs
- Moral Issues

## 6 Obstacles

- Software reliability
- Autonomous cars rely on maps
- Inter-Car-Communication required

## 7 Opportunities

- Reduction in traffic collisions
  - 90% less car accidents
  - 190 billion US\$ savings in the United States
- Driver is not required
- Higher speed limits possible
- Higher fuel efficiency

## 8 References

- [https://en.wikipedia.org/wiki/Autonomous\\_car](https://en.wikipedia.org/wiki/Autonomous_car)
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