

A world of driverless cars

Fully autonomous vehicles are developing faster than anyone would have thought a few years ago, with many experts predicting that they will become widely available in the next 5–10 years. Many questions remain, but it is already possible to imagine how this new world of driverless cars will work.

PERCEPTION
Vehicles use **radar** to detect obstacles, a **laser ranging system** to map the surroundings in three dimensions, and **video cameras** to identify objects such as traffic lights, construction signs, pedestrians and other vehicles.

DECISION AND ACTION
To make the appropriate responses to rare events — such as a ball bouncing in from a playground, or a plastic bag blowing down the roadway — the cars rely on **algorithms** refined through millions of kilometres of test drives.

ADAPTIVE TRAFFIC FLOW
Smart infrastructure integrates V2V signals from the moving cars to optimize speed limits, traffic-light timing and the number of lanes in each direction on the basis of the actual traffic load. The result is a smoother flow, shorter travel time and less energy wasted at traffic lights or in traffic jams.

COMMUNICATION
Vehicle-to-vehicle (V2V) radios send signals between cars, trucks and infrastructure items such as traffic lights.

ROUTE PLANNING
An **on-board computer** uses sensor data to plot a route that gets the car where it needs to go, while avoiding people, potholes and other vehicles.

LOCATION
Mapping software uses **Global Positioning System** data to tell the car where it is in relation to roads, traffic signals, and other landmarks.

2020s

The decade when driverless cars are predicted to become widespread.

10%

Fuel savings for cars that travel in formation.

ROAD TRAINS
Vehicles can take advantage of aerodynamics and save fuel by following one another almost bumper to bumper. They are protected from catastrophic pile-ups by their **V2V radios**, which allow all the cars in line to hit their brakes at the same time.

CITIES TRANSFORMED
MASS TRANSPORT People increasingly give up owning cars in favour of calling companies to pick them up wherever they are and drop them off wherever they need to go — a driverless version of a ride-sharing service.
LAND USE Urban centres begin to undo the many accommodations they have made for personal vehicles — starting with the vast quantities of real estate devoted to parking, which could be adapted to more productive uses.

800 million

One estimate of the number of US parking spaces. Many could be used for other purposes if people ride-share more.