FAA Installs 36,000-Foot-Tall Air Traffic Lights
THE MICROCHIP
Microprocessor Transistor Counts 1971-2011 & Moore's Law

curve shows transistor count doubling every two years

Date of introduction

Transistor count
Exponential Growth of Computing

The exponential growth of computing is a marvelous quantitative example of the exponentially growing returns from an evolutionary process. We can express the exponential growth of computing in terms of its accelerating pace: it took 90 years to achieve the first MIPS per 1000 dollars; now we add 1.2 MIPS per 1000 dollars every hour.

Source: Ray Kurzweil and KurzweilAI.net
VEHICLE
## Traffic Ahead

Many carmakers are developing prototype vehicles that are capable of driving autonomously in certain situations. The technology is likely to hit the road around 2020.

<table>
<thead>
<tr>
<th>VEHICLE</th>
<th>BMW</th>
<th>Mercedes-Benz</th>
<th>Nissan</th>
<th>Google</th>
<th>General Motors</th>
</tr>
</thead>
<tbody>
<tr>
<td>VEHICLE</td>
<td>5 Series (modified)</td>
<td>S 500 Intelligent Drive Research Vehicle</td>
<td>Leaf EV (modified)</td>
<td>Prius and Lexus (modified)</td>
<td>Cadillac SRX (modified)</td>
</tr>
<tr>
<td>KEY TECHNOLOGIES</td>
<td>• Video camera tracks lane markings and reads road signs</td>
<td>• Stereo camera sees objects ahead in 3-D</td>
<td>• Front and side radar</td>
<td>• LIDAR on the roof detects objects around the car in 3-D</td>
<td>• Several laser sensors</td>
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<tr>
<td></td>
<td>• Radar sensors detect objects ahead</td>
<td>• Additional cameras read road signs and detect traffic lights</td>
<td>• Camera</td>
<td>• Camera helps detect objects</td>
<td>• Radar</td>
</tr>
<tr>
<td></td>
<td>• Side laser scanners</td>
<td>• Short- and long-range radar</td>
<td>• Front, rear, and side laser scanners</td>
<td>• Inertial measuring unit tracks position</td>
<td>• Differential GPS</td>
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<td></td>
<td>• Ultrasonic sensors</td>
<td>• Infrared camera</td>
<td>Four wide-angle cameras show the driver the car’s surroundings</td>
<td>• Wheel encoder tracks movement</td>
<td>• Cameras</td>
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<td>• Ultrasonic sensors</td>
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Audi RS 7 piloted driving concept
Driver assistance systems
10/14

Front camera:
- Audi active lane assist
- ACC with Stop&Go function
- Speed limit display
- Audi pre sense / front / plus
- Audi adaptive light

Ultrasonic sensors at side:
- Park assist with display of surroundings

Front, rear and top-view cameras:
- Parking system plus with front and rear camera
- Park assist with front and rear camera

Ultrasonic sensors at rear:
- Parking system plus with front and rear camera
- Park assist with display of surroundings

Ultrasonic sensors at front:
- ACC with Stop&Go function
- Parking system plus with front and rear camera
- Park assist with display of surroundings

Infrared camera:
- Night vision assistant with highlighting of detected pedestrians

Front radar sensors:
- ACC with Stop&Go function
- Audi pre sense / front / plus

Rear radar sensors:
- Audi side assist
- Audi pre sense rear / plus

Crash sensors:
- Front protection adaptivity
- Side protection
- Rear impact protection
Figure 2 Several driver-assistance systems are currently using radar technology to provide blind-spot detection, parking assistance, collision avoidance, and other driver aids (courtesy Analog Devices).
Budget Cuts
Just Ahead