BlueBox: Complete Autonomous Vehicle Platform Using NXP Silicon at Each ADAS Node
Safe & Secure Mobility – 90% Innovation Through Electronics

Seamlessly Connected Mobility Experience

ADAS Towards Self-Driving

Energy Efficiency

One hour per day in the vehicle

Enjoying Life

1.3M global road fatalities every year

Saving Lives

US mandates 163 grams / mile and 54.5 MPG by 2025

Reducing CO₂


# Road Traffic Accidents – the Causes

## Critical Reasons

<table>
<thead>
<tr>
<th>CRITICAL REASONS</th>
<th>NUMBER</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Driver</td>
<td>2,046,000</td>
<td>94%</td>
</tr>
<tr>
<td>Vehicles</td>
<td>44,000</td>
<td>2%</td>
</tr>
<tr>
<td>Environment</td>
<td>52,000</td>
<td>2%</td>
</tr>
<tr>
<td>Unknown</td>
<td>47,000</td>
<td>2%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2,189,000</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

## Driver-Related Critical Reasons

<table>
<thead>
<tr>
<th>DRIVER-RELATED CRITICAL REASONS</th>
<th>NUMBER</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recognition Error</td>
<td>845,000</td>
<td>41%</td>
</tr>
<tr>
<td>Decision Error</td>
<td>684,000</td>
<td>33%</td>
</tr>
<tr>
<td>Performance Error</td>
<td>210,000</td>
<td>11%</td>
</tr>
<tr>
<td>Non-performance Error (e.g. Sleep)</td>
<td>145,000</td>
<td>7%</td>
</tr>
<tr>
<td>Other</td>
<td>162,000</td>
<td>8%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2,046,000</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

---

**EVERY YEAR…**

- ~1.3 MILLION fatalities
- >50 MILLION people seriously injured
- >$3 TRILLION cost of road accidents
- >90% caused by human mistakes

---

We need to get the **HUMAN FACTOR** out of the equation!
Steps Towards Highly Automated Driving

LEVEL 1
Driver Assistance

- Adaptive cruise control (ACC)
- Automatic braking
- Lane keeping

LEVEL 2
Partial Automation

- Partial automated parking
- Traffic jam assistance
- Emergency brake with steer

LEVEL 3
Conditional Automation

- Semi autonomous:
  - Highway chauffeur
  - Self parking

LEVEL 4
High Automation

- Autonomous driving across many driving modes

ADAS

- Responsibility for safe operation
- Control of complete vehicle
- Control of steering
- Control of vehicle speed

Self-Driving

Driver

Vehicle
NXP’s Automotive Experience to Master the Robust Tetrahedron

**FUNCTIONAL SAFETY:**
Zero accidents by system failures (ISO 26262)

**FUNCTIONAL SECURITY:**
Zero accidents by system hacks

**DEVICE RELIABILITY:**
Zero components failures (robust design)

**ROAD SAFETY:**
Zero accidents by human error
NXP Automotive – Comprehensive Portfolio for Self-Driving Robots

SENSE

V2X

Radar

Camera

Lidar

Ultrasonic

Line of Sight

THINK

BlueBox

Non-Line of Sight

ACT

Instrument cluster

Vehicle Control

Engine
Transmission
Brake
Steering
Airbag
Suspension

Vehicle State

Speed

Motion

NXP Portfolio
NXP Automotive – Complete Portfolio for Self-Driving Robots
Engineered to Enable the World’s Leading Carmakers to Design, Manufacture and Sell Self-Driving Cars By 2020

- Easily industrializable platform for autonomous vehicles
- Built on NXP’s smart and safe solutions shipping in volume production or sampling now
- Multiple streams of sensor data are fused and processed by the BlueBox engine to determine vehicle’s behavior
- Open platform, easily customizable for optimal product differentiation
- Already in customers’ hands at four of the top five largest carmakers

NXP BlueBox: Central Processing Unit For Autonomous Driving

Highly Optimized Sensor Fusion
- Various sensor data streams: Radar, Vision, LiDAR, V2X
- S32V automotive vision and sensor fusion processor
- LS2085A embedded compute processor

Ease of Development
- Open Linux-based
- Programmable in linear C
- Easily customizable
- Development environment for mainstream vehicles

High Performance per Power
- Up to 90,000 DMIPS at < 40 W
- Complete situational assessment
- Supporting classification
- Object detection and localization
- Mapping

Security
- CSE and ARM® Trust Zone®

Decision Making
- Global Path Planning
- Behavior Planning
- Motion Planning

www.nxp.com/BlueBox