

# Perception in All Conditions

## Based on ultra-high resolution radar technology



### Revolutionizing Radar-Based Perception for All-Scenario Safety

Safe hands-free driving demands flawless reliability for precise decision-making. Only perception based on the Arbe radar chipset delivers.



**Perception in all conditions based on ultra-high resolution radar technology**



**Unmatched image quality 100 times more detailed than any radar on the market**



**Empowering sensor fusion for reliable decision-making beyond what vision can deliver**

### Transforming Road Safety from Every Perspective

*Achieving the best radar-based image quality on the market, Arbe's Perception differentiates true threats from false alarms to ensure a safe road ahead for drivers, pedestrians, and other vulnerable road users.*

- 360° Perception
- Free Space Mapping
- Object Tracking
- Fusion
- Hands-Free Driving
- SLAM

Arbe created the first radar technology detailed enough to enhance perception algorithms, providing critical sensing data diversity, such as depth, relative velocity, object orientation, and long-range detection at levels optical sensors can't match. It accomplishes all of this even in environmental conditions where optic sensors fail, making it a critical sensor for reliable redundancy.

Far outpacing the industry's latest 16x16 imaging radars, Arbe's high-resolution Perception Radar relies on 48 transmitting and 48 receiving antennas to create a wide, 2,304 virtual channel array, paving the way for genuinely safe hands-free driving.

From emergency braking to cyclist and pedestrian detection, and from lane change to highway autopilot and traffic jam assist, L2+ and higher applications have so far been mostly about driver comfort. By perfecting these applications in all environmental conditions, Arbe elevates them from a nice-to-have comfort solution to must-have safety features.

# Unmatched Safety. Delivered.

## 360° Perception

---

Arbe's 360° Perception relies on data sharing between multiple radars, decreasing latencies while increasing confidence levels and accuracy of the tracking and the free space map. Multiple radars overlap in the fringes, tracking objects of interest smoothly from one radar to the next and validating the location of the same object through two different perception algorithms. The result is reduced false alarms, higher resilience to occlusion scenarios, and the ability to better foresee the quickly evolving vehicle environment.

## Free Space Mapping

---

Free Space Mapping is the basis for navigation, path planning, and obstacle avoidance and therefore paves the way to autonomous decision-making, and autonomous driving. These applications require a reliable estimate of the empty vs. occupied space in the vehicle's environment. Arbe's Perception satisfies key requirements for free space mapping, namely high spatial resolution in all dimensions regardless of lighting or weather conditions, at long range with high reliability. Further, its high doppler resolution allows it to distinguish efficiently between stationary and dynamic detections. Together these capabilities make imaging radar a mandatory sensor suite component to map free space in real-time.

## Object Tracking

---

Object tracking is the ability to determine an object's location in relation to the vehicle, to classify it, and to understand its speed, size, shape, altitude, and orientation. Sophisticated tracking empowers all advanced safety applications, building a more complete picture of what is happening on and near the road and enabling safer navigation. Thanks to significantly better spatial resolution, Arbe's radar-based perception complements cameras for object tracking due to its superior long range detection, direct measurement of distance and relative velocity, and recognition of connections between frames.

Arbe (Nasdaq: ARBE), a global leader in Perception Radar Solutions, is spearheading a radar revolution, enabling truly safe driver-assist systems today while paving the way to full autonomous-driving. Arbe's radar technology is 100 times more detailed than any other radar on the market and is a critical sensor for L2+ and higher autonomy. The company is empowering automakers, Tier-1 suppliers, autonomous ground vehicles, commercial and industrial vehicles, and a wide array of safety applications with advanced sensing and paradigm-changing perception. Arbe is based in Tel Aviv, Israel, and offices in China, Germany and the United States.

## Fusion

---

Sensor fusion refers to the integration and combination of data from multiple sensors, leveraging the strengths of different sensors and compensating for their individual limitations, to obtain a more accurate and comprehensive understanding of the vehicle's environment. Arbe is the first radar-based perception to provide the sufficient detail required to support integration with camera data for unparalleled data redundancy and diversity. It elevates autonomous driving with unparalleled safety advancements and perfects decision-making capabilities beyond the reach of vision-only systems.

## Hands-Free Driving

---

High resolution radar is the key to safe hands-free driving. Advanced sensing, AI, and perception, improve image reliability through multipath suppression and false alarm elimination. Truly safe path planning is achieved via clustering of point cloud detections for joint object tracking, frame registration provides certainty about an object's location and anticipated position, highly accurate ego-velocity estimations, object orientation assessment, and more. This allows the vehicle to overcome challenging scenarios in both dense urban environments and on the highway supporting safe and successful lane changes, emergency braking, traffic jam assist, highway merging, and intersection navigation.

## SLAM

---

All of these perception abilities, combined with the highly detailed 4D radar data and the ability to detect stationary objects, enable the radar to provide Simultaneous Localization and Mapping (SLAM). SLAM is the ability to map the vehicle's surroundings while simultaneously localizing it within that map as it is being continuously generated. Arbe's independent SLAM solution is designed to work both in conjunction with and independently of other sensors in the vehicle, providing both redundancy and full backup when other sensors fail.