

The Mirror as a Module

The amount of electronic technology within the modern day automobile continues to rise, and the rearview mirror has become an ideal location to incorporate much of this electronic content. When a driver glances at the mirror, only subtle eye movements are required, allowing them to remain focused on the road. In addition to increased safety for the driver, electronic content in the mirror is also more cost-effective than purchasing these components separately and designing them into the vehicle interior.



Why the Mirror Has Become the Ideal Location for Technology:

1. Lower Cost

First and foremost, locating electronic devices in the mirror is by far the most cost-effective solution. The alternative is redesigning and retooling the overhead console, instrument panel or center console each time a new feature is added to the vehicle, and that's a costly, time-consuming proposition.

2. Common Electronics

Automatic-dimming mirrors use a combination of sensors and complex electronics to dim. Many of these components (sensors, circuit boards, micro-controllers, etc.) can be shared with other advanced features to save cost and space, while reducing part counts and overall vehicle complexity.

3. Superior Performance

Because of the mirror's location in the vehicle — high on the windshield, in the driver's line-of-sight, surrounded by glass — it's an excellent, high-performance location for displays, microphones, antennas, receivers, etc. The mirror, while surrounded by glass, is the most advantageous location for sending and receiving signals. And, with its position high on the windshield, it's the optimal location for cameras — looking forward of the vehicle, protected by glass, and in an area swept clean by the wipers.

4. Safety

The mirror's location also makes it a safe place to put features because mirror-borne displays and interfaces can be viewed and interacted with while keeping the driver's natural line-of-sight on the road ahead. Viewing the rearview mirror requires minimal eye movement and drivers view their mirror more frequently than they view the instrument panel. Data by the Japanese Insurance Association shows that drivers view interior rearview mirrors at least every 15 seconds, or 4 times per minute, while viewing their instrument panel just three times per minute.

5. Quick-to-Market

Featured mirrors can be designed, engineered and tooled quickly, and are often available "off the shelf." They're also easy to install, allowing vehicle manufacturers to bring new features to market quickly and efficiently across different vehicle platforms.

6. Consistent Location

Placing features in the mirror allows manufacturers to present electronic content to drivers in a common location across vehicle platforms.

7. Serviceability

Automatic-dimming mirrors are easily accessible, simplifying diagnostics and service. If necessary, they can be easily replaced.

8. Flexibility

Mirrors can be changed out or updated easily as new features become available. This enables manufacturers or automobile dealers to freshen new and used vehicles alike while keeping pace with new technology introductions.

9. Model Differentiation

By using the mirror as an electronic module, manufacturers can differentiate between vehicle grades or competitive vehicles by placing different features in the mirror.

Automotive Products

Safety and Innovation

Gentex pioneered the electrochromic automatic-dimming mirror, which detects and eliminates dangerous rearview mirror glare, making nighttime safer for drivers around the world. Today, Gentex mirrors are the optimal space in the vehicle for the placement of a broad array of electronic technology, and are lower in cost than designing electronics into the vehicle interior. Locating informational displays in the mirror also affords increased safety, requiring the driver to simply glance at the mirror while remaining focused on the road.

Driver Safety & Information

- Glare Management
- HomeLink
- Displays
- Telematics
- Microphones
- Lighting

Side Blind Zone

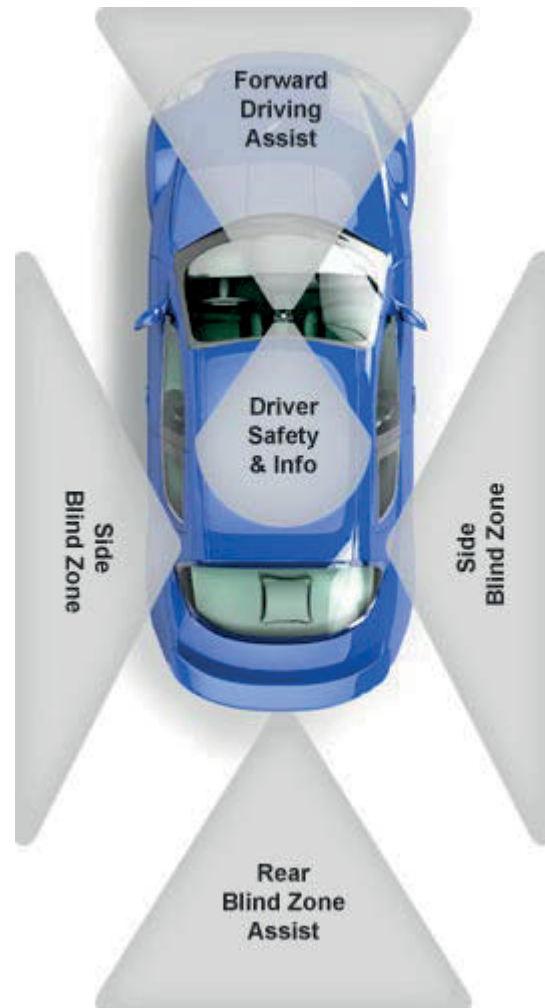
- Signals
- Alerts
- Curved Glass

Lighting and Driver Assist

- Lighting Assist
- SmartBeam DFL
- Driver Assist
- Custom Sensor Clusters

Rear Blind Zone Assist

- Rear Camera Display



Automotive Products

Driver Safety

Glare Management

Research shows that during nighttime driving, headlight glare from the vehicles traveling behind you can be blinding. Even after the glare is removed, an after-image remains on the eye's retina that creates a blind spot for the driver. This phenomenon, known as the Troxler Effect, postpones driver reaction time by up to 1.4 seconds. At 60 mph, a car will travel over 123 feet in this amount of time. Gentex auto-dimming mirrors make nighttime driving safer by detecting glare and automatically dimming to protect driver vision.



HomeLink®

All of your HomeLink options -- from mirror to module -- are available under one roof. HomeLink has been seamlessly integrated into the Gentex automatic-dimming mirror, giving drivers the ability to operate a wide variety of garage doors, estate gates, home security systems, lighting, interior electronics and appliances. The multi-button interface is located as an easy-to-install module, or the base of the rearview mirror for a convenient, programmable solution that eliminates the need for traditional clip-on transmitters. With new developments soon to be available in non-automotive HomeLink applications, you will be able to control your gates, lights and garage doors from the seat of your ATV, lawn mower, snowmobile, golf cart, motorcycle, and a wide range of home and farm utility vehicles. HomeLink is a registered trademark of Gentex Corporation.



Displays

Gentex is the leading supplier of mirror-based displays. The mirror has proven to be the choice location to display driver information, such as rear camera display (RCD), compass, temperature, and much more. The mirror offers a common location across all vehicles as it optimizes space for emerging technology.



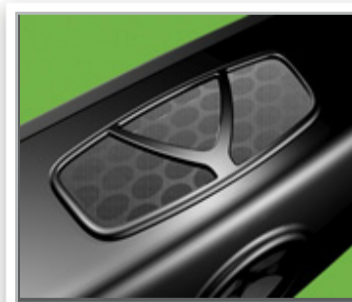
Telematics

Gentex is on the leading edge of telematics development with both OEMs and other suppliers for many years. The mirror has proven to be the choice location for the buttons and indicators of telematic systems. Since every vehicle has a mirror, the mirror offers a common location across all vehicles. The visibility of the mirror provides great brand recognition of any telematics system and the position provides easy access to the buttons in the case of an emergency.



Microphones

Gentex is a leading automotive supplier for microphones. These microphones are designed specifically to support hands-free and voice recognition systems. With superior acoustical performance and a design that rejects airflow coming from the vehicle defroster, our solution exceeds all performance requirements. Our mirror-based solution optimizes space and allows for a quick implementation across many vehicle types.



Lighting

Our ambient lighting products are positioned to illuminate the center console area without hampering the driver's vision. Interior lighting is important for passenger activities or when looking for items in the center console. All Gentex lighting solutions are LED based to ensure long life and quality performance. Positioning the maplights in the mirror optimizes the space in a vehicle and reduces potential distractions to the driver during passenger activities.



Automotive Products

Side Blind Zone

Signals

Gentex through-glass Razor® Turn Signals warn vehicles in your side blind zones of impending turns and lane changes. They produce 10 times more light than conventional, shell-mounted "wrap-around designs", and direct that light to the side blind zone regions.



Approach Lighting

When you activate your key fob to unlock your vehicle, Gentex through-glass approach lights illuminate the side of the vehicle, door handle, and entry path. Unlike other conventional "puddle" lamps that shine downward towards the door hinges, our approach lighting places the light where it is most useful and makes entering the vehicle safer and easier.



Side Blind Zone Alerts

Hundreds of thousands of side-blind-zone-related accidents occur every year. Gentex Side Blind Zone Indicators illuminate to notify the driver when vehicles are traveling in either side blind zone. The signal detecting the presence of a vehicle in the side blind zone is provided by an OEM-specified supplier, and that signal triggers the Gentex Side Blind Zone Indicator to light up. Gentex Side Blind Zone Indicators are currently used by six automakers.



Curved Glass

Gentex curved mirrors provide a larger field of view than traditional planar (flat) mirrors, and eliminate blind spot issues for many different-sized vehicles. Our capabilities allow us to bend multiple shapes to satisfy the diverse needs of our customers.

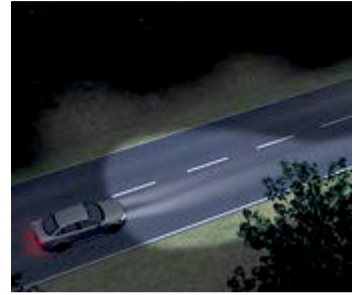


Automotive Products

Forward Driving Assist

Lighting Assist - SmartBeam®

SmartBeam uses a miniature camera-on-a-chip integrated into a Gentex auto-dimming mirror combined with algorithmic decision-making to automatically operate a vehicle's high beams in order to optimize their usage according to surrounding traffic conditions. Next-generation SmartBeam products will produce continuously variable low-beam patterns and control "constant ON" high beam systems for advanced headlamp hardware currently being applied to new vehicle applications. Space is optimized in the Gentex SmartBeam system with the camera and the control electronics as part of the mirror.



SmartBeam® DFL (Dynamic Forward Lighting)

SmartBeam DFL (Dynamic Forward Lighting), consists of a custom CMOS (complementary metal oxide semiconductor) image sensor combined with algorithmic decision-making to offer constant "on" glare-free high beams. Specifically, the system detects the presence of other headlamps and taillamps and generates dynamic "block-out" zones around vehicles that it is either trailing or moving toward. Special headlamps equipped with shutters block portions of the high beams to prevent blinding surrounding traffic while continuously optimizing forward lighting.



Driver Assist

As demand for additional camera-based features grows, Gentex is enhancing its capability to apply additional features to the mirror. Driver Assist systems that offer features like lane departure warning, forward collision warning, traffic sign recognition, and pedestrian detection also use a miniature camera-on-a-chip integrated into a Gentex auto-dimming mirror combined with algorithmic decision-making. Gentex is in development of Driver Assist systems in conjunction with Mobileye®, the global pioneer in the development of vision-based driver-assistance systems. Space is optimized in the Gentex Driver Assist system with the camera and the control electronics as part of the mirror.



Custom Sensor Clusters

Gentex is an experienced leader in integrating custom sensors into the windscreen. We collaborate with our customers to design the best solution for their cluster, which may include multi-purpose cameras, velocity sensors, rain sensors, humidity sensors, and more. Our experience with regulatory requirements, supply base, and sensor synergy allow our customers to be quick to market with their solution.



Rear Blind Zone Assist

Rear Camera Display

The Rear Camera Display uses a liquid crystal display (LCD) integrated into a Gentex auto-dimming mirror that works with a video camera mounted at the rear of the vehicle to provide a view directly behind the vehicle while backing up. When the vehicle is shifted into "reverse", a display appears automatically through the auto-dimming mirror's reflective surface. The display disappears when the vehicle is shifted into any other gear, a capability that is made possible utilizing Gentex's "transflective" coating and lighting techniques, which result in a bright, high-resolution color image.

