

FEDERALLY FUNDED RESEARCH DRIVES AMERICAN INNOVATION

AUTOMOTIVE APPLICATIONS OF BASIC RESEARCH

Federally funded research laid the foundation for many technological advances in the modern car



LCD Monitors:

The National Institutes of Health (NIH), National Science Foundation (NSF), and Department of Defense (DOD) funded the basic research that led to thin film transistor liquid crystal displays (LCD) in 1988, making possible such features as back-up cameras, television, and GPS.

Speech Recognition Technology:

The Defense Advanced Research Projects Agency (DARPA) and NSF funded research in the 1980s that led to speech activation and recognition technology, which is used to control music, navigation, and phone devices for safer driving.

Lithium-Ion Batteries:

The rechargeable lithium-ion (Li-ion) battery, developed in 1990, stemmed from Department of Energy (DOE) basic electrochemistry research funding as well as Air Force research. The Li-ion battery is an energy-efficient alternative for powering hybrid and electric cars.

Catalytic Converters:

Supported by NSF, Art Heuer at Case Western Reserve University developed zirconium dioxide-based ceramics to survive extreme conditions. Used in catalytic converters, these tough ceramics increase gas mileage by preventing cracking.

Microprocessors:

In the 1980s, DOD and DARPA supported research that led to major innovations in microprocessor manufacturing, making possible microchips with millions of transistors that are critical to everything from fuel efficiency to power steering.

Global Positioning System (GPS):

The development of GPS technology depended on basic and applied research (microwave research, recognition of the Doppler Shift, atomic clocks, satellite launching technology) supported by DOD and other federal agencies.

Center Brake Light:

In 1974, social scientist John Voevodsky found that a third brake light on automobiles would reduce rear-end collisions, injuries to drivers, and auto repair costs by more than 60 percent. After finding similar results in a repeat study, the National Highway Traffic Safety Administration required the third brake light.

Car Bumpers:

Reaction injection molding (RIM) creates resilient plastics used in car bumpers, which reduce repairs, insurance costs, and fuel consumption. RIM research came out of university-based materials research laboratories funded by DOD, NSF, and NASA.

Power windows:

Neutron-scattering instruments funded by DOE gave researchers the ability to develop new types of magnets, a critical component of the small yet robust motor that powers car windows.

Resistance Reduction:

DOE's Vehicle Technologies Office supports research on the loss of vehicle energy efficiency from such factors as wind resistance and braking. Such non-engine losses can reduce efficiency by as much as 45 percent.

Remote Car Locks:

Basic research supported by DOE's Office of Science contributed to non-rechargeable lithium batteries, which offer high energy storage capacity and are used in remote car locks to ensure long life.

Airbag Deployment Sensors:

Both NSF and NASA funded research on micro-electro-mechanical systems (MEMS), which made possible the creation of MEMS accelerometers, tiny motors critical in triggering airbags.

Shatterproof Windshields:

Neutron-scattering instruments funded by DOE allow researchers to study the structure of various compounds. This research has contributed to the development of polymers such as polyvinyl butyral, the resin used to create shatterproof glass.

