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Automotive Electronics-A Face of System Engineering

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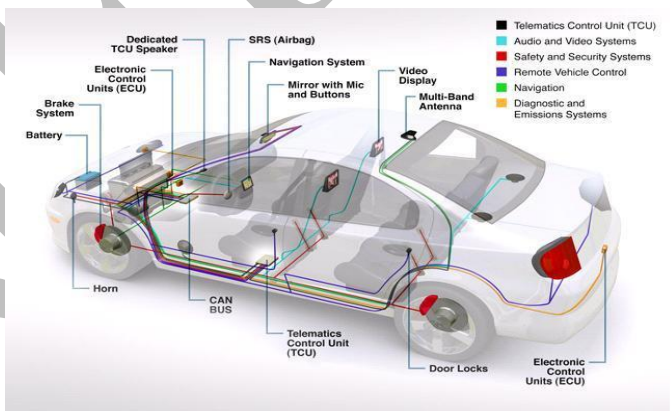
ABSTRACT
Electronics is now a day's a primary concern of the progress of a car, to entertain the passengers, to set up the connectivity with the rest of the world and to ensure the safety. The requirement of better performance, safety and comfort is the thrust behind the remarkable development of electronics in the cars. The success depends generally on system cost and reliability, which in turn are connected to the options of technological approaches. Will the electronics be an important factor in car manufacturing and design? In this paper, we will discuss some of the major contributions of electronics in cars. This paper also aims at design and trends, which are incorporated in a setting where vehicles are manufactured based on existing platforms.

Keywords: automotive electronics, role of semiconductors, system design, electronic control units

INTRODUCTION
Automotive electronics is a sub-system in modern vehicles, consisting mainly of semiconductor devices which are used to sense, compute and actuate the various features or functions in a vehicle. Human's new requirements to Car are mobility, economy, safety and stability. Conventional mechanical devices are unable to solve certain problems. Automotive electronics industry emerges after electronics and information technology is applied to the automobiles. From the point of view of application, automotive electronics can be divided into engine transmission system, chassis system, body system, communication system, safety system and so forth.



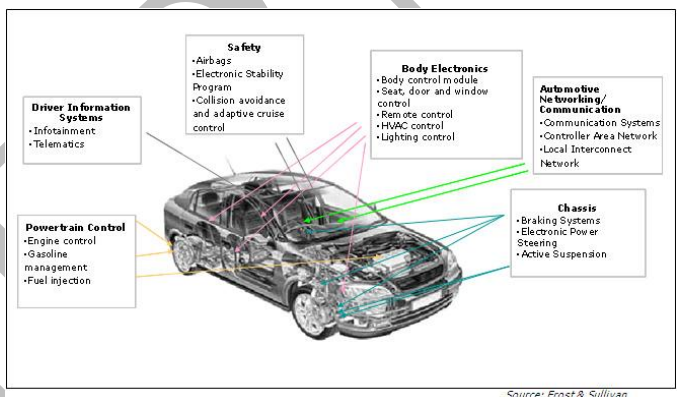
ELECTRONIC SYSTEM DESIGN

On the whole objective of electronic embedded system design is to balance production costs with development time and cost in view of performance and functionality considerations. Manufacturing cost depends generally on the hardware components of the product. As the complexity of the products under design increases, the development efforts increase dramatically. Simultaneously, the market dynamics for electronics systems push for shorter and shorter development times.

TRENDS IN AUTOMOTIVE ELECTRONICS SYSTEMS

Looking at electronic systems or ECUs (electronic control units) for these systems, however, development is expected to be much stronger. Now-a-days, electronics run attractive much everything in a vehicle. Between consumer love of electronic conveniences and hybrid or electric vehicles, the use of electronic systems in the automotive industry is accelerating at a furious pace. Of course, with new technologies come new challenges.

Interoperability has emerged as a major challenge for automotive design engineers and Radio Frequency is now an integral part of that. Engineers are looking at not only analog and digital or serial data signals in the time domain but also increasingly Radio Frequency signals in the frequency domain. Things like tracing the handshake between a radio transmitter and receiver as the communication is established and determining if a Bluetooth radio IC is transmitting when it is supposed to be common tasks that span the time and frequency domain. We now require looking at both domains at the same time. Time domain and frequency domain with time-correlated data are important factors to determine how one signal affects to another or if there is any unexpected signal behavior that may cause malfunctions.



Source: Frost & Sullivan

One of the major roles is played by the electromagnetic interference. So many things play into electromagnetic interference and it is rather not to take lightly. With more number of electronic control units come further wireless functionality and the move toward higher switching power in hybrids and electrical vehicles. So, we cannot ignore the importance of electromagnetic interference.

Automotive is one of the fastest growing sectors in India. There is a constantly growing condition for environment protection. The end users are asking better fuel effectiveness, safety and security. This has greatly contributed to the fast development of the technology that can be employed in the vehicles.

AUTOMOTIVE ELECTRONIC DEVICES MARKET:

The growing automotive industry and constant technological growth have transformed the driving experience completely. Cars in today's world are equipped with extraordinary numbers and types of advanced gadgets. Be

it the GPS system or entertainment systems, everything is going digital and driving the global market for automotive electronic devices.

The automotive electronic devices market can be segmented based on parameters such as technologies and products. Based on the product type, the different electronic devices used in vehicles are: GPS systems, entertainment systems, control devices, and video devices among others. Of all the product types, entertainment systems are the most vibrant and have multiple sub-segments, such as radio/audio devices, satellite radio, dashboard player, TV-DVD players, and so on. A new trend showing up in the market is the integration of multiple systems into one, so that scope for new systems or multiple installations, cost optimization, and design variations is further raised. This is further expected to drive the market growth.

ROLE OF SEMICONDUCTORS:

The explosive growth of infotainment systems in modern cars has a major impact on the market demand for semiconductor memories. New memory solutions, specially adapted for automotive infotainment systems, are required to offer supplementary storage space for rich infotainment multimedia data and superior software and applications. Quality is an essential factor for the rapidly modern in-vehicle infotainment electronics market and memory is the backbone of this segment where semiconductor products must meet exact automotive rating recognition. Microcontrollers were mainly used in automobiles for the fuel injection system. But, later these found application in numerous other applications such as in vehicle control modules like electronic power steering systems, adaptive cruise control systems, airbag control systems, electronic stability control systems and anti-lock braking systems.

SAFETY AND SECURITY SYSTEMS:

Along with comfort and entertainment, we also give the importance to the security and safety features. There are a number of layers of security that such systems would offer and this are-

1. Security against theft.
2. Security against car misbehavior.
3. Personnel safety in case of collisions.
4. Security against accidents.

POWERING THE FUTURE OF AUTOMOTIVE INNOVATION:

The future of the automotive industry is being formed by the tech-savvy, digitally connected generation, positioning automotive innovation as the nexus point where the latest in mobile, entertainment, navigation and safety technologies meet. As in-car instrumentation and infotainment technology progresses to become increasingly complex, it is critical that reliable, high-quality components are powered to get the interactive driving experience to life while simultaneously improving driver protection**.**

CONCLUSION:

The use of electronics in the automotive industry is really exploding with many new and innovative traits. Instead of lagging behind the rest of the industry, automotive is at the front position. Our motive should be to provide knowledge on how to integrate automotive electronic systems successfully in a setting where vehicles are developed based on existing platforms. The effect of the ongoing changes in the automotive market is reflective and Original Equipment Manufacturers are investing to manufacture energy efficient connected vehicles to meet the demands of tomorrow's consumers. Manufacturing techniques are also changing speedily because renovation reduces the cost and time of assembly and flexible automated plants benefit from machine-learning analytics to grow throughput and improve quality. Rising digital sales platforms and connected cars present exciting new income opportunities but are attracting new entrants from the technology world.

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