

# [Abstract all the electronic control units (ecus)](https://assignbuster.com/abstract-all-the-electronic-control-units-ecus/)

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AbstractAnew development within the internet of things is the development of connectedcars. Vehicles developed lately have connected more than 150 small computersinside (ECUs), whose are creating in-vehicle network. These kind of vehicleshave multiple connection points on the internet which offer a lot of onlineservices to the users. Everydevice that is connected on internet is exposed to a lot of online threats, thesame happens with the connected vehicle. Keywords: connected car, threat model, security embedded systems, protocols, etc. IntroductionTheworld is getting interconnected every day.

The devices we are using are nowsmart devices, even the vehicles we are using are becoming smart. A recentdevelopment within internet of things are connected cars. Nearly everyfunctionality within a car has its electronic control unit (ECU) running on itsdedicated embedded controller with its own software. ECUs are used for manypurposes such as safety, comfortableness, entertainment energy saving. Each carhas approximately 100 to 150 ECUs which have more sensors and actuatorsattached.

Oneof the main parts of the vehicle is the internal vehicle network. This networkconnects all the electronic control units (ECUs) in the car and each ECU is responsiblefor a different car function. Internet vehicle network and the ECUs transformthe car to work on drive by wire technology. Some of the systems are:-         Intelligentparking assistance,-         Lane keepingsystem-         Being spot warningAllof these are part of Advanced Driver Assistance System. Recently, researches have shown that it is possible to hack vehicles even remotely and tocontrol a variety of car actuators. BackgroundAnembedded system is the electronic system which is created to access and tocontrol the data in electronic systems.

The system includes a single chipmicrocontroller such as ARM, cortex and microprocessors. For the first timeembedded systems in the automobile industry is used by Volkswagen in 1968. Automotiveembedded systems are classified in some groups such as:-         airbag system –         GPS-         Anti – lockingbraking system-         Fuel injectioncontroller devicesTheequipment in automotive industry are being changed from mechanic systems toelectronic systems. Embedded system is the heart of the vehicle electronicsystems because of its versatility and flexibility. Advancedusage of embedded systems in vehicle can help in controlling the pollution, increasing the facility to provide systems monitoring features that consumersdemand. Atypical vehicle nowadays contains around 25 to 35 microcontrollers. Automobileshave computer controlled electronic systems and the most commonly used embeddedsystem include airbag, anti – lock braking systems, drive by wire, satelliteradio, traction control, automatic parking, night vision, navigation systems, climate control, etc.

ConnectedCarsBythe definition, a connected car is a vehicle equipped with internet accesswhich allows to interact with other vehicles around it. When a connected carhas the internet access than that vehicle is able to use information to drivethe vehicle without human interaction. Inthe new vehicles there are a lot of new technologies installed but, thetechnologies cannot be used without the internet connection. Eachcar consists of 100 to 150 ECUs (Electronic Control Units) which are smallcomputers that are networked together and control most of the vehiclefunctions. Each ECU has a number of sensors and actuators attached to them. TheECU and internal vehicle network replace the mechanical connections withelectrical systems and slowly transform the car to work on drive – by wiretechnology.

Today’svehicles are equipped with a number of new technologies and features that werenot possible without an internet connection. Passengers no have the option toreceive service information and traffic reports through the vehicle’s dedicatedcellular connection. They also have the option to connect their smart phone tothe vehicle over the Bluetooth or Wi Fi connection and use the smart phone’sinternet connection to enable some of the new features of the vehicle’sentertainment center. This center enables web browsing, access to socialnetworks, streaming of online content, and many other services depending on thevehicle type and manufacturer. Inthe very near future, vehicles will communicate with each other (V2V) and withthe infrastructure around them. (V2I). This is going to reduce accidents and todecrease gas consumption by letting vehicles communicate with each other andhave more control.

Some of the major features of V2V technologies are todetermine the speed limit and in order to collect information about traffic androad conditions the vehicles must be connected to the internet. Vehicleto vehicle (V2V) technology enables cars to wirelessly communicate with eachother and to maintain temporary networks among themselves in order to preventaccidents. The information that is exchanged between two connected vehicles isrelated to traffic safety and security, keeping a safe distance between the twocars for preventing accidents or any other data that is meaningful to thevehicles.

This technology is challenging because of its distributed nature andto implement V2V connection the car manufacturers need to agree oncommunication technologies and protocols that will be used. Otherwise withoutthe mutual agreement between car manufacturers, the communication would be madeonly between cars from the same brand. V2I(Vehicle to infrastructure) are technologies where the car communicates withinfrastructure environment around, which includes highways, road signs, trafficlights. Also, it is possible to get information from traffic jams andaccidents. In the near future when most of the vehicles will be connected cars, the traffic can be regulated by one central authority by giving suggestions toall vehicles on the best route and speed, enabling an environment withouttraffic jams, accidents and with less fuel consumption. AbstractAnew development within the internet of things is the development of connectedcars. Vehicles developed lately have connected more than 150 small computersinside (ECUs), whose are creating in-vehicle network.

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