UNIT- V

SAFETY IMPACTING DEVICES:

Vision Enhancement:

→ Limited visibility, whether due to darkness, obstructed views, or inclement weather, has always been one of the biggest challenges for drivers and automakers.

→ Vision Enhancement system for night driving commonly are either night vision goggle (NVG) or in-vehicle displays.

→ In-vehicle vision Enhancement Systems will improve visibility for night driving, inadequate lighting, fog, drifting snow or other inclement weather driving conditions

Driver Condition Warning:

→ Driver drowsiness detection is a car safety technology which helps prevent accidents caused by the driver getting drowsy.

→ Various Studies have suggested that around 20 %. of all road accidents are fatigue-related, upto 50 % on certain roads.

→ Other driver warning systems are indication / alerts of

* Preferred route
* Hand brake
* Gear shift
* Seat belt
* Over speed
* Door lock

ABS

* Anti-lock braking system is otherwise called as Anti-skid braking system

* It uses hydraulic components of braking by means of electrically actuated through ECU.

* The ABS pumps 18 times / second, the brake fluid.

Route Guidance & Navigation:

"Alpine"

→ The system consists of base unit, Antenna monitor, remote control, CD ROM disc.

→ The input to the navigation system to choose the place show the monitor are by using voice command.

→ The upcoming junctions so that the users can determine the route.

→ If the destination route has changed by mistake of the drivers, then the Auto-reroute system computes by itself and acknowledges the drivers to reach the destination in alternate route.

In - vehicle computing:

→ Throughout the car are various computers called electronic Control Units (ECU), or ECUs - the traffic lights and intersections of our road system analogy.

→ Each ECU has several jobs: such as Controlling the engine or transmission, rolling up windows, unlocking doors & the like.

→ Automotive Controller Area Network system is a vehicle bus standard designed to allow ECUs and devices to communicate with each other in applications without a host computer.

CARPUTER:

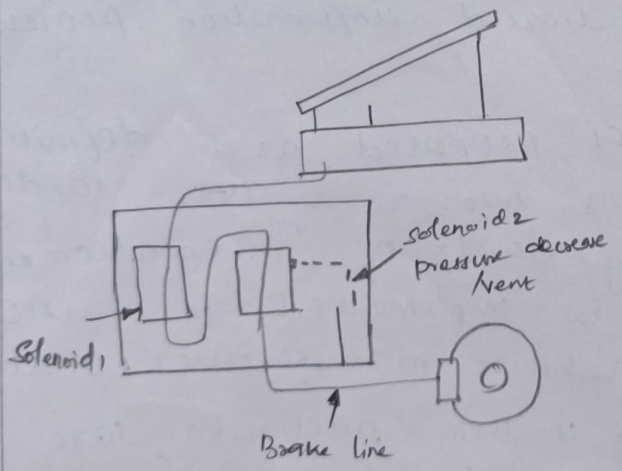
→ Refers to any computing platform that is installed in a vehicle

→ While some after market carputers are available to consumers, most carputers are built by enthusiasts using desktop PC components from smaller for factors like the mini-ITX or micro ATX

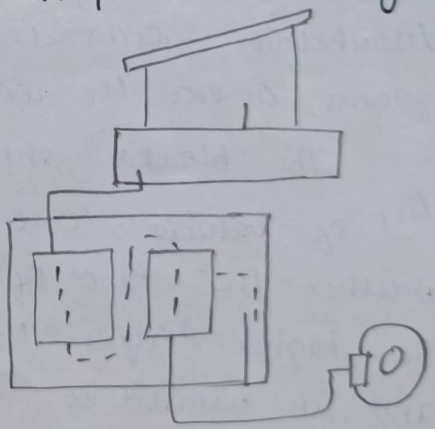
OPERATION OF ABS :-

Depressing the brake pedal operates the brakes in the normal way. For example, should the wheel sensors indicate to the computer that the front right wheel is about to lock, the computer will start up the modulator pump and close the inlet valve CA. This prevents any further pressure from reaching the right front brake. This is known as the 'pressure retention phase'. If the wheel locks up, the computer will register the fault and send a signal that will open the outlet valve DA so that pressure is released. This will result in some rotation of the right front wheel. This is known as the 'pressure reduction phase'. If the sensors indicate the wheel is accelerating, the computer will signal the outlet valve D4 to close and the inlet valve CA to open and further hydaulic pressure will be applied. This is known as the 'pressure increase phase'. These 3 phases of ABS braking, ie. pressure retention, pressure release and pressure increase, will continue until the threat of wheel lock has ceased or until the brake pedal is released.

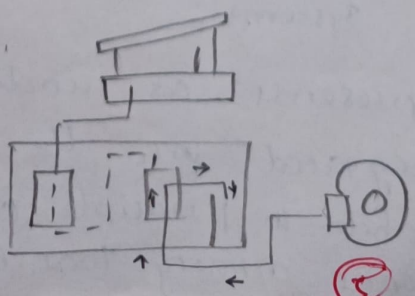
(1) Increase in pressure:



(2) Hold pressure steady



(3) Decrease in pressure



* CONTROL ARCHITECTURE :-

MULTI-LAYER ARCHITECTURE :-

We consider a general layered architecture which is naturally abstracted from the hierarchical 2 and 3-layer control (T2) topologies of section 3. This leads to single class of functional (T5) topologies, but which admits alternative structures in terms of the flow of control actions (T2).

A number of levels or layers of vehicle control functionality or 'behaviours'. Higher layers involve more integrated functionality, in other words a more co-ordinated use of actuators. The bottom layer, Layer 0, represents the minimum level of functionality for the vehicle to operate at all, whether or not any electronic control systems are included. Because, for simplicity, the sensor and information structures are not being dealt with in any detail, the interface to such system is simply represented on the left side ~~of~~ in terms of a multiplexed 'bus' or network serial from which information is interchanged. There are many possibilities for how information is structured and exchanged, for example with basic sensor signals being supplemented by state and disturbance estimates from dedicated information processing systems, or via the control blocks.

The blocks shown are not proposed as a definitive list of vehicle control functions, nor as a IVCS standard, rather the kind of increasing levels of 'integration' in the higher layers that might be implemented in practice, and it would be for each vehicle manufacturer to define and develop such functionality in any particular case. It is of course quite possible to extend the layering upwards to include multi-vehicle system behaviour and interaction with other roadway systems.

Each block represents an individual 'behaviour' that is to be integrated into the overall control system operation. While in principle a 'behaviour' could be any type of operational activity that has no obvious overall

ON-BOARD DIAGNOSTICS :-

A contemporary microprocessor based on-board diagnostics or OBD system is intended to self diagnose and report when the performance of the vehicle's emissions control systems or components have degraded. This is to the extent that the tailpipe emissions have exceeded legislated levels or are likely to be exceeded in the long term.

When an issue occurs the OBD system illuminates a warning lamp known as the malfunction indicator lamp (MIL) or malfunction indicator (MI) on the instrument cluster. In the united states this symbol often appears with the phrase 'check Engine', 'check' or 'Service Engine soon' contained within it. European Vehicles tend to use the engine symbol on an orange background.

When the fault occurs the system stores a diagnostic trouble code (DTC) that can be used to trace and identify the fault. The system will also store important information that pertains to the operating conditions of the vehicle when the fault was set. A service technician is able to connect a diagnostic scan tool or a code reader that will communicate with the microprocessor and retrieve this information. This allows the technician to diagnose and verify the fault, make a repair/replacement, reset the OBD system and restore the vehicle emissions control system to a serviceable status.

As vehicles and their systems become more complex, the functionality of OBD is being extended to cover vehicle systems and components that do not have anything to do with vehicle emission control. Vehicle body, chassis and accessories such as air conditioning or door modules can now also be interrogated to determine their serviceability as an aid to fault diagnosis.

ANTI-LOCK BRAKING:-

Anti-lock Braking is another form of a computer controlled system that is commonly used. A relatively modern system that uses individual wheel control for ABS and is known as a 4-channel system. The braking system uses a diagonal split of the hydraulic circuits. The brakes on the front left and rear right are fed by one part of the tandem master cylinder, and the brakes on the front right and rear left are fed from the other part of tandem master cylinder.

The wheel sensors operate on hall principle and give an electric current output which is considered to have advantage over the more usual voltage signal from wheel sensors. The ABS control computer is incorporated into the ABS Modulator, and with the aid of sensor inputs, provides the controlling actions that are designed to allow safe braking in emergency stops.

Starting at the top left corner, there are 2 hydraulic accumulators which act as pressure reservoirs for hydraulic fluid. Below these is the modulator pump which is under computer control. At the bottom of the 4 wheel brakes and above are the inlet and outlet valves which, under computer control, determine how braking is applied when the ABS system is in operation.

ABS is not active below 7KM/h and normal braking only is available at lower speeds. When ABS is not operating, the inlet valves rest in open ~~op~~ position and the outlet values rest in the closed position. At each inlet valve there is a pressure sensitive return valve that permits rapid release of pressure when the brake pedal is released and this prevents any dragging of the brakes.

HYBRID CARS (Electric/ Future cars)

→ Hybrid vehicle is a combination of the electrical drive alone with IC Engine.

→ The hybrid vehicles are classified as

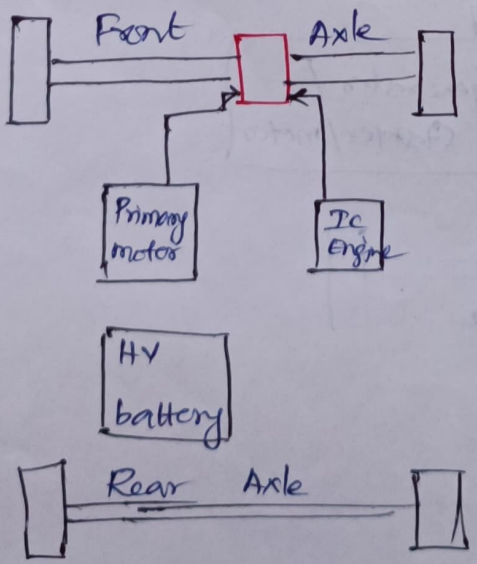
* Semi Hybrid
* Fully Hybrid

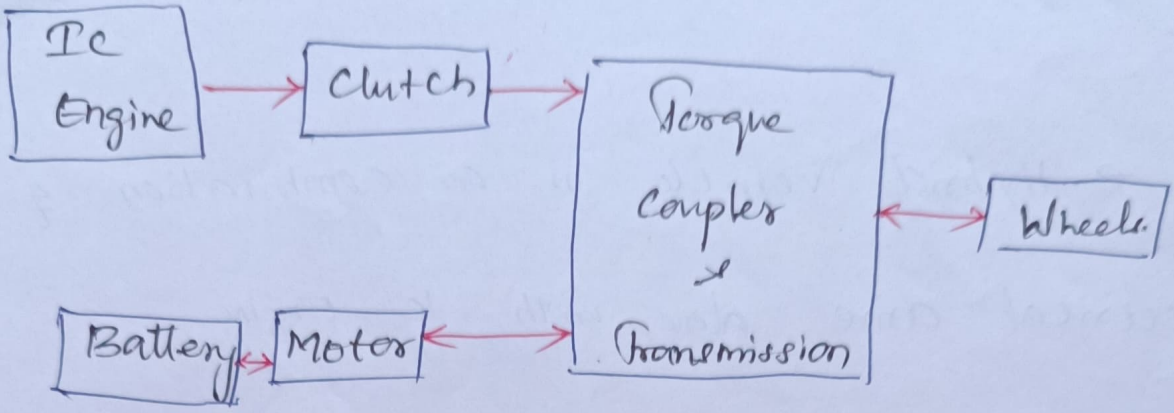
→ According to power flow

(i) Parallel Hybrid

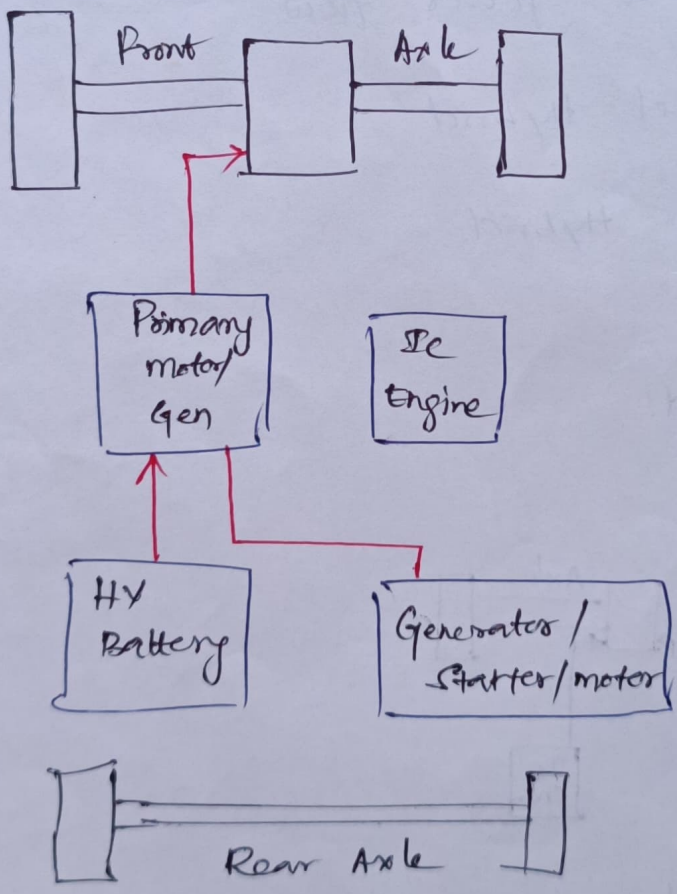
(ii) Series Hybrid.

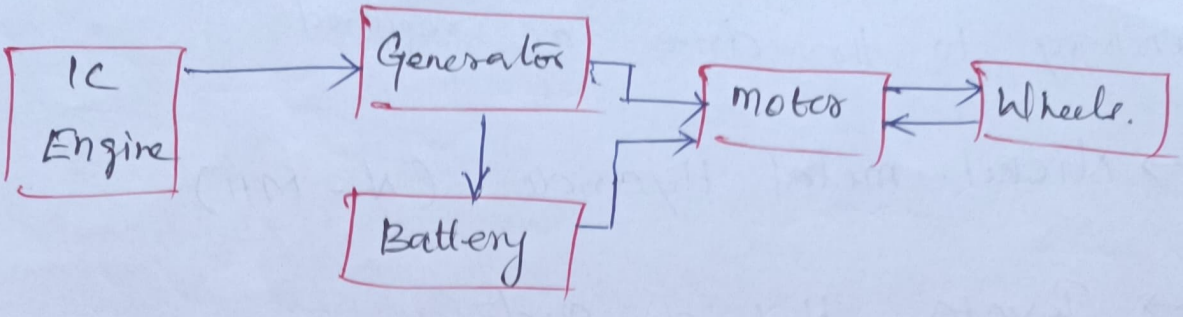
Parallel Hybrid:



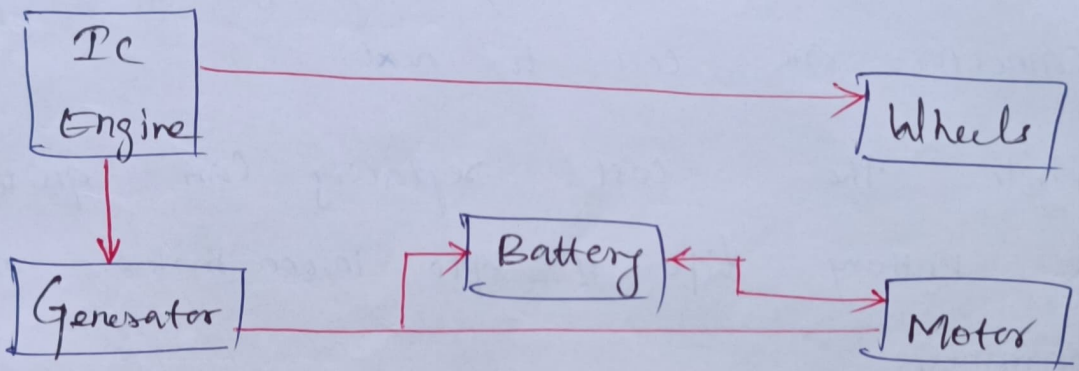


Series Hybrid:





Case study on Hybrids.



Manufacturers : HONDA TOYOTA

models

Honda - Insight

civic

Accord

Prius.

→ The high voltage battery provides electrical energy to the drive as required.

→ Nickel-metal Hydride (Ni-MH)

→ Toyota Hybrid System each consist of 1.2 V for a total of 273 V direct current.

→ The ~~sensor~~ cells are connected by a single contacts connector, one cell to next.

→ While the cost replacing can quite high the battery life is upto 10,000 miles. in warranty.