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A Study on the Perception of Different Converters for Electric – Vehicles

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Abstract: ***A good electrical power system ensures the availability of electrical power without any of the interruption to every load connected to it. Generally the power is transmitted through the high voltage transmission lines. Normally these are the types of the devices which are can be of the batteries or of the ultra-capacitors these devices stores energy as the DC Charges. Here the energy can be obtained from the AC lines which are connected to the grid lines and these can be processed either type can be wired type or the wireless. The processes involved they will work in the reverse direction in which the power present which can be fed back to the grid lines and the batteries which is of the regenerative braking type when the vehicle present in the idle V2G state. Here the typical placement of the various different types of the converters in an EV positioning systems along with the power converting storage type of the devices here the conversion present can be of the DC-AC or DC-DC types. Here the description of the power converter electronic devices are provided and the classification of the AC-AC converters.***
Index Terms: LLC, SRC , MOSFET, ZVS FB Converter, BCM, OLPT, PMPT, RIPT, V2G.

I. INTRODUCTION

The Power Conversion techniques involves different types of the converters having AC/DC and the utility plugging system. Here the different arrangements for the AC-DC converter having the power from the grid system which can be stored in the another form of the storage having the DC-DC conversion in EV systems. Here the power supply can be from the storage devices having various types of the converter devices and the motor drive type of the systems having energy storage systems, motor drive unit, energy storage systems which is having DC linkage having variable AC voltage system. The power which is fed back to the source here the DC-DC type of the boost converter can also be to combine a power source to drive the DC motors having the power source to increase the voltage which is dependent on the battery storage in which the boost converter having the DC link in which the power flow and here the converter type which is as the buck converter in which the flow it can be reversed here the type of the operating conditions it can be of the switching configurations in which the digital signals can also be used in which the digital signal processing units here the DC-DC converter having boost converter here the battery used which can be used upto the voltage level that is also configured into DC-DC Converters.

Here the inverter which is involved that is the dual inverter type of the updated type of the technology which can be used which is the permanent magnet type hence it can be of the synchronous motors type that is PMSM. Here the voltage sources which are involved which can get operated present on the space vector configurations which can use both induction motors types and the PMSMs here the bidirectional inverter type of the matrix can also be used which consists of the system configurations.

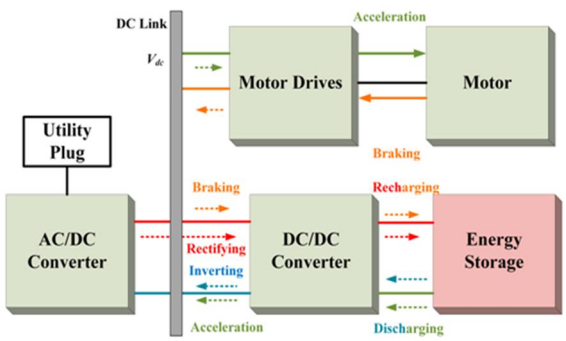

Fig 1:Typical placements of the different types of the converters present in an EV system it transfers power to the source through the another stage of the DC-DC Conversion.

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II. BLOCK DIAGRAM OF CONVERTER

When an un stabilized input voltage is given to the controller which produces a stable output voltage which is precisely constant with no voltage fluctuations. A static system plays an important function as the stability configuration for the voltage fluctuations involved and the disturbances which are transient in the nature present in the interconnected manner having the DC-DC stage and the AC-DC stage here for both the converter types of the circuits which can also be stacked into the various types of the converters that can be used which can be shown in the figure, having the PWM type of the pulse width modulation can be on or off.

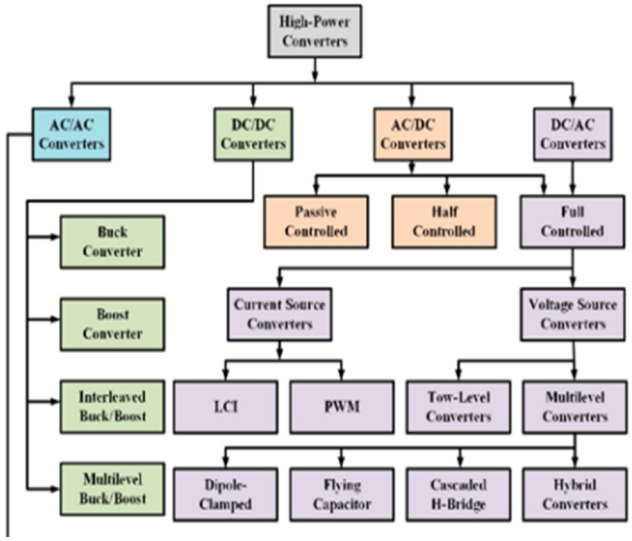

Fig 2:Power supplied to the motors from the storage through the DC-DC Converter

+ Here some of the notable DC-DC converters that can be of the phase shift type of the registers which full bridge type of the converter(PSFB), here the inductor- inductor type of the capacitors (LLC), and also the comparision of the components that can be present in the three converter stage circuits. Here the series converter circuit which is resonant type that used in the DC-DC converters which required to be the having the low cost, low weight having the size range which can be integrated with the preferable options that can be integrated into its closed loop type of the closed coupled inductor (CCI) and then loosely coupled type of the inductor circuit(LCI) which can be interleaved type of the inductor circuits in which these types of the converters can also be used having converter circuit which stated as the Power Factor Correction(PFC).

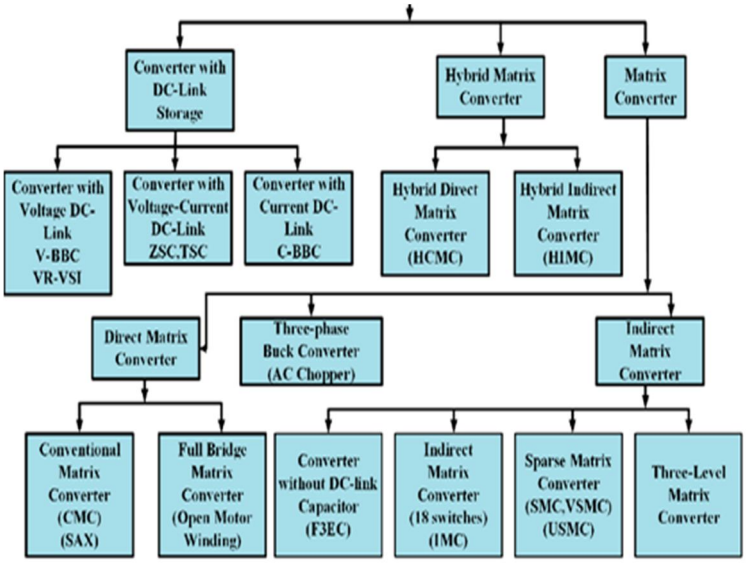

Fig 3:Detailed type of the Converters

The high power factor of the converter circuit having detailed structure of the number of diodes and the number of transformers having twice of the switching frequencies having low ripple which is twice of the gating signals. In the Bridgeless or the dual boost type of the converter having identical switches which is used in MOSFET which are decoupled in nature here the rectifier input bridge the interleaved Boost PFC converter proposed which is to operate the above 3.2 KW level having the two types of the MOSFETS by using two fast diodes. Here the gating signals which are present having a phase difference of 180 degrees.

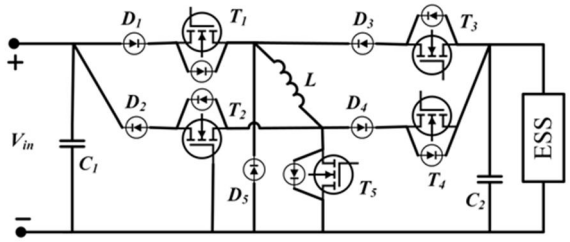

Fig: Universal DC-DC Converter

According to the dual converter configurations having a driver circuit to drive the AC motors which can be used both on the PMSM and a stacked matrices which is used in the systems which acquires the power system configurations having single approach and Double approaches inverter circuits having the different interleaved structure two stage approach having batteries high frequency which is having two ripple structures that can be used in different types of the techniques having various comparision of components with the SRC Converter, LLC Converter, which are adapted from the various output and the input filter circuits which are present in the circuits having the components like gating MOSFETS signals which are decoupled type of the structures that can be made to achieve the high input voltage conditions.

Direction	Mode	T_1	T_2	T_3	T_4	T_5
V_{dc} to V_{ban}	Boost	On	Off	Off	On	PWM
V_{dc} to V_{ban}	Buck	PWM	Off	Off	On	Off
V_{ban} to V_{dc}	Boost	Off	On	On	Off	PWM
V_{ban} to V_{dc}	Buck	Off	On	PWM	Off	Off

Fig 5: Operating conditions for the universal DC-DC converter

According to the converter for the wired charging conditions that it can be interleaved from the converter side configurations having PFC techniques which suits for the low power charging conditions having high frequencies conditions therefore it can be represented by the ZVS FB Converter having voltage doubler circuit represented by the charging conditions.

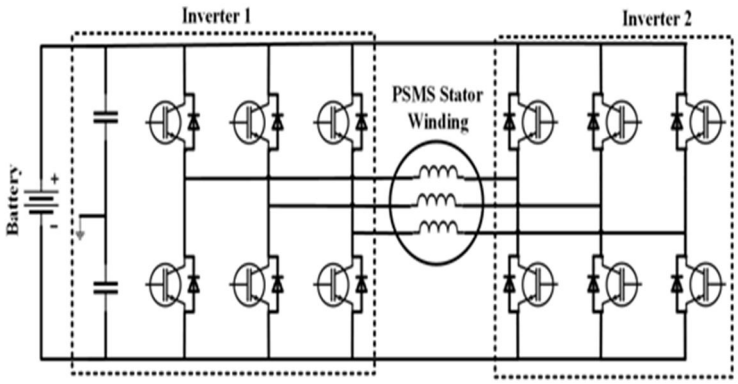

Fig 6:Dual inverter circuit for the Single source

The loosely coupled type of the circuits which are also interleaved from the common PMSM converter type of the circuits which are having stator windings in which one suits for the low power circuit system configurations having different types of the diodes and having suitable for the charging conditions which are coupled to the boost converter type of the circuits are having different types of the structure configurations here some of the isolated type of the converters which are having the capacitive output filters.

Item	PSFB	LLC	SRC	
Number of switch blocks		4	4	4
Number of diode blocks		4	4	4
Number of transformers		1	1	2
Number of inductors		1	0	0
Additional capacitor	Blocking capacitor		-	-
Output filter size	Small	-	Large	

Fig7:Comparision of the Converters.

According to the various types of the converters which are involved having most type of the updated type of the technologies having most of the synchronous type of the motors which are operated on the inverter 1 and the inverter 2 having the system configurations having the single source technologies.

The type of the system presented has isolated type of

The DC-DC Converter having different types of the topologies types of the structures which are proposed which also reduces the ringing type of the diode rectifiers having an trailing type of the edge structures

In which the further which also reduces the voltage

The interleaved type of the Boost type of the PFC converter having various types of the diodes and the various types of the inductors are also involved. Here AC-DC Converter is also present in which the front end type of the structure is also present having interleaved type of the converter which are working in the 180 degrees out of phase with each other having different types of the configurations which provides the lower ripple type of the structures which are made identical to each other by tying the type of the power power train type of the switches.

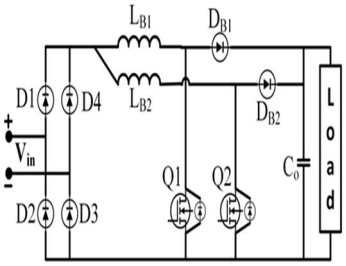

Fig 9:Interleaved Boost PFC Converter.

Here the inductor, capacitor and the different types of the diodes are connected to the load supplied by the single source supply units. Rectifier bridge unit is not present in which the power produced by the fuel cells.

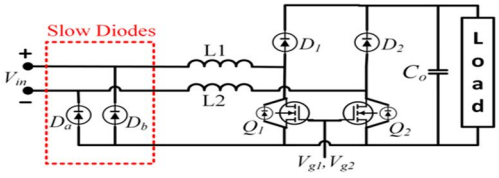

Fig 10: Bridgeless/dual type of the converter.

Here the bridge less inverter type of the circuit it can be interleaved by the slow diodes having positive and the negative supply units having the bidirectional converters .Here the driver 1 circuit is also present.

Stresses which reduces the cost of the circuit having high frequency at the resonant converter circuit which shows the telecom sectors having industry type of the environment having various EV applications having the design procedures for those type of the configurations having various application procedures. In which the boundary conduction mode are also preferable for these type of the converters.

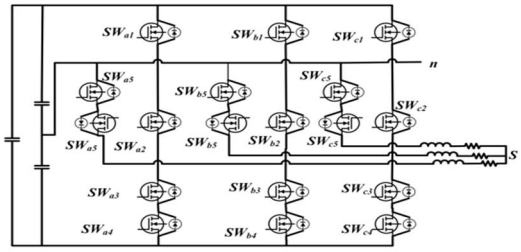

Fig 8:Novel stacked matrix inverter

Here the Williamson et al he presented some of the isolated type of the DC-DC converters having different types of the MOSFET switches which are connected to the single source supply unit having stacked type of the structures having capacitive mode

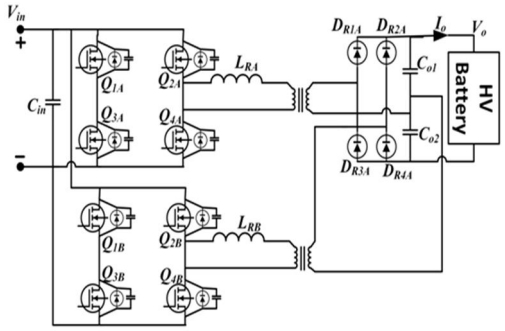

Fig 11: Inter leaved ZVS FB Converter

The above shown figure is a type of the circuit having various circuit feature consists of the high voltage battery type of the circuit having full wave bridge circuit having different having different types of the converter having the switches matrix inverter circuit.

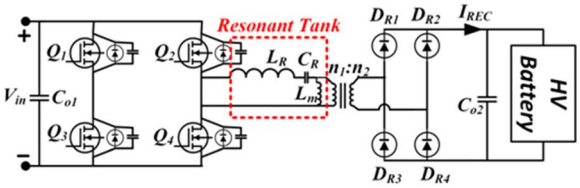

Fig 12: Full Bridge LLC Resonant Converter

The full Bridge wave rectifier units having the resonant type of the converter configurations. Here the inductor element stores the energy having the resonating tank having the transformer ratio which is to be stepped up and stepped down the voltage.

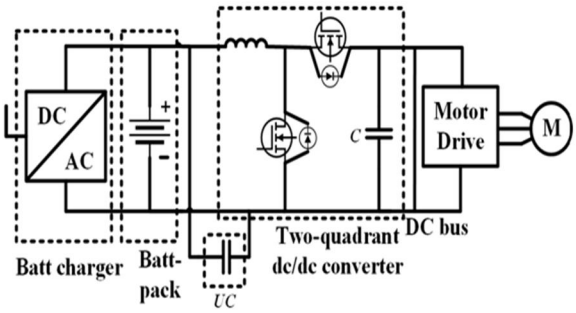

Fig 13:Two Quadrant DC-DC Converter, converts the battery voltage having motor drive type of the circuit.

Here the DC or the AC type of the block element connected to the voltage supply units having positive side of the supply connected to the inductor element having the coupler circuit in which the two quadrant chopper dc/dc converter circuit having DC bus element. Here the motor drive element connected to the motor drive having the ultra capacitors having charging and the discharging types.

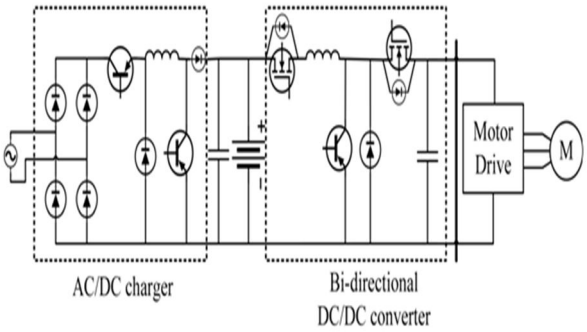

Fig 14:Cascaded Converter to be used in PHEV.A bidirectional DC-DC converter having AC/DC charger system having transistor configurations.

The Bidirectional type of the converter is also present which helps to transmit the power from the various motors of the circuit to its energy sources. Here the types of the novel technologies which are involved can also be erected which is used in the PHEVS, which are being searched by the system configurations having different arrangement conditions for the type of the electric vehicle which is also involved which is represented in the above system diagrams having multiple sources of energy conditions, here the type of the system having various features can also be dealt with the various types of the capacitors and also ultra battery structures which are also added in the cascaded manner like structures.

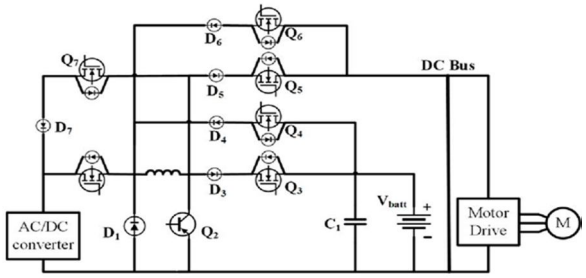

Fig 15:Integrated type of the AC/DC-DC/DC Converter.

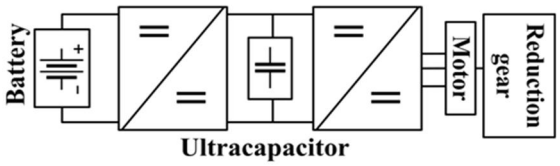

Fig 16: Ultra Capacitor Circuit Diagram

Here the above two diagrams shows the integrated type of the AC/DC Converters and DC/DC Converters here the battery charging capacity of the element in which the positive supply of the system and its respective negative terminal which is connected to the ultra capacitor here the motor which converts mechanical energy into the electrical energy here the motor circuit which is internally connected to the reduction gear unit type which can also be depicted by the above circuit diagram having an ultra capacitor which acts like a charging and discharging condition element, here the first system of the ultra capacitor which forms both of the battery of the system and also the ultra capacitor which is involved connected in the parallel circuit configurations, here the third system which is present having the system which is employing the type of the fuel cells in which the battery which is present can be used mainly for the back up protection schemes here the bidirectional AC/DC Converter it also be sub divided into two main group like structures one which is low frequency component block having transistor configurations.

Here the AC-DC Converters which are also present which can be used in charging the batteries from the AC supply units here the term k unit which represents the type of the Coupling coefficient of the system having two inductors types L1 and L2 here there are two inductors which are also present having the system configurations which also demonstrates the charging system having double arrangement that is the 'double' arrangements for the WPT system which also demonstrates the various types of the converters here the permanent magnetic type of the power transfer circuit which is also incorporated having the principle of power transfer by means of the flux linkage of the system here the most of the rudimentary type of the power transfer from one of the coil to another coil of the system which also uses the various coupling units.

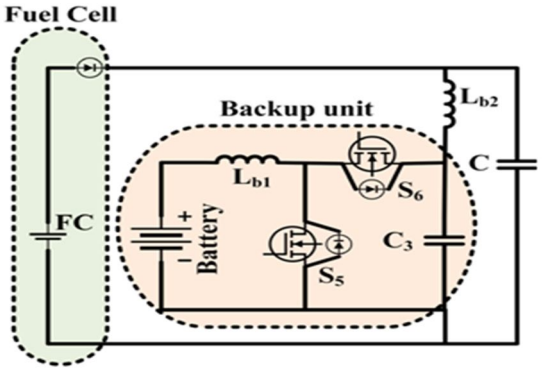

Fig17:Cascaded connection (a)Parallel connection (b)Cascaded connection (c)Fuel cell with the battery back up.

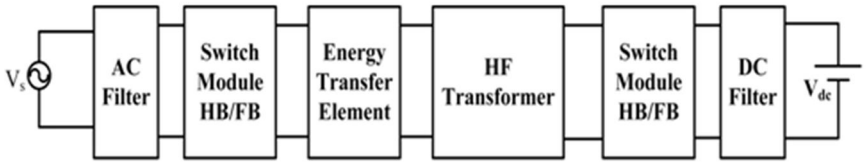

Fig 18:Low frequency AC High frequency AC/DC Converter also called as the single stage converter

Here the use of the resonance circuit which can also be the power transfer technique which also called as the Online power transfer technique (OLTP), here the AC filter which is internally connected to the switch module type of the HB mode/ the FB mode of operation can also be used, the resonating conditions can also be incurred where there is similar type of the technologies having equipping with the EV Vehicle charging systems wirelessly in which the receivers are been integrating into various types having an inductive powers in which the pilot projects can also be present having various characteristics in which the system table, resonant system table which is a power transfer technique that can also be incurred with its receiver system having resonant antennae circuits which are present in the system having charging WPT system configurations in which the rotor is made to rotate in the which is placed in the another vehicle.

Configuration EV	Reference	Operation	Key Features	Application in
Buck converter	Bose [92]	Step down	Can operate in continuous or discontinuous mode	Sending power to the battery
Buck-Boost converter	Bose [92]	Step up and step down	Two quadrant operation of chopper	Regenerative action
Interleaved Boost PFC converter	Williamson et al. [46]	Step up with power factor correction	Relatively small input EMI filter	Chareing
Bridgeless/Dual Boost PFC Converter	Williamson et al. [46]	Step up with power factor correction	Does not require rectifier input bridge	Chareing
ZVS FB Converter with Capacitive Output Filter	Williamson et al. [46]	AC-DC conversion	Zero voltage switching	Charging

Fig19:Converters with EV application displaying their key features.

Here the AC/DC Charging system having wireless or the wireless power transfer WPT techniques which uses the principle of the transformer having its primary circuit which is present at the charger end, in which the energy is also present which can be transferred to the secondary circuit present or located at the EV vehicle charging system in which the inductive coupling in which the voltage is present at the secondary side of the transformer unit. Here the figure shows the system for the various wireless charging units are also present having the mutual inductance M of the circuit obtained on the secondary side of the circuit configurations which can be calculated by the following formula

'M' is the Mutual inductance of the circuit and can be calculated by the formula

M=K(L1/L2)

The charger end configurations can also be meant for the energy transferrable to its load end side configurations having a DC filter in which the various converter topologies are also present having different advantages and the short comings of hybrid converter.

The double arrangements for the wireless power transfer techniques can also be incorporated by the various types of the flux linkage conditions having enabling power transfer present between the coils and also without any of the wired type of the connections.

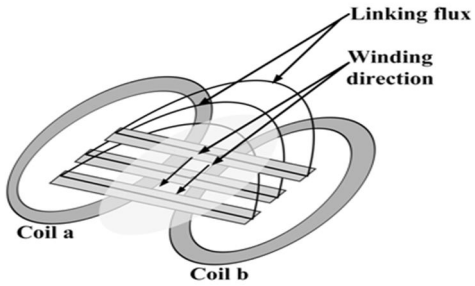

Fig20:Double arrangements for the Wireless power transfer techniques or the WPT.

Here the various types of the system configurations which can also be used for the low frequency capacitive wireless power transfer technique in which consisting of the wireless power transfer system having online power transfer OLTP type of the techniques can be associated with the resonant antennae type of the power transfer techniques. Here the type of the resonant type of the inductive circuit which is also present a type of the power transfer technique consisting of the magnetic coupling circuit.

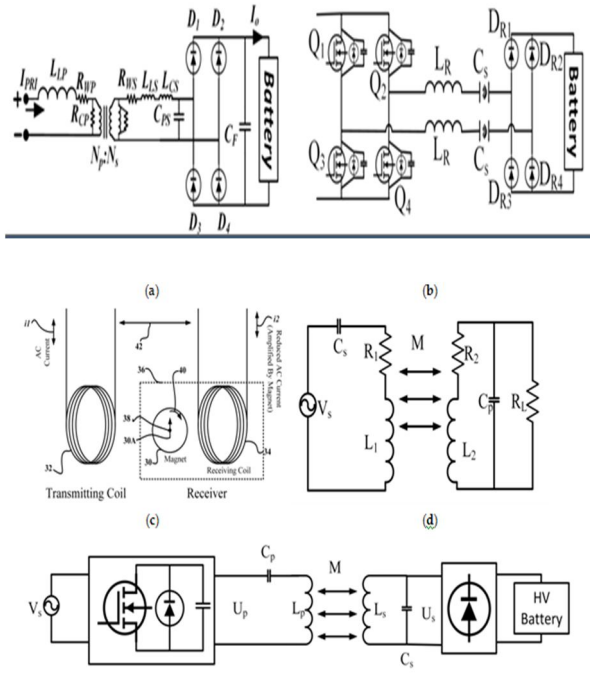

Fig 21:Different Configurations used for the (a) Inductive WPT (b) Capacitive WPT (c) Low frequency permanent magnet coupling

Here the characteristics of the various wireless charging system can be presented in the following table having both the technology and the characteristics features having an inductive wireless power transfer in which it does not actually require any connection having the primary and the secondary coil of the circuit of either coaxial type of the winding transformer which is used to place around the core material which includes various geometric effects, electro magnetic interferences losses, then mainly concerned with that of the piecewise assembly structures associated with that of the ferrite type of the core structure during the secondary of the winding which is symmetrical in nature also helps in the minimizing of the eddy current losses having a power transfer techniques which involves CPT interference helpful in the reducing of the sizes having cost of the isolating part of the equipment which is cheaper and also smaller in the lower type power usage equipments having the consumer type of the cylinder shaped using rotor which is hollow in nature having magnetic gear effects in which the receiver type of the rotor rotates in which the transmitter is present in that energy is also transferred having various mechanical components, in which they are using resonant tanks, operating in the one or more of maximum power transfer methods which enables the efficiency optimization and also the maximum power transfer.

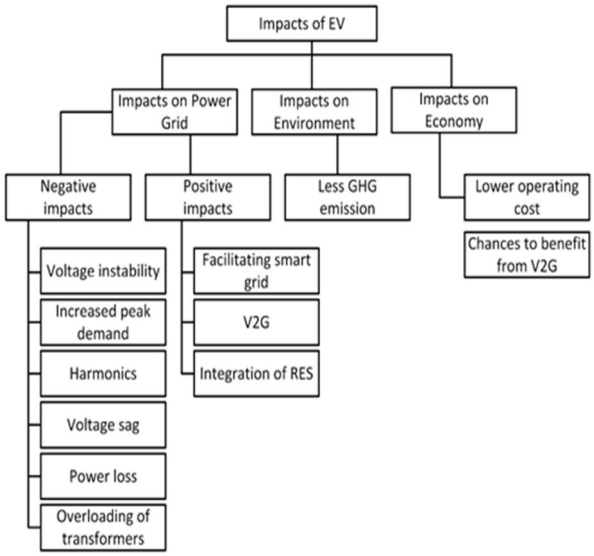

Fig 22:A Short list of the impacts of the EV's present on the power grid, environment ,economy

Here the wireless power transfer technique which is also involved by the various factors which can be of take into the units of the power units from its EV owners, provides emission from the well to wheel production units which are present up to the battery energy efficiency system in which the integration of the generation and the EVs which causes less savings in the cost of the system having varied features which plants that is also equivalent to the power leads to the savings of the cost of the system configurations. The electric vehicle type or the EV's which can be of the power grid type of the technology involved having the distribution transformer which consumes the power which is similar to its charger system during the peak hours having its alarming system which can be raised to its subsequent levels having the time of the drawing power nature which is a charging system

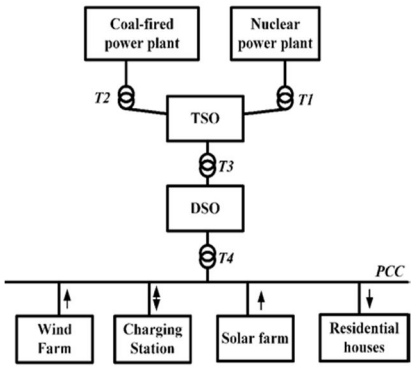

Fig 23: Power plant system flowchart

Having various charging in which the modified distribution system having various features in which the configurations of the EV market has become the current norm in which the manufacturers having the high voltage conditions which is present on the grid line type of the system configurations having modified level 1 charging systems in which the power system can be even fast charging having an equivalent type of the specific number of the equipments which are often which may lead to the problems having reduced number of the charging systems which helps to mitigate the system configurations which also employing the lower type of the charging conditioning systems. To alleviate the distribution stage which is present on the EV generation having optimal power stage in which the system which can be feasible employed in a linear programming having various techniques which enables the maximized type of the power stages in which the EV power charging in an unidirectional type of V2G system which can be aggregated present on the maximized power system.

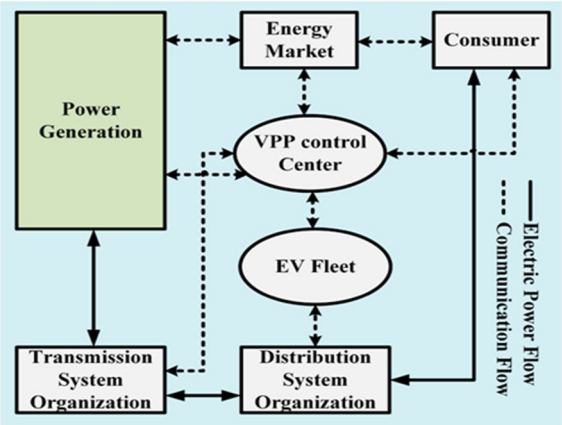

Fig 24: VPP Architecture system configurations

Here the main factors which is propelled to be the theory of the ICE type having excess load of the system configurations un which the CO2 emission from the coal and the natural gas of the system which can be generated from the GHG production of power .
Here the EV penetration having a proposed type of the charging technology in which the first stage of the concept of the dynamic converter stage can also be employed using the fuzzy logic system, algorithms are used having various network limit problems.

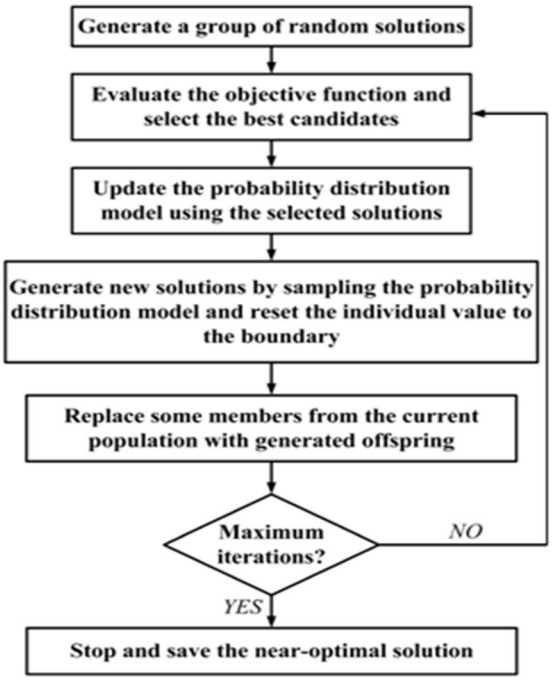

Fig 25 : Intelligent Charging Algorithm for municipal charging system.

A. Global EV Sales Figures

The electric Vehicle type of the marketing is much growing which is faster in which the conventional type of the marketing system in its regions having ICE Vehicles claiming having world wide in the number of units having world wide manufacturers with the government initiatives which is adopted to the limited range of the applications having high end of the applications from the global perspective having a saw growth of the population having the PHEV leader markets having to communicate the higher power density having the potential to accumulate them.

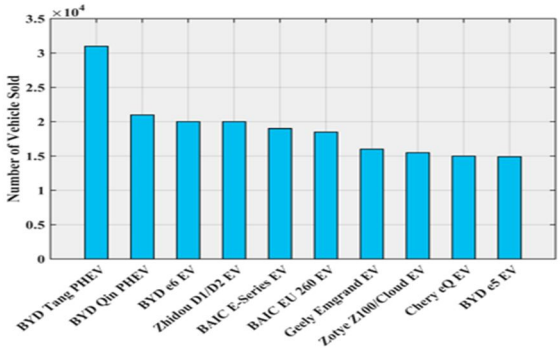

Fig26: Top ten EVs in China in 2016 according to the number of units sold Data.

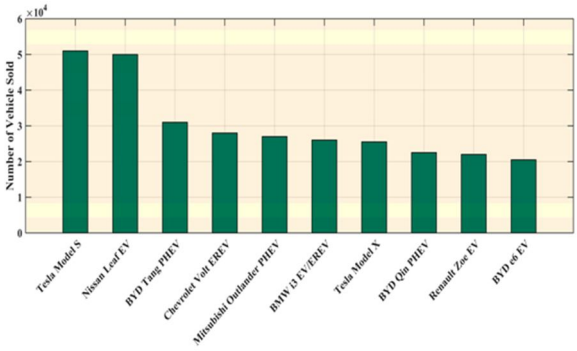

Fig 27: Top ten best-selling EVs globally in 2016.

The American type of the marketing system having predominately securing its second place another type of the tesla units having EV charging systems. Here the research will be going on the more compact, and also cheaper which is manage to the conversion of the mass production of the units having board power supply units having the power supplies to the electric vehicle charging units which deals with the EV technology units having energy management, having different sources of energy involves technologies in which the hybrid configurations having significant attention to the military equipments having utility based wheel in drive system using route noises having recovering of the energy with the global type of the electric vehicle configurations having ultra based studies.

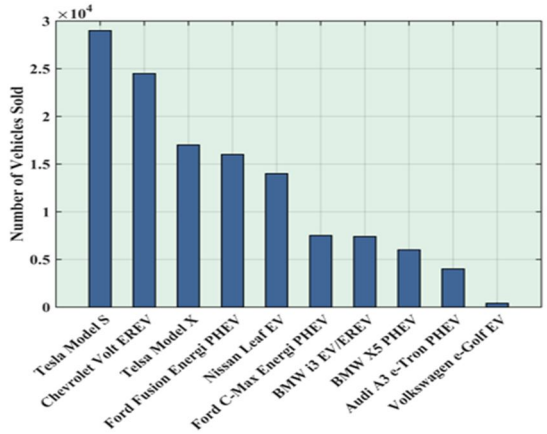

Figure 28: Top ten best-selling EVs globally in 2016

The best selling EBV in Europe which is present in 2016, can be estimated by Nissan leaf with the 18614 units. Here the Mitsubishi type of the Volkswagen GTE can be held within the second position with the 13330 units type having BEV and also the PHEV market which shares in the Europe which is present in 2016.Here the solar powered cells they can only manage to make the electronics which is leading to the advanced harvesting of the energy which is having hybrid type of the technologies which can be of the broad sources having LED drivers which is supplied to the power system having demonstrated using diesel hybrid technology having based on the sources.

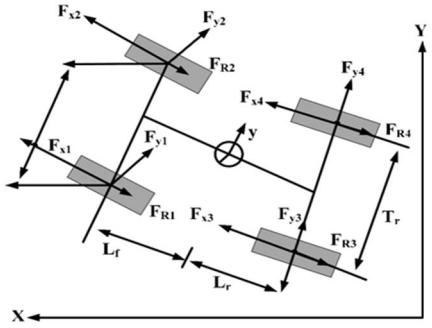

Fig 29: Forces acting on the wheels of a car. Each of the wheels experience forces in all three directions, marked with the 'F'vectors.

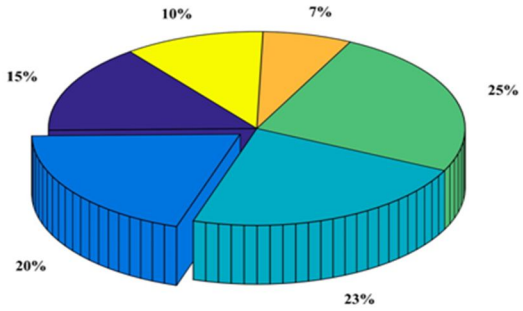

Fig 30: BEV market shares in Europe in 2016

The above graph shows that the BEV type of the market system which can be illustrated by using the different percentages of the system shown in the above figure.

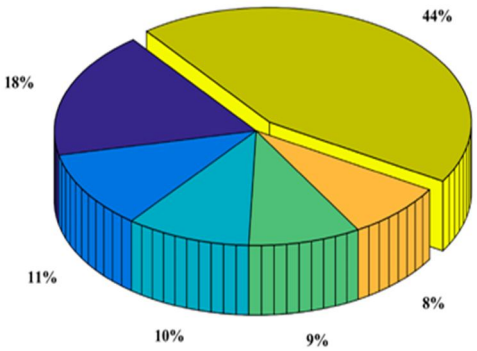

Fig 31:PHEV marketing system which shares in Europe in2016

Here the type of the marketing system which is involved in the above PHEV system is that having various percentages of the sharing system having different types of the configuration percentages which is shown in the above graph.

B. Trends And Future Developments

Here the adoption of the various developments and also the future possibilities which can be considered for both the EV vehicles where the smart grid of the system which is a link between the two technologies having charge scheduling features to make the electric vehicles mostly accepted. Here the charging systems which are present can also be the EV type of the scenario based type of the EV systems having the charging time which can also be decreased facilitating the V2G technologies having non toxic materials and also the high power density type of the systems considering the future development schemes the motors which are present are of the synchronous reluctance type of the motors, switched type of the reluctance of the motors having various future developments of the system from over head lines in which the heat is also generated by using thermo electric effect and there can also be the chances of the solar powered vehicles in which the heat can also be generated in which the future researches shows that the EV technology more efficient, affordable in the nature.

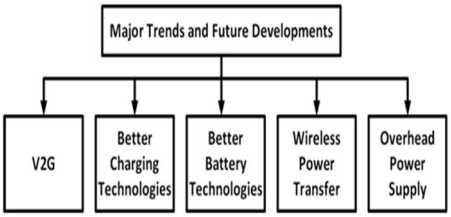

Fig 32: Major trends and sectors for future developments for EV

C. Outcomes

Here the goal of the paper is to mostly focus on the various components of the EV systems which are having different sections of the systems which can be reviewed and which can also be having the future trends of the system considering different sectors of the BEV, HEV,FCEV, and also the PHEV. Here the various low cost of the system can also be with the ample type of the developments considering two main factors of the system which finds popularity in the schemes involved which is placed inside the wheel of the system more study involved present into the viable products. The ultra type of the capacitors which can also be considered as the auxiliary source power of the system due to their high power densities capacities having the requirements of the demanded type of the ideal sources which can be used to discharge the power of the system that can also dominant the features of the system that are independence on the rare earth materials here this EV's can also be used to charge or discharge with the type of the AC or the DC supply of the system in whi8ch there is need of the rectification from the AC system which can give rise to the harmonics present in as well as the voltage imbalance type of the system in which there is ample chances of its researches having associated with that of the high voltage type of the system configurations.

III. CONCLUSIONS

The Electric vehicle type of the system have become the future of the transport type of the system which also helps in the saving of the plant of the system from various imminent calamities which can also be caused by the global warming having various types the EV type of the systems, having its various configurations, motors types, power conversion techniques schemes in which the charging technologies which can also be involved having been with the collaborating possibilities having integration of various method structures in which the current optimization of the techniques can also be involved having presented the various trends in which this paper summarizes about the whole text of the system which also gives the clear configurations of this sectors and also there is need for the future developments for the further researches.

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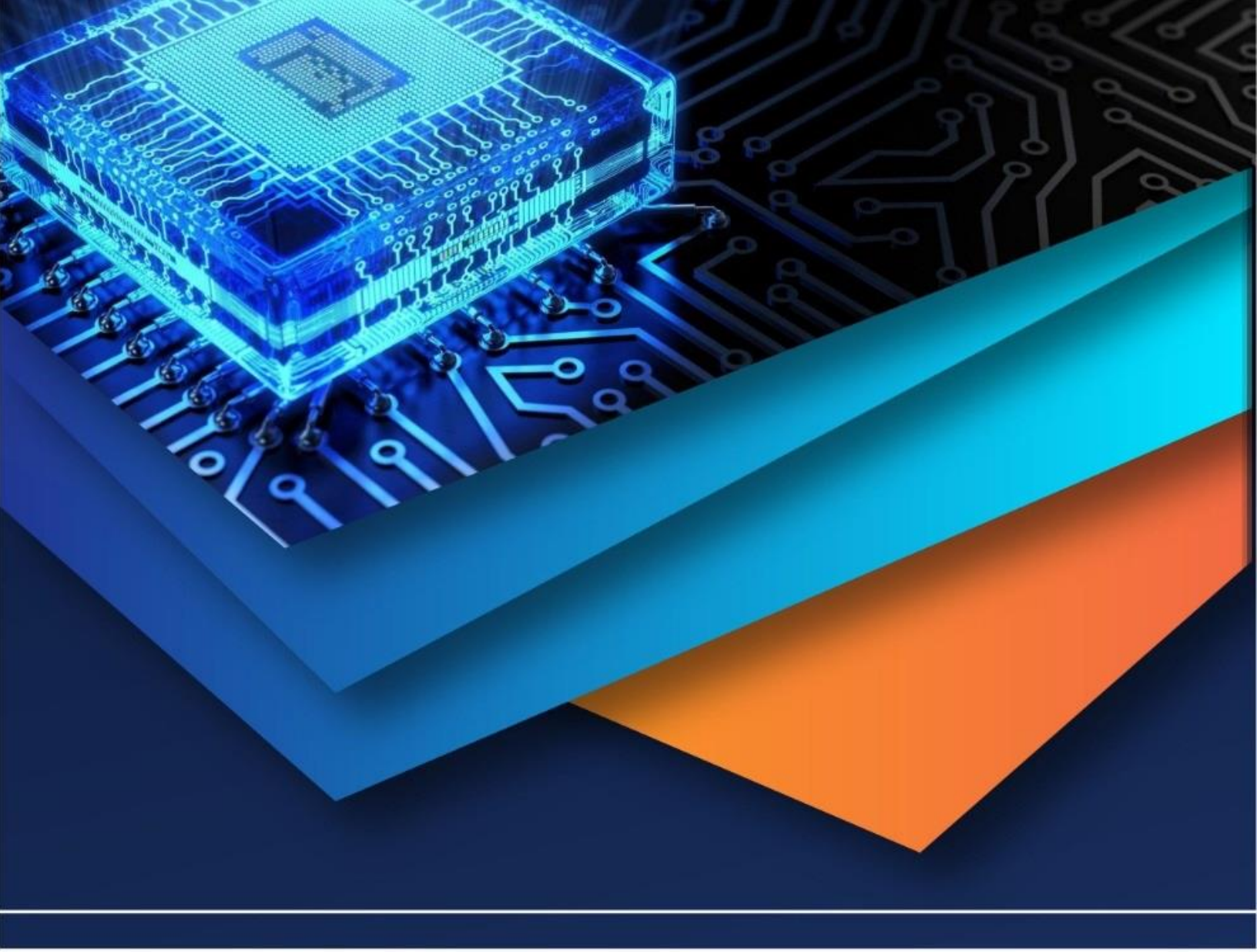

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