

## **Design and construction of on board charger for electric vehicle application**

The increased demand of modern transportation system for the economic development and societal comfort is creating the growing presence of global warming and some dangerous climate changes. The major cause of these adverse environmental effects is due to the harmful environmental pollutants emitted by Internal Combustion automobiles. One potential alternative to the world's dependence on standard combustion engine vehicles is EVs.

An EV power train mainly consists of an energy storage system, electric motor, power converter to drive the motor and EV charging circuit.

The EV charging circuit is basically classified as on board chargers and off board chargers depending on its location. If the charging circuit is incorporated in the EV power train itself it is an on-board charger and if it is placed outside, separately in a public area, it is an off-board charger.

Batteries can be charged through conductive or inductive methods. Due to some challenges such as electromagnetic compatibility (EMC) issues, limited power transfer, bulky and expensive structures, shorter range, and lower efficiency, inductive chargers are not largely commercialized and employed as the conductive ones.

On-board chargers can be structurally embedded in two stages On-board charger and single stages On-board chargers. two stages On-board charger are typically composed by two stages: a front-end AC-DC stage and a back-end DC-DC stage. The front-end rectifier usually contains a boost power factor correction (PFC) converter to achieve high power factor and low harmonic distortion. single stages On-board Chargers If the ac-dc rectifier is combined with the dc-dc converter, a single stage battery charger is obtained. This topology of battery charger is used if lower cost and size are required. in fact, single stage battery charger allows the elimination of some bulky and expensive components such as inductors and dc-link capacitors which instead are required in two-stage charger. However, the drawback is that single stage battery chargers with non-isolated converter suffer from a limited conversion ratio, which limits their application for the wide range of output voltage.

In this thesis, a new on-board charger design and implement to improve factors such as charging time, power level, power density, energy density, design complexity, price, weight, volume and etc.