

# Simultaneous IPT Systems with Fault Tolerance

## Power Systems

### Background and challenges

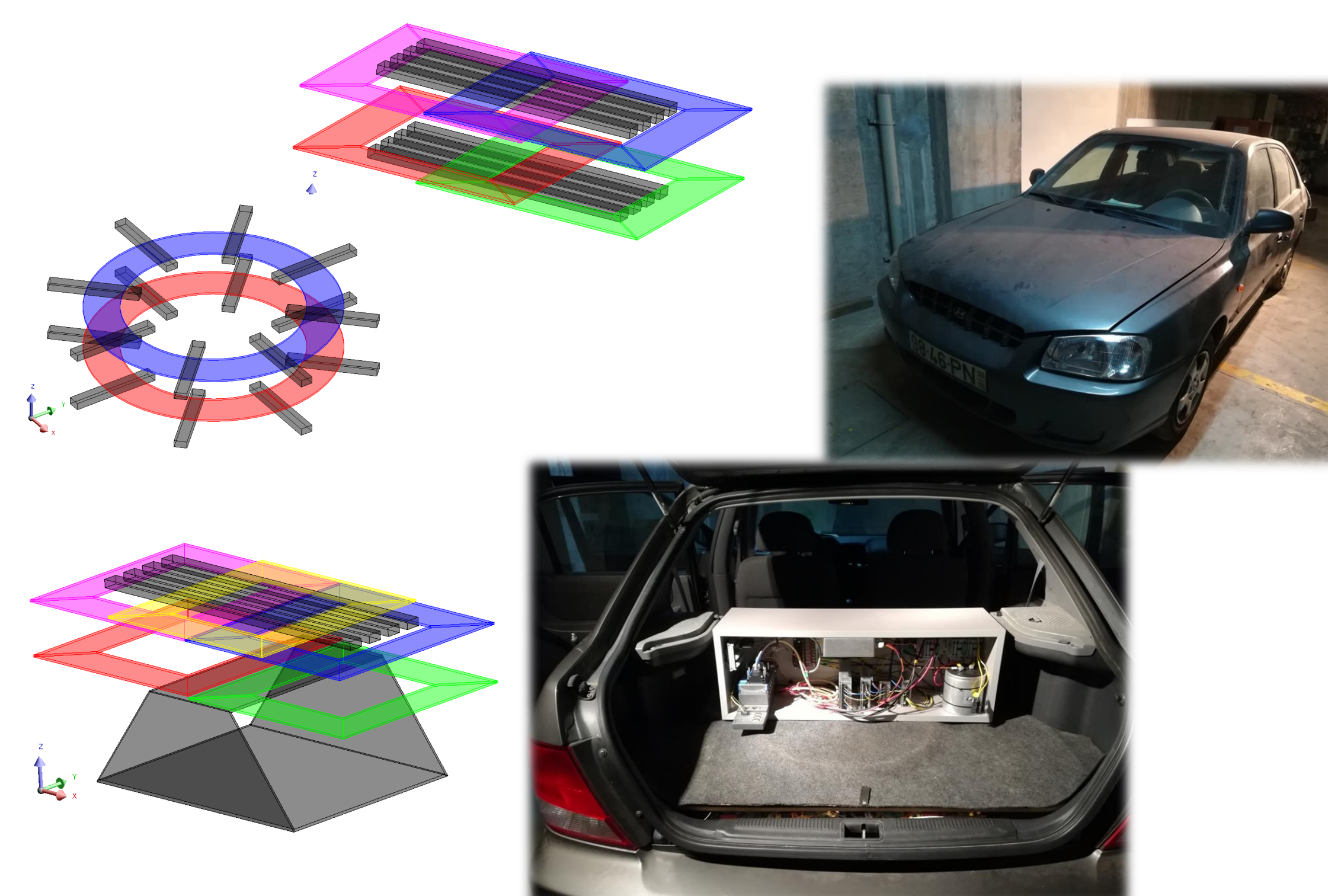
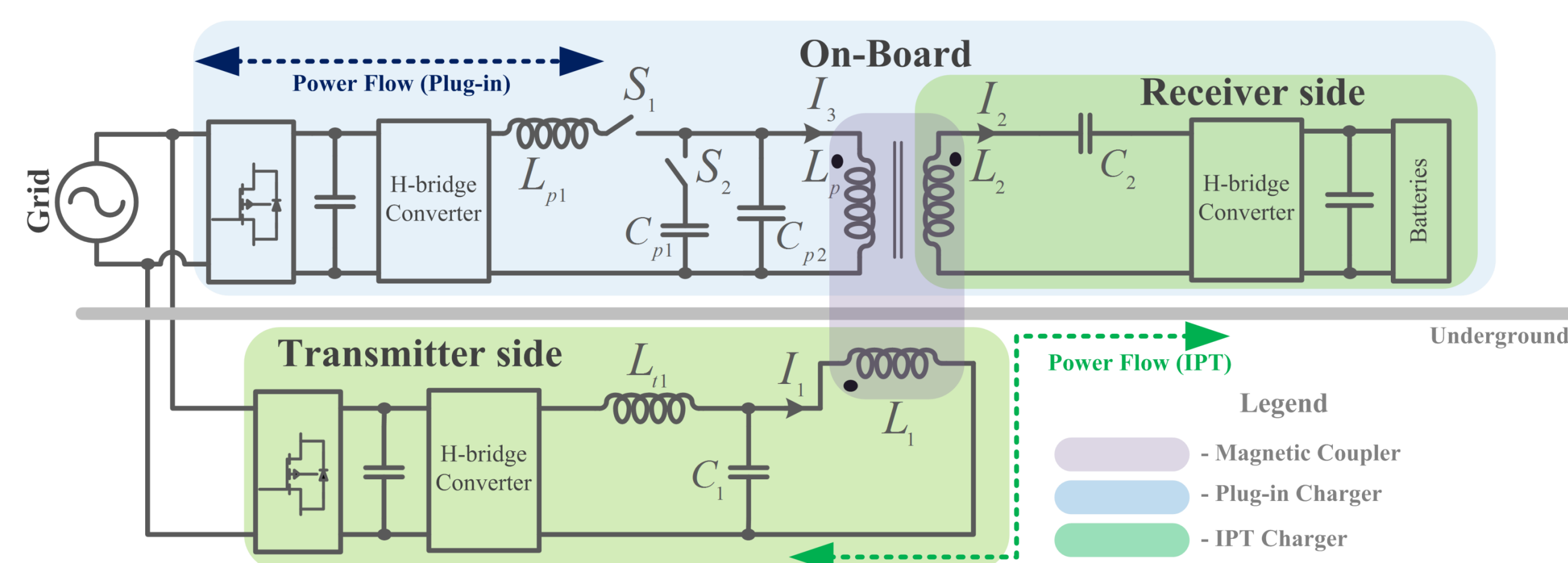
- Development of Inductive Power Transfer (IPT) systems with simultaneous charging capabilities of multiple electric vehicles batteries.
- Development a bidirectional control strategy with fault tolerance
- Development of position detection algorithms

### Description and main innovation

Inductive Power Transfer systems enable a contactless transfer of energy between two separate systems by means of a variable magnetic field. It is mainly comprised by two high-frequency resonant converters and a magnetic coupler (MC). The MC is the key element with several geometries available in the literature. However, the lack of a proper design methodology of the MC hinders the design process of an IPT system.

The work conducted in the power systems laboratory addresses the design methodology of MC and integration of IPT capabilities with fault tolerance into a vehicle traction system. The main contributions are:

- Framework tool that returns the best suitable geometry with dimensions for the MC based on certain system requirements like output power, working frequency, misalignment tolerance, amongst others.
- Proposal of a hybrid topology that interconnects plug-in isolated topologies with the IPT technology
- Position detection algorithm for a series-series with an intermediate coupler



### Achievements

- Framework tool developed in Labview
- Conversion of a combustion vehicle into a electric one with the proposed topologies and control strategies
- Several publications in IEEE Conferences
- Publication in 1 Journal