Nowadays electric vehicles (EVs) are back in the street view, because petrol has become more and more expensive. The major problem of EVs is the cost of the batteries. This is due to the high cost of the technology for batteries but also the high weight of batteries needed in a commercial EV. This problem can be solved by reducing the total weight of the vehicle. Therefore, we want to design an ultra light EV named the ELBEV, acronym for Ecologic Low Budget Electric Vehicle. The ELBEV is a one person EV with batteries, mainly for commuting purposes in the city and in the suburbs. The car has three wheels, two driven and steering front wheels and one rear wheel. The maximum speed of the car is 70km/h and the range will be about 100km. The total curb weight (batteries included) will be about 100kg. The used Lithium Polymer battery pack has a high energy to weight ratio: 20Ah, 96V and 11kg.

The current work consists of an integrated design of the drive train for the ELBEV. In the past, the power electronics and controller have been developed and tested. A gearbox has been designed, built and tested together with a commercial outer rotor permanent magnet synchronous motor. A new optimized design for this machine (PMSM) is currently implemented in combination with an improved single stage gearbox. The optimized parameters for the new outer rotor PMSM are amongst others the number of pole pairs, the number of teeth and the diameter of the motor. For the single stage gearbox an analytical model is implemented for different gear ratios. The PMSM and gearbox are optimized for the New European Driving Cycle (NEDC). The goals are a minimization of total weight and a maximization of the total efficiency of the drive train, consisting of the power electronics, the PMSM and the gearbox. Next to the drive train, several other components of the vehicle were developed during the PhD: chassis, contactless gas and brake handles, lighting, suspension and steering system.