
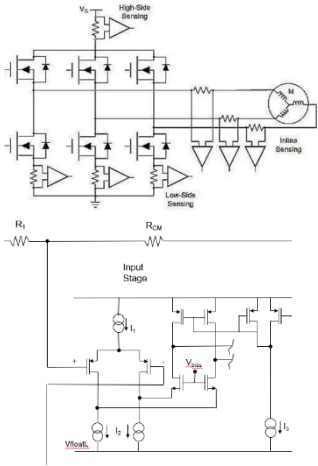


ST Internship proposal

Division	Automotive Division Group
Group	Smart Power Solutions RnD
Title of the Internship Project	High accuracy Current Sense Amplifier for brushless motor control
Description of the Thesis work (tasks that the student will be performing, objectives of the position)	Design of a low offset, low noise analog Current Sense Amplifier with programmable gain for sensing and control of current flow in brushless DC motors
Field of application and competence development  	<p>The automotive market is experiencing an unprecedented evolution due to the entry on the market of numerous models of electric and hybrid cars. In this context, the number of electronic devices on the car is increasing exponentially and the need to evolve and improve the performance of all functions is a mandatory step. In particular, the reduction of power consumption and integration plays a fundamental role. Among the applications available on a car, many involve the presence of motors which require for their control a precise reading of the current; there are different technique to make this measurement and among these the most accurate and diffused is the voltage reading on a shunt resistor placed in series to the motor coils.</p> <p>In this thesis, we propose the development of an integrated analog amplifier capable of measuring the voltage on a shunt resistor with these characteristics:</p> <ul style="list-style-type: none"> • Zero offset to sense mV of input signal differential dynamics and discriminate current inversion inside shunt • Common mode swing from negative voltage to battery levels with slope up to 1 -10 V/ns • optimized noise performances to have a precise motor control loop • current consumption aligned to state-of-the-art design of low power consumption in electric cars <p>Student will acquire basics of mixed signal design in latest BCD technologies, learning usage of latest CAD simulation tools and methodologies (cadence framework and Simulink among others) together with strong analog design skills.</p>
Profile related to the position	<ul style="list-style-type: none"> • Basic analog structure knowledge (band-gap reference, current mirrors, operational amplifiers, compensation methods) • Strong knowledge of transistor level analog electronic concepts (noise, matching, offset, bandwidth) • Cadence design suite or equivalent spice simulation experience is a plus
Location	Cornaredo (MI)
Company Tutor	S. Caccia
Duration (at least 720 h, 4 months and a half)	6-9 months
Starting Date/Ending Date	
Reimbursements (€) and benefits	800€/month, canteen lunch and transportation from Milano included