

SCHEMA PER LA RELAZIONE ANNUALE DEL DOTTORANDO CICLO Anno

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- Dottorato in **INGEGNERIA MECCANICA**
- Ciclo XXXI Anno di Corso 2
- Dipartimento di afferenza
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- Tutore Prof. Alessandro Vigliani
- Area Culturale di Interesse (in Italiano e Inglese)
Applied mechanical engineering, simulation, Control , Automotive
- Breve descrizione dell'argomento della tesi o dell'Area Culturale di Interesse (massimo 20 righe, in Italiano e Inglese)

This activity is focused on development and integration of an experimental tire test bench(TTB) with ZF-TRW HIL. This system is aimed to investigate the tyre transient behaviour and its effects on active control system (e.g. ABS). To achieve this aim in the first step, electrical and mechanical upgrades of TTB are necessary. The purpose for mechanical upgrade is to simulate the behavior of Tyre that can accelerate/decelerate and apply vertical load on the road. Aim for electrical upgrade is to control TTB via Profibus. In this activity, mechanical upgrades are as following:

- (1) Installation of torque meters for wheel torque and belt torque (Done)
- (2) Installation of optical micro-meter for belt positioning (Done)
- (3) Installation of dynamometer for vertical load measurement (Done)

Activities related to electrical upgrades of TTB are as below:

- (1) Realization of the TTB wiring for PLC control (Done)
- (2) Realization of the TTB control panel (Done)
- (3) Realization of the TTB control panel wiring for PLC control (In progress)

Second step of activity is integration of brake pedal robot with HIL. Brake pedal robot is containing an actuator that is linked to a motor and Siemens control unit. The connection of brake pedal robot system with HIL was done via profibus. In order to establish this connection, Matlab s-funtion and Simulink were used and Success of integration was defined by force and position control of brake pedal robot via Control desk (dSPACE). It is mentioned that in order to be able to have force and position control, LVDT and load cell were installed on the brake pedal in vehicle. At the end, the best values for PID controller parameters according to rising time and overshoot for force and position control were defined.

The activities for the next year will be as following:

- TTB control through PLC and Profibus
- Integration of TTB with HIL
- Planning test and development activities with TTB-HIL

- Attività di formazione svolta nell'anno (corsi, seminari, etc.); per ogni attività specificare natura, durata e sede
Development of innovative solution for motor vehicle (CFU=6)(superato-merit)
Writing Scientific papers in English (CFU=3)(superato)
LabView Core 1 (3, 4 and 7th July, 24 Hours)
Seminar: "Nonlinear vibrations of shells in traditional, hyperelastic and advanced materials: modelling and experiments" by Prof. Marco Amabili (5th May 2017)
International Mechatronics summer school in Technical university of Brno (czech Republic)
(Sep 2017, 40 hours)
- Eventuali collaborazioni con imprese nell'anno
ZF-TRW

- Elenco delle Pubblicazioni del Dottorando

Two conferences:

S.H.Mirmohammad Sadeghi, R.Sesana, D.Maffiodo "Friction Calculation and Simulation of Column Electric Power Steering System" 19th International Conference on Automotive and Mechanical Engineering, UK, London, Jan 2017.

S.H.Mirmohammad Sadeghi "Integration of Hardware in the Loop with Brake Pedal Robot and control the system via dSPACE" 5th International conference on Control, mechatronics and Automation, Alberta University, Canada, Oct 2017. (Upcoming)

Journal publication:

S.H.Mirmohammad Sadeghi, R.Sesana, D.Maffiodo "Friction Calculation and Simulation of Column Electric Power Steering System" International Journal of Mechanical, Aerospace, Industrial, Mechatronic and Manufacturing Engineering Vol:11, No:1, 2017 .

Torino,

Firma del Tutore

Firma del Dottorando

Il Coordinatore