

MECHANICAL ENGINEERING

MUR DM 117/Easyrain - Detection of aquaplaning and identification of potential friction in tyre/road contact under low grip

Funded By	EASY RAIN ISRL [P.iva/CF:01735280933] MINISTERO DELL'UNIVERSITA' E DELLA RICERCA [P.iva/CF:97429780584] Politecnico di TORINO [P.iva/CF:00518460019]
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Context of the research activity	<p>The PhD will be devoted to the research and development of innovative safety systems for hazardous wet road conditions and other grip related issues.</p> <p>in particular, it will focus on developing algorithms capable of recognizing conditions commonly associated with the phenomenon of aquaplaning, distinguishing it from similar situations of low-grip road surfaces, such as icy and snowy surfaces.</p> <p>The activity will also investigate the estimation of the potential friction coefficient between the tyre and the road under low-grip conditions, e.g., on mud or gravel.</p> <p>Progetto finanziato nell'ambito del PNRR - DM 117/2023 - CUP E14D23002030004</p>
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Objectives	<p>The research program proposed in the doctoral program, in accordance with the objectives of the National Recovery and Resilience Plan (PNRR), is oriented towards enhancing applied research programs through synergy between universities and industry to promote technology transfer and innovation processes. The project focuses on sustainable mobility, with particular emphasis on autonomous vehicles, intelligent actuators, sensors, driving control systems, and simulation models (MOST Center).</p> <p>The research will be developed in cooperation with Easyrain I srl, an Italian company founded in 2013, aiming at the development of the first active safety system preventing accidents occurring in aquaplaning conditions, hazardous wet road conditions and other grip related issues.</p> <p>Specifically, the research aims to develop algorithms capable of recognizing conditions commonly associated with the phenomenon of aquaplaning, which refers to the loss of contact between the wheel and the road due to</p>
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the presence of a layer of water. The development of such algorithms includes the necessary procedures to improve the recognition of aquaplaning, distinguishing it from similar situations of low-grip road surfaces, such as icy and snowy surfaces.

The research also aims to estimate the potential friction coefficient between the tyre and the road under low-grip conditions. The research will also encompass other specific conditions such as gravelly or muddy surfaces, taking into account road irregularities such as potholes and speed bumps.

The research will also focus on validating the results through both virtual and real testing sessions, using vehicles provided by Easyrain Company.

Skills and competencies for the development of the activity

The candidate should possess knowledge of vehicle dynamics and control. Moreover, he must be familiar with Matlab/Simulink software and have practical experience on acquisition systems and control systems (e.g., Arduino, DSpace, SpeedGoat, National Instruments, etc.)

He will be requested to develop the research strictly interacting with researchers and engineers of the company involved in the project, to develop algorithms and to integrate them in vehicle dynamics models of different level of complexity.