

PhD Scholarship in Autonomous Machinery

The topic involves developing concepts and the implementation of processes for autonomous operation of machinery such as bulldozers and other heavy machinery, operating in contexts such as construction sites.

Particular focus, in this topic, is given to the high-level components of control and planning, integrating them with the perception processes, for performing tasks achieving or improving the usual flexibility and efficiency of a well- trained human operator.

Substantial critical components of this system have been already investigated and solved by the supervisors, being the objective of this topic to add components of top of those already achieved.

The objective of the full autonomous operation is performing typical tasks, in those contexts of operation, in an efficient way (in terms of reducing energy consumption, elapsed time, risk, mistreatment of equipment, and improving accuracy of solutions)

The topic also involves applying those concepts using an actual machine, in small scale, in our MTRN laboratory and other available spaces in our School, using realistic contexts.

For working in this topic, the student should feel interested in working in aspects related to the theory of Control, Machine Learning , Estimation and other areas of Mathematics, in addition to having interest in working with real platforms (UGVs, sensors, actuators, in indoor and outdoor real contexts).

Based on existing resources, the applied/experimental component of this thesis is secured.

Students who have interest and want to ask for more details, may ask Dr. Jose Guivant, who would provide details and links papers and videos to his previous work, which are part of this project, in addition to provide details of the material resources used in the project.

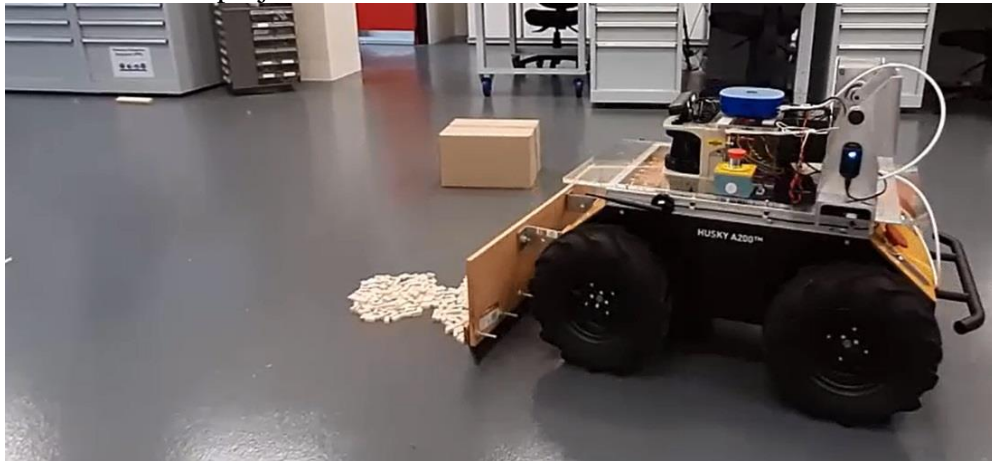


Figure 1. Our project's UGV/Bulldozer, moving material in our MTRN lab, according to a specific mission. This UGV has been retrofitted with rich 2D and 3D sensing capabilities, for its onboard perception modules, which model the surrounding terrain.

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Some video links

<https://www.youtube.com/watch?v=q1YcoaGxUmU>

https://www.youtube.com/watch?v=Uzb_BfCzN9g

<https://www.youtube.com/watch?v=CzpDNIXQ8GY>