

ELECTRICAL, ELECTRONICS AND COMMUNICATIONS ENGINEERING

DM 629/PA - Leveraging robotic navigation and localization capabilities with brain-inspired models and technologies

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Context of the research activity	<p>The rapid advancements in mobile/service robotics (mainly rovers-UGV and drones-UAV) have highlighted the necessity for developing more sophisticated and energy-efficient navigation and localization algorithms to be used with robots in challenging scenarios, particularly those involving highly dynamic and crowded surroundings like hospitals, airports and similar socially relevant indoor or GNSS-denied environments.</p> <p>Progetto finanziato dal PNRR a valere sul DM 629/2024 - Pubblica Amministrazione - CUP E14D24002750006</p>
Objectives	<p>The objective of this PhD thesis is to investigate innovative solutions that leverage emerging technologies to enhance the performance and reliability of mobile robots in these demanding settings. By investigating the suitability of neuromorphic hardware and event-based sensors, coupled with last-generation neural networks and fused into robotics navigation algorithms, efficiency, in terms of both latency and energy consumption, will be assessed as well.</p> <p>The resulting system will hence target the possibility of efficiently extracting multi-modal information from the environment and directly feed the localization and control modules of the robot.</p> <p>The final goal of this research is to substantially advance the field of social mobile robotics, offering new tools and providing new insights capable of resulting in solutions to be exported and implemented wherever the presence of humans in highly dynamic environments demands for fast</p>

perception together with agile and safe motion.

**Skills and
competencies
for the
development of
the activity**

LM in Mechatronic Engineering
Programming in C++ and Python
Robotics
Embedded systems and sensors
AI/ML algorithms base elements