

A New Modular Architecture for the Mobile Robot MORDUC: from the Hardware to the SLAM Algorithm

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Abstract

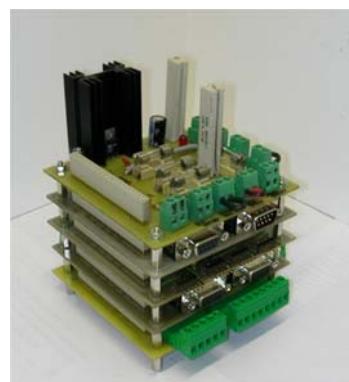
This paper describes a new architecture designed and realized for the Mobile Robot MORDUC (Mobile Robot DIEES University of Catania), a dual drive system with a castor wheel; this robot has been recently updated to use several sensors (encoder, laser scanner, sonar, contact switches and a webcam). Most of the hardware has been organized in a turret where each floor realizes an interface with a kind of sensors or actuators, the software, instead, is a client server system where the server is used to read the sensor data while the client realizes the user interface.

In a very active laboratory, like the university, it is very important to have a modular platform to try new sensors in an easy manner, without the need to redesign the whole hardware. For this reason, particular attention has been kept on the hardware modularity: a Communication BUS has been designed to facilitate this task, bringing to the overall architecture a compact and robust feature. Both the power supply and the communication interfaces (I^2C , CAN, RS422, and RS232) are part of the same BUS, in this way a single cable is needed to connect all the boards of the turret to the PC and no cable is needed between the boards.

In order to separate the SLAM algorithm from the sensor acquisition task, the Software has been realized into two parts: the low level module realizes an abstraction layer to the sensors; moreover a simple navigation algorithm has been implemented in this level to avoid obstacles even if the robot is tele-operated. The high level module is used to tele-operate the robot (GUI) and to implement the SLAM algorithm, it retrieves the sensor data via RPC and can physically reside on a different PC connected to the same LAN (Wireless).



A picture of the robot.



A picture of the hardware turret.