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Design and operation of grasping devices and robotic hands at LARM

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Several industrial and non-industrial applications could be conveniently achieved by means of devices that are capable of mimicking human grasp in terms of weight, shape and size of objects that can be grasped and handled. Therefore, design solutions have been proposed in the literature either for specific grasping devices or for general purpose multi-fingered robotic devices and hands. A large variety of specific grippers and gripping tools are commercially available while general purpose design solutions are often limited to laboratory prototypes with just few market solutions. In fact, available prototypes are still not able to fully reproduce the highly flexible multi-purpose operation of a human hand, while they usually have high number of DOFs, high complexity, limited reliability, high cost. The above-mentioned aspects have significantly limited a wide spread of robotic hands in the market. Therefore, since late '90s at LARM: Laboratory of Robotics and Mechatronics, in Cassino research activities have been carried out in order to design gripping devices and multi-fingered robotic hands having low-cost and easy operation features. This presentation will outline the main design and operation issues for achieving suitable user-friendly grasping devices and robotic hands. Specific attention will be made addressed to the LARM Hand series prototypes as well as to the content of the recent book "Grasping in Robotics", which has been edited by Giuseppe Carbone with Springer publishing house in 2013.

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Dissemination and reachability of alert messages in intelligent transportation systems for improving road safety

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Over the last decade, numerous research works have been performed on active road safety applications that fall under the theme of intelligent transportation systems (ITS). Among the list of plausible ITS based on-road applications, alert messages dissemination protocols based on vehicular ad hoc networks (VANETs) have received a special attention worldwide and was supported by governments, industries and research institutes. The main goal on the work summarized here is to target reduction of road accidents by providing early event-driven warning messages to endangered vehicles and hence increasing the capability of avoiding accidents or traffic congestion spots. Few ideas pointed out that broadcast based alert messages dissemination services can lead towards 75% of reduction in both urban and rural road traffic accidents. The current work is directed towards design of new relay node selection protocols based on link quality estimation for better message dissemination and reachability. Simulations demonstrated very good results in terms of alert messages reachability and robustness with an acceptable improvement in end-to-end delay. In this regard, several mobility models were investigated including a realistic model that mimics road designs in Oman, namely, car following model with roundabout layout (CFM-RL). The algorithm performance was evaluated over different mobility models and was proved that the models affect the performance of broadcasting beacon messages in VANETs. Additionally, the prototyping platform based on socket programming was developed in multiplatform operating systems to be used for implementing and testing the prototype. These are underway for different road scenarios to study and determine the performance of the developed models.

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