Title: New strategic concepts for lightweight cobot arms

Collaborative robots or "cobots" are robots designed to operate in direct physical contact with a human operator. What sets cobots apart from traditional industrial robots is that safety is prioritized to protect humans from harm resulting from impacts, pinching or crushing. As a result, contrary to traditional robots, they do not need to be isolated from humans through fences. A human operator can then hold the robot and physically guide it during operation, helping it to complete its task.

Typical payload-to-mass ratios of commercial cobots are around 1:10, meaning that the cobot arm itself is heavier than the payload it is carrying. Because the magnitude of the impact upon collision is directly related to the (moving) mass of the cobot arm, reducing this mass is an essential step towards improved safety. To improve this situation, new strategic concepts are needed in the mechatronic design of the cobots and their actuators, as well as in their identification and control. At the Robotics and Multibody Mechanics group (R&MM), we have identified a number of promising ideas, which we would like to develop into effective technological solutions.

Your research would consist of investigating these strategic concepts for lightweight cobot arms. Depending on your expertise and interest, the work could consist of conceptual design, design optimization, identification, control, and even the construction and testing of prototypes. The ambitious goal of our group is to build a cobot arm with a payload-to-mass ratio of 1:1, a value comparable to that of the human arm.

Supervisors: Tom.Verstraten@vub.be

Website: https://www.brubotics.eu/

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