**Human Prosthetic Hand Interaction Based on Electromyography and Image Recognition.**

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**Introduction and hypothesis:** The World Health Organization appointed a demand of 30 million prostheses in low-income countries by 2011. Hand prostheses available on the market have high prices and besides their cost, they also rely on an intensive and tiring muscular training to learn how to trigger one of their predefined grasping sequences, without the guarantee the user is going adapt. We hypothesize that the proposed interface can make an easier use of the prosthesis at a much lower production price.

**Objective:** Develop a hybrid Human-Machine Interface for prosthetic hand using electromyography (EMG) and image recognition technologies as an alternative to the ones that require a great set of electrodes. The hybrid innovating solution will allow the user to easily select one of the predefined grasping pattern to interact with an object based on a picture taken of this object.

**Materials and Methods:** As shown in Figure 1, the system architecture is composed by two parallel processing fluxes, being EMG the input for the first and an object image for the second.



Figure 1: Overview of the proposed platform

The EMG based contraction detector system, that is always running, starts the camera processing flux when the user executes an arm contraction. It then activates the Raspberry Pi 3.0 camera, taking a picture and sending it to Google Cloud Vision API. The API returns a label for the object, used then as a key, for a query of the grasping type database. This will generate grasping type suggestions sorted by most likely choices. Using the contraction detector system, the user will, one by one, accept the suggestion or ask for the next one. When accepted, the controller mediates the contact to the hand prosthetic, which at development stage is simulated in V-REP [2].

**Relevance:** The hand prostheses present on the market have high costs and a hectic human machine interface, making difficult their acquisition and use. This project aims to reduce the costs and facilitate the use of the human-hand prosthesis, by decreasing the number of electrodes on a 3D printed hand like.

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