Cheap prosthesis made from PET are light and heat sensitive

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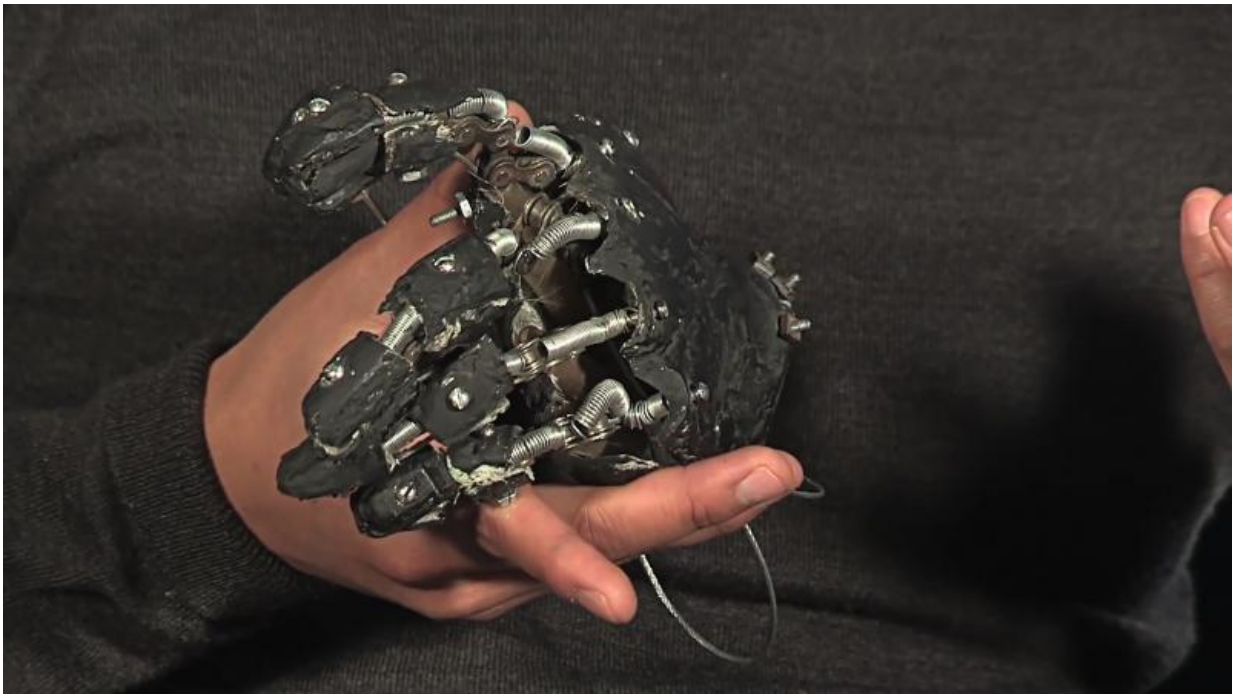

One problem that prostheses present is that by lacking sensitivity, they can become damaged when exposed to objects emitting high temperatures and consequently burn the user. To avoid this, the Protesa group was given the task of designing sensors to warn prosthesis users of heat excess.

These sensors are mostly made of recyclable PET material, making them lighter, but with the ability to lift up to eight kilograms, said Carlos Perez Roque, project leader and student of Engineering Mechatronics at the Technological University of Mexico (UNITEC).

"The temperature is calibrated to the human body, 35 degrees centigrade, to prevent a burn on the stump if that amount is exceeded. The sensors distributed in the hand, stump and arm of the prosthesis are connected to a device, which communicates through vibrations," he added.

When the prosthesis detects heat, it transforms thermal energy into electricity and activates the vibration motor located on the stump. Then the hand closes automatically as a protective reflex to prevent a burn.

Current sensors are 30 mm in length, and the design requires placing 15 in the hand, and another 25 along the arm to give full heat sensitivity to the prosthesis. Moreover, the price of the prosthesis ranges from 2,000 dollars just for hand and wrist to 2,500 for the entire limb.

For now, Perez Roque said, there are four prototypes that have undergone quality tests using a special bracelet placed on the arm for mobility and sensitivity of the prosthesis to be evaluated.

Protesa aims to make economical prostheses that are accessible to people with limited resources so they can resume quality of life equivalent to that before the loss of their limb.

According to figures by the National Institute of Statistics and Geography (INEGI) in Mexico, more patients need prostheses, but they are costly and their purchase is difficult.

Roque Perez is targeting orthotic centers and medical institutions, where

patients can be evaluated to determine whether a prosthesis is suitable.

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