# Trapping Phantoms into Robots: A New Control Method and Design for Transradial Myoelectric Prostheses and Induced Penfield's Map Cortical Remapping for Tactile Feedback

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Nowadays it is possible to observe certain shortcomings in commercial transradial myoelectric prostheses regarding skill and haptic capabilities of natural human limb mimicry. This is due to the fact that the control method used in this kind of prosthesis has not changed much since its establishment, making these robotic limbs have a high bounce rate because they do not attend the needs of individuals with this type of disability. To address the shortcomings of prostheses reviewed in the literature, this research aimed to create a control program for transradial myoelectric prostheses based on a continuous decoding strategy of motor intentions from the muscle activity in the voluntary stump, turning possible the individual and continuous control of the metacarpophalangeal and proximal interphalangeal joints and wrist and use this control method to control a 3D printed ABS plastic prothesis, designed such a way that will abe to express the independence, dexterity of degrees of freedom that the control method makes possible. The prosthesis has pressure and temperature sensors which transmit this information to a hapic display placed on the volunteer arm. This hapic display was integrated with a virtual arm controlled with the program created, thus inducing cortical remapping, every touch performed on the prosthesis and perceived as a touch of the lost limb. The control method proposed was able to continuously estimate the position of the joints of the hand of a volunteer with unilateral transradial amputation with a RMSE joints average of 0.12912, demonstrating its functionality.

**Awards Won:**

Intel ISEF Best of Category Award of $5,000

First Award of $5,000

Philip V. Streich Memorial Award to the London International Youth Science Forum