Laboratory for Interaction of Machine and Brain

# Plug and Play Myoelectric Control

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## Introduction

sEMG is a measure of muscle activity used by machine learning models to infer user intent for prosthetic hand control

***Fig. 1a**:* sEMG open

***Fig. 1b**:* sEMG pinch

Many users report difficulty performing everyday grasping tasks with current control schemes [2]

Studies report prosthesis abandonment rates of up to 40–50% [2]

***Fig. 2a**: Over-grip*

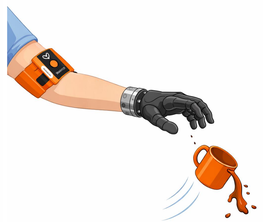

***Fig. 2b**: Under-grip*

## Hypothesis

Object grasping becomes more intuitive when grasp force regulation is handled by the prosthetic hand

## Methods

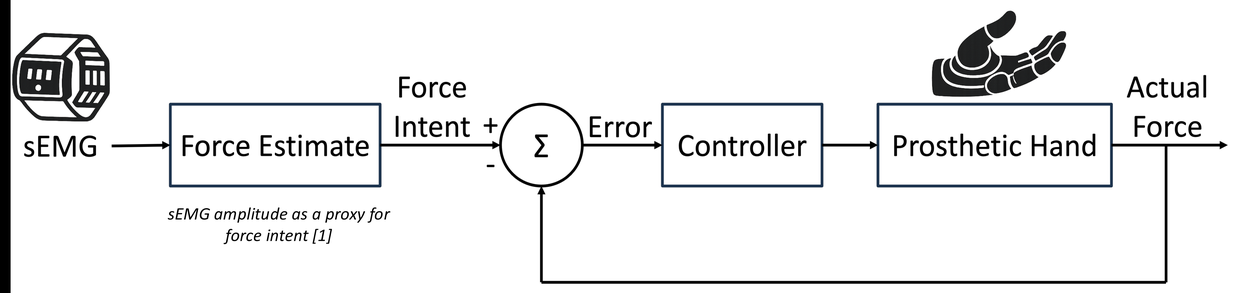


***Fig. 3**: Algorithm diagram*

The algorithm is triggered upon object contact, shifting force regulation to the prosthetic hand

## Results

***Fig. 4a**:* Low grip force

***Fig. 4b**:* High grip force

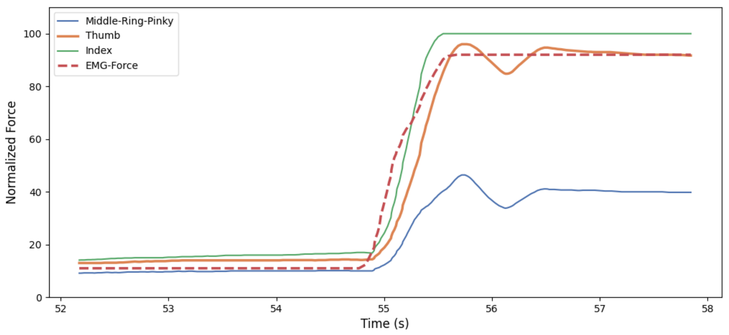


***Fig. 4c**:* Force sensor readings during grip increase

## Demo

***Fig. 5**: Firm Object Grasp*

***Fig. 6**: 15 Second Demo Video*

## Limitations

User force estimation was evaluated under controlled conditions

Further evaluation is required across a wider range everyday objects

## Conclusion

sEMG estimates user's force intent while the prosthetic hand regulates it

Results show the prosthetic hand adjust grip force to match user intent

This enables more natural, biologically aligned approach to hand control

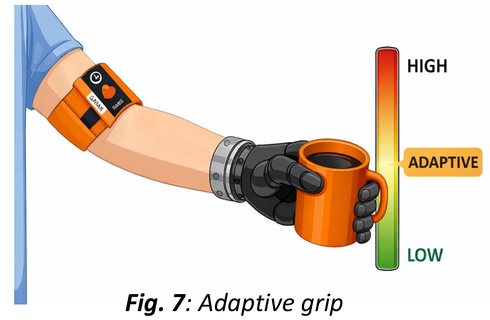


***Fig. 7**: Adaptive grip*

## References

[1] De Luca, C. J. (1997). The use of surface electromyography in biomechanics. *Journal of Applied Biomechanics*, 13(2), 135–163.

[2] Biddiss, E. A., & Chau, T. T. (2007). *Upper limb prosthesis use and abandonment: A survey of the last 25 years.* Prosthetics and Orthotics International, 31(3), 236–257.