Final project:
Thumb Orthosis Motion Analysis

Biomechanics

Alejandro García González
Erika Vianey Zañudo Angulo

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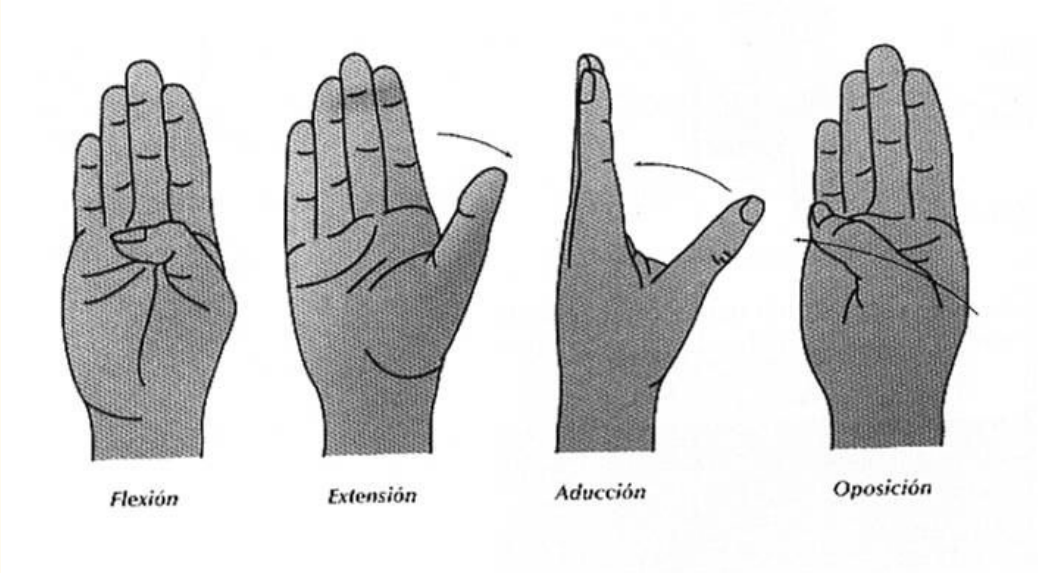
José Olaf Huerta de la Vega A01633187
Daniela Corral Martínez A01632701
Priscila I. Medina Martínez A01633158
Diego Alberto Marín Esparza A01261355
Estefanía Guadalupe Langarica A01632328
Ana Luisa Ortega Rodríguez A00226513

Introduction

40% of the hand capabilities involve the thumb

Strategic position



Universidad de Zaragoza (2010)

McGavin, G. (2014)

Hypothesis

The implementation of a thumb orthosis will increase the range of possible movements and actions in a person that suffered a thumb injury.

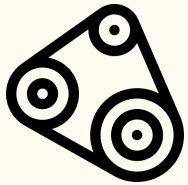
Objective

Design, implement and evaluate a thumb orthosis with two degrees of freedom (opposition and adduction) myoelectrically controlled with haptic feedback to accomplish grab tasks.

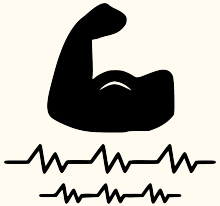
Methodology

1. Mechanical design

2. Actuator & control



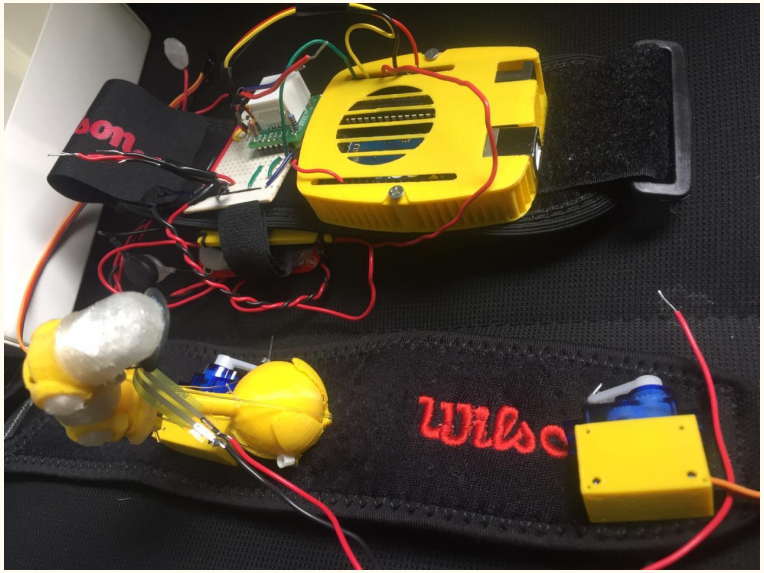
3. EMG Signal



4. Haptic feedback

5. Test & validation

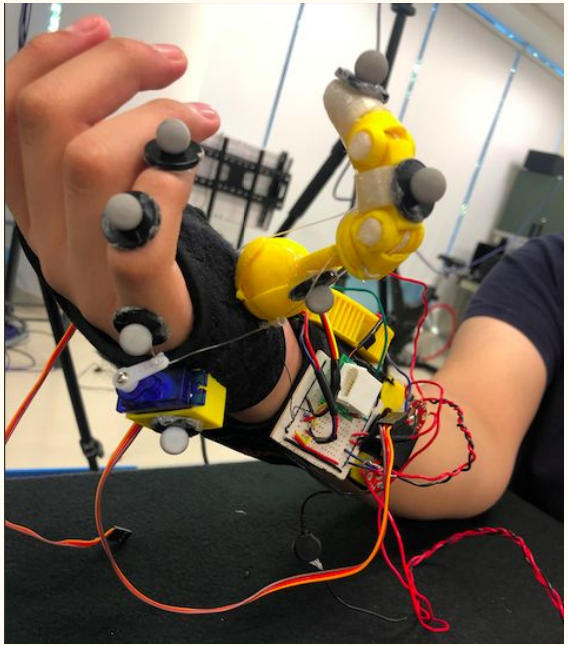
Thumb orthosis



Markers

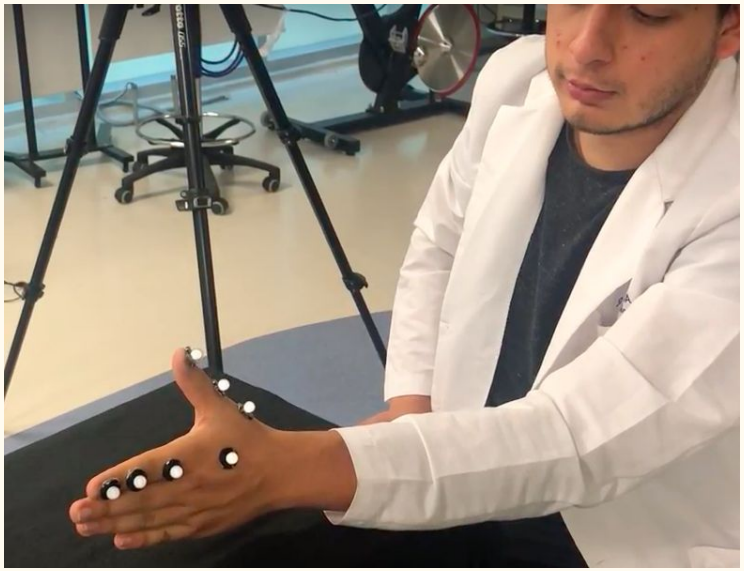
HAND

ORTHOSIS



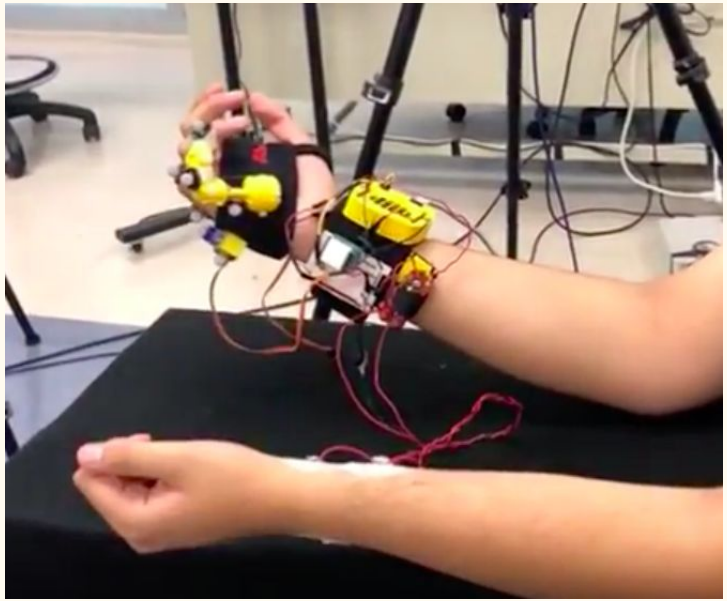
Motion Capture: Adduction

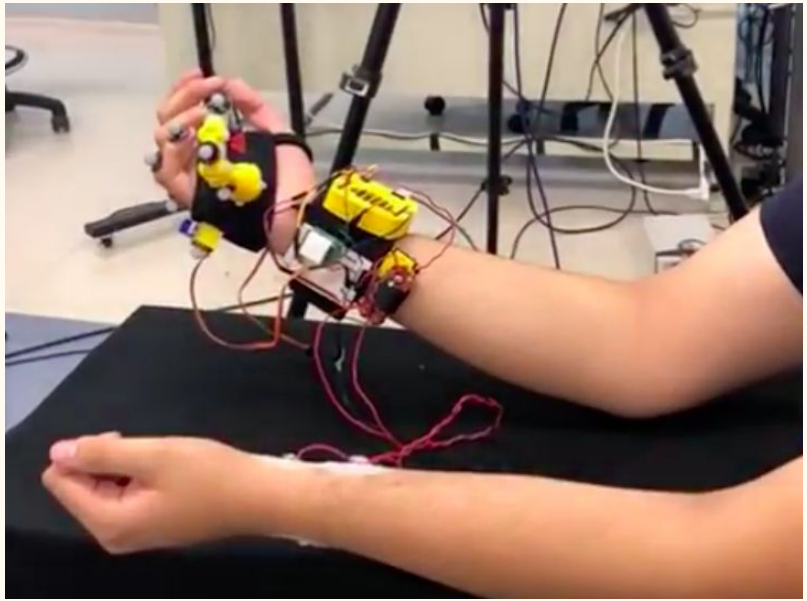
HAND



Motion Capture: Adduction

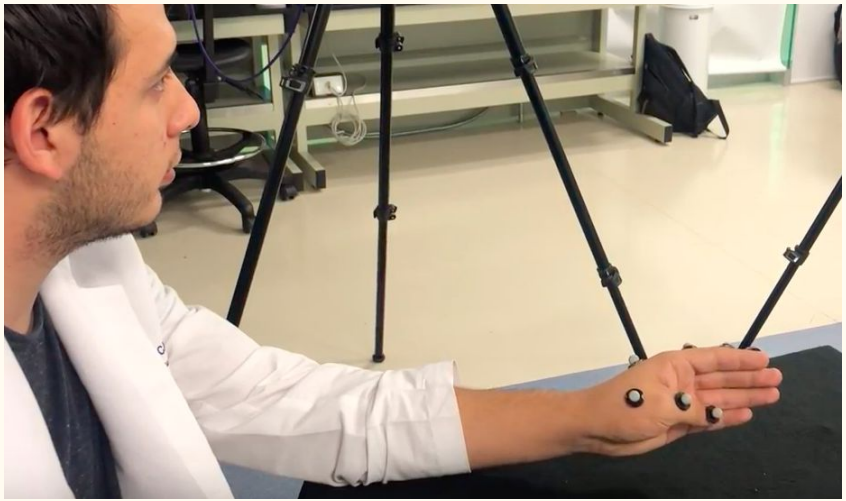
ORTHOSIS

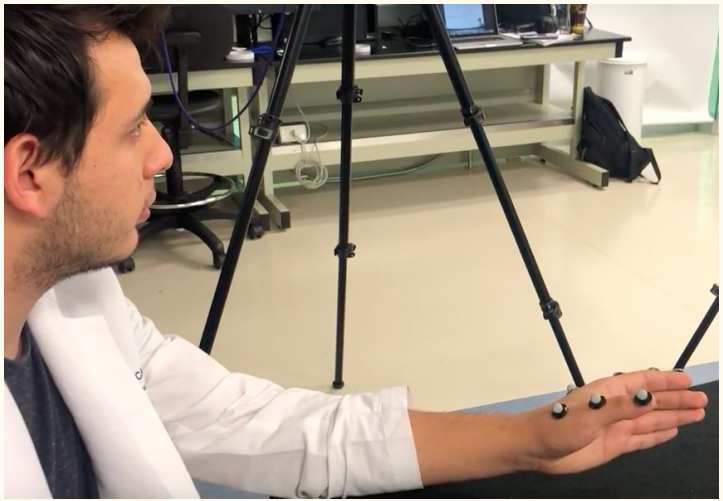




Motion Capture: Opposition

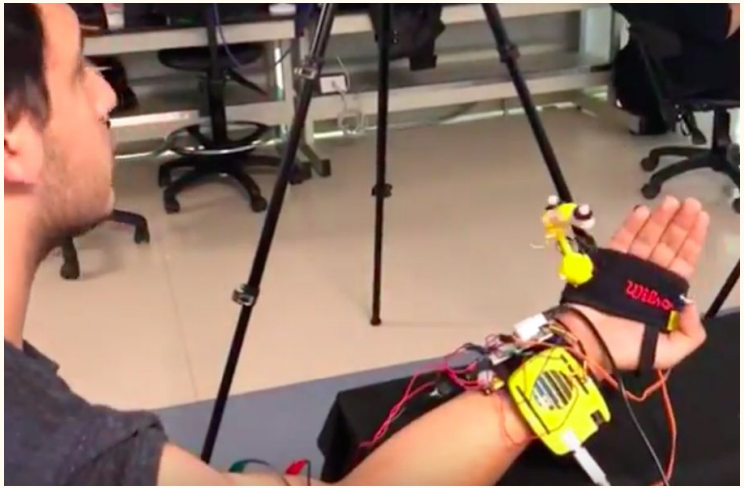
HAND





Motion Capture: Opposition

ORTHOSIS



Conclusion

It is observed that the natural range of movement of the thumb is greater than the orthosis one. Although, the two degrees of freedom were achieved. A more natural movement for the orthosis could be achieved by implementing a more degrees of freedom to the mechanical system.

References

McGavin, G. (2014). Las increíbles extremidades del ser humano: manos y pies. BBC News. Recuperado de https://www.bbc.com/mundo/noticias/2014/03/140227_ciencia_manos_y_pies_jgc_finde

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