LARM2: Laboratory of Robot e Mechatronics
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Numerical and experimental validation of ExoFing

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Background

Demand of mechatronic devices for:

- Diagnosis
- Rehabilitation
- Exercise
- Assistance

Work plan:

- Functionality analysis of ExoFing for different finger sizes
- Comparison with the numerical result

Requirement motion for exoskeleton

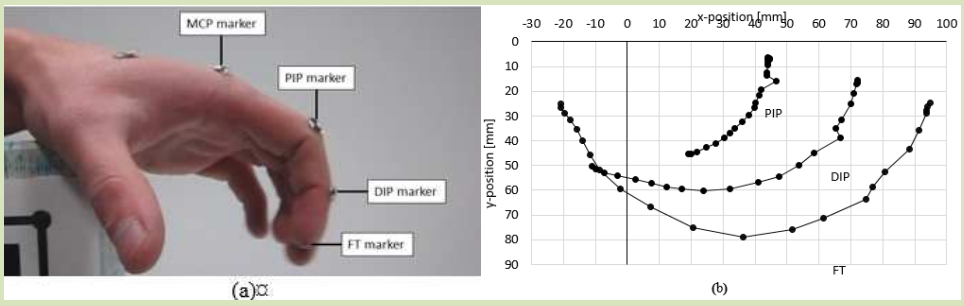

Fig.1. Acquired trajectories of PIP, DIP, and FT markers for a finger movement of a healthy human

Performance and simulations

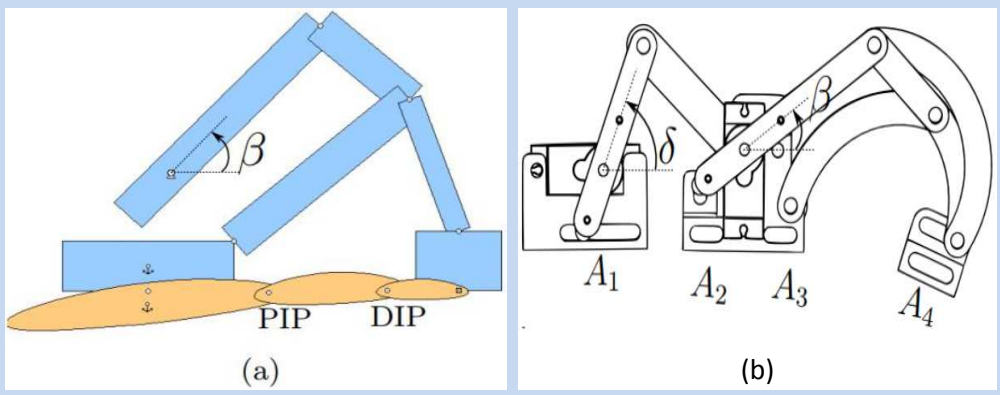

Fig.4. Mechanism simulation using Working Model and CAD

Fig.7. Inputs and signals from sensors during a test

Design Proposal and Modeling

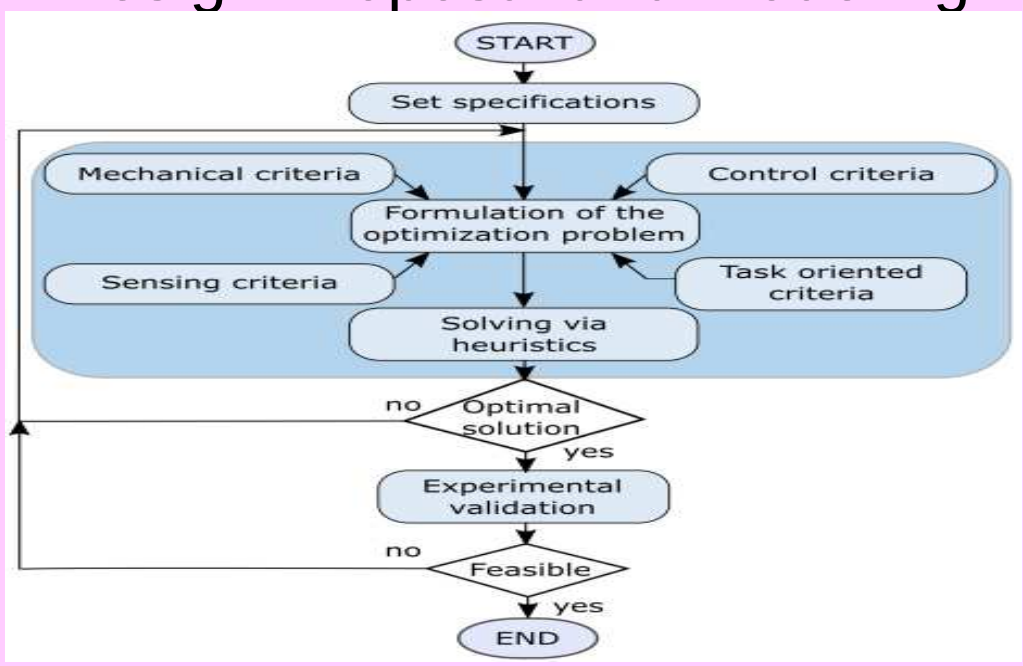

Fig.2. A flowchart for a mechatronic design

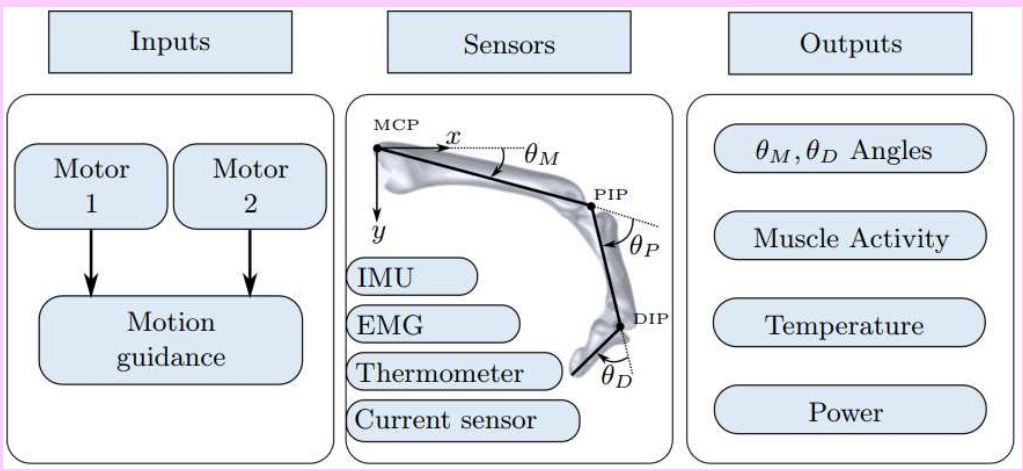

Fig.3. A conceptual and kinematic scheme of ExoFing

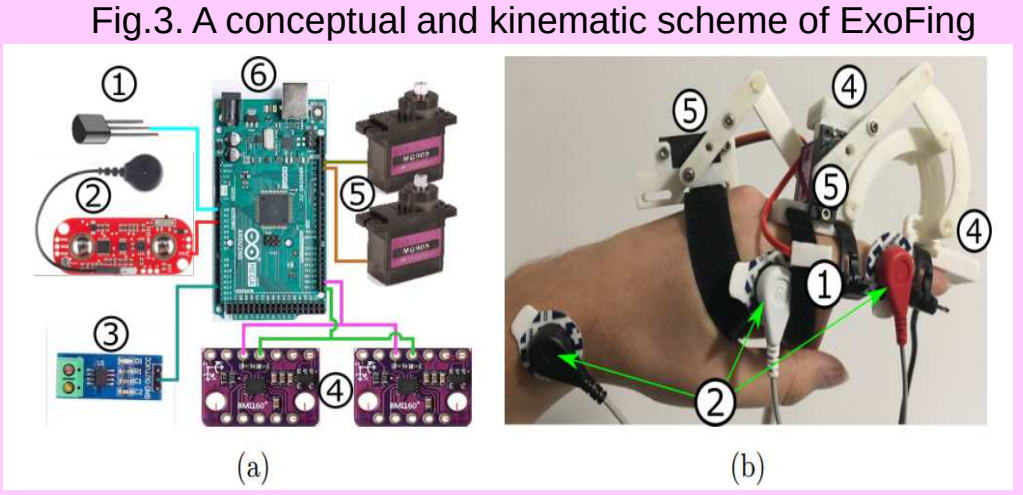

Fig.5. Lab setup with sensors and actuators
(1: Thermometer, 2:EMG, 3: Current sensor, 4: IMU's, 5: Motors, and 6: Arduino)

Results

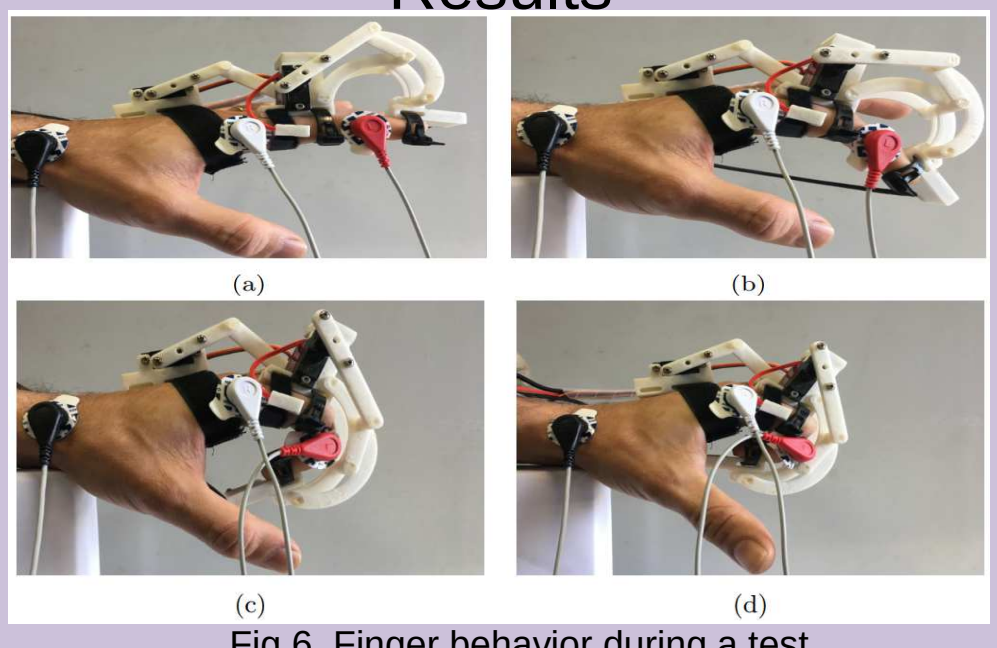

Fig.6. Finger behavior during a test

References:

- Gerding, E.C., Carbone, G., Cafolla, D., Russo, M., Ceccarelli, M., Rink, S., Corves, B.: Design of a finger exoskeleton for motion guidance. EuCoMeS 2018, pp11-18, Springer, Cham (2019).Patent
- Gerding, E.C., Ceccarelli, M., Carbone, G., Cafolla, D., Russo, M.: Mechanism for a finger exoskeleton. Italian Patent application No. 102018000003847 (2018).