

Background

Problems:

- High frequency
- Limited Study

Work plan:

- Mechanism design
- Characterization
- Simulations
- Experimental test



Fig 1. Events with high frequency of head impacts.

Design Proposal and Modeling

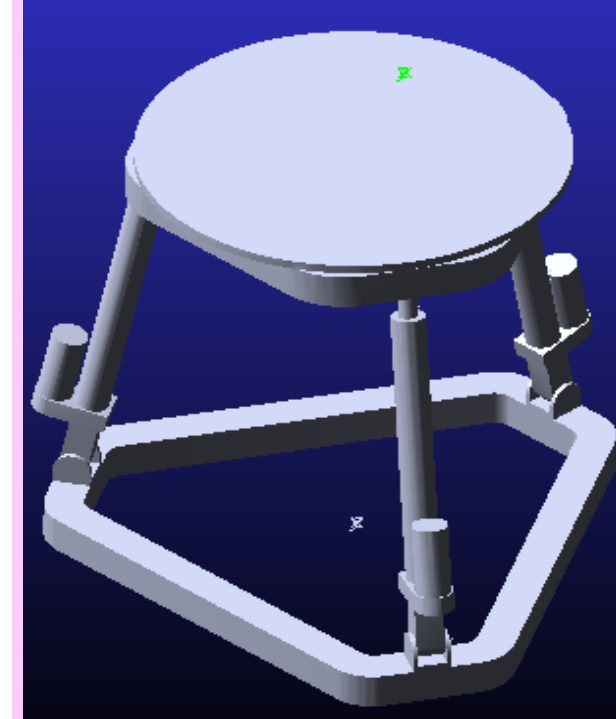
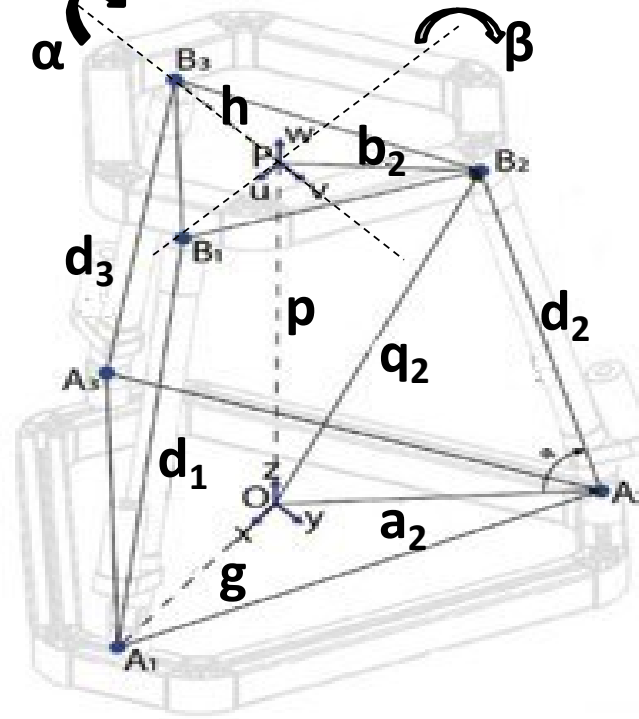


Fig 2. A design of a PK solution for head impact simulation: a) a kinematic Scheme; b) a CAD solution.

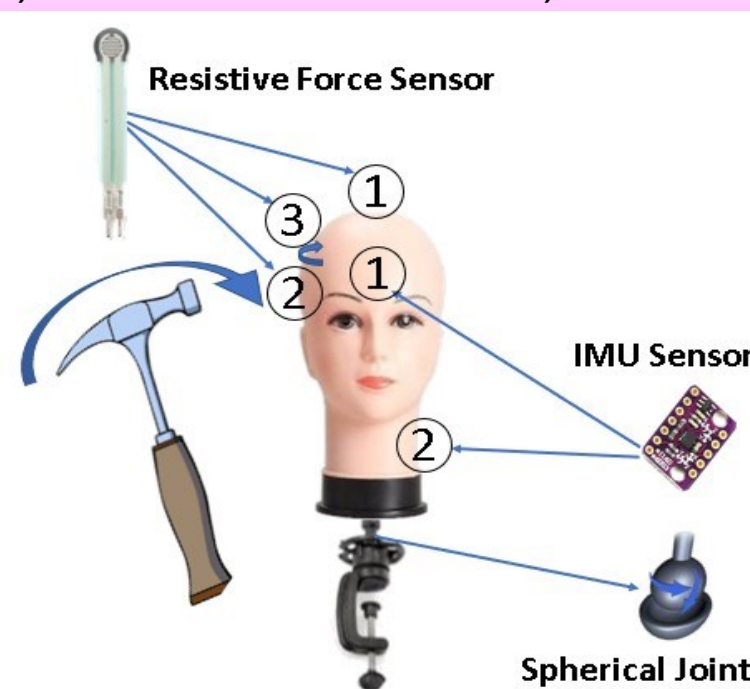


Fig 3. Experimental layout at LARM2 in Rome: a) a scheme; b) a lab solution.

Performance and simulations

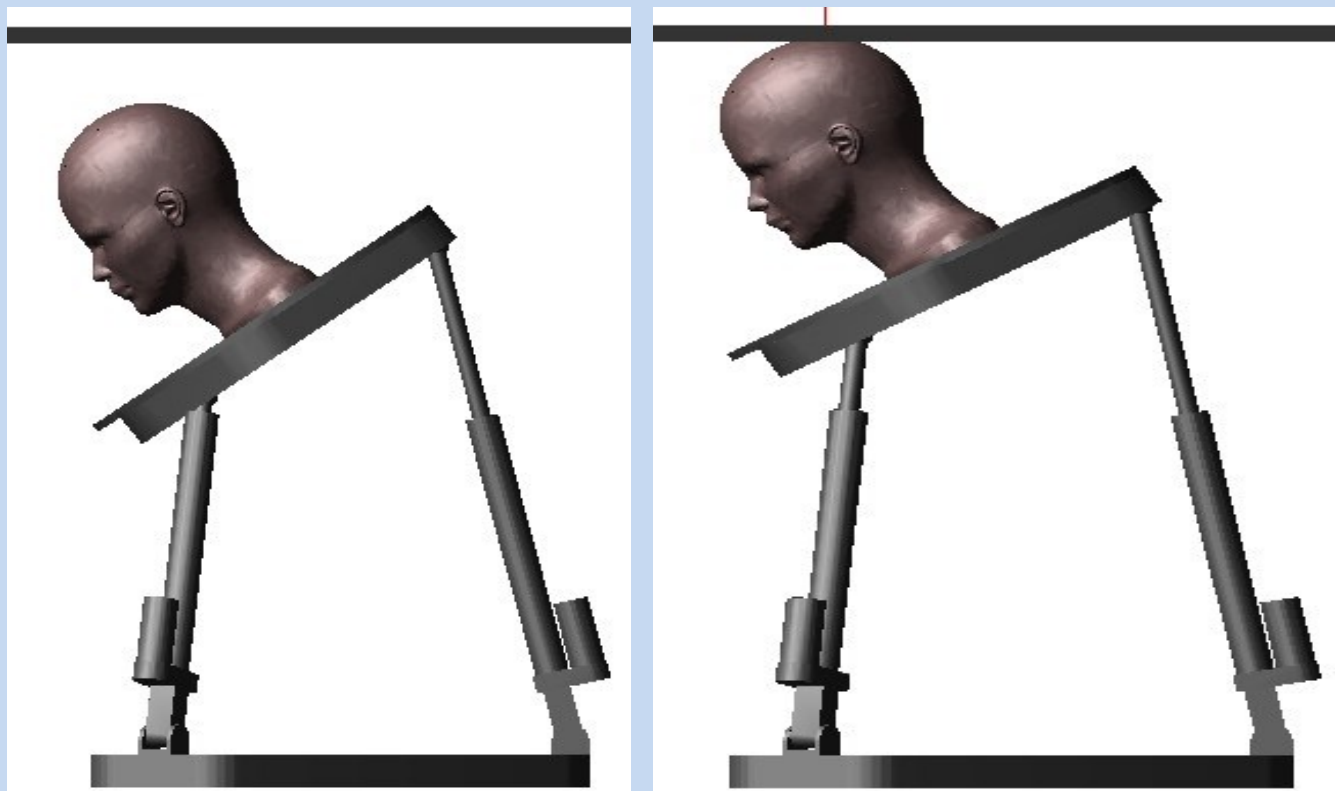


Fig 4. A snapshot of simulated operation in testing head impact

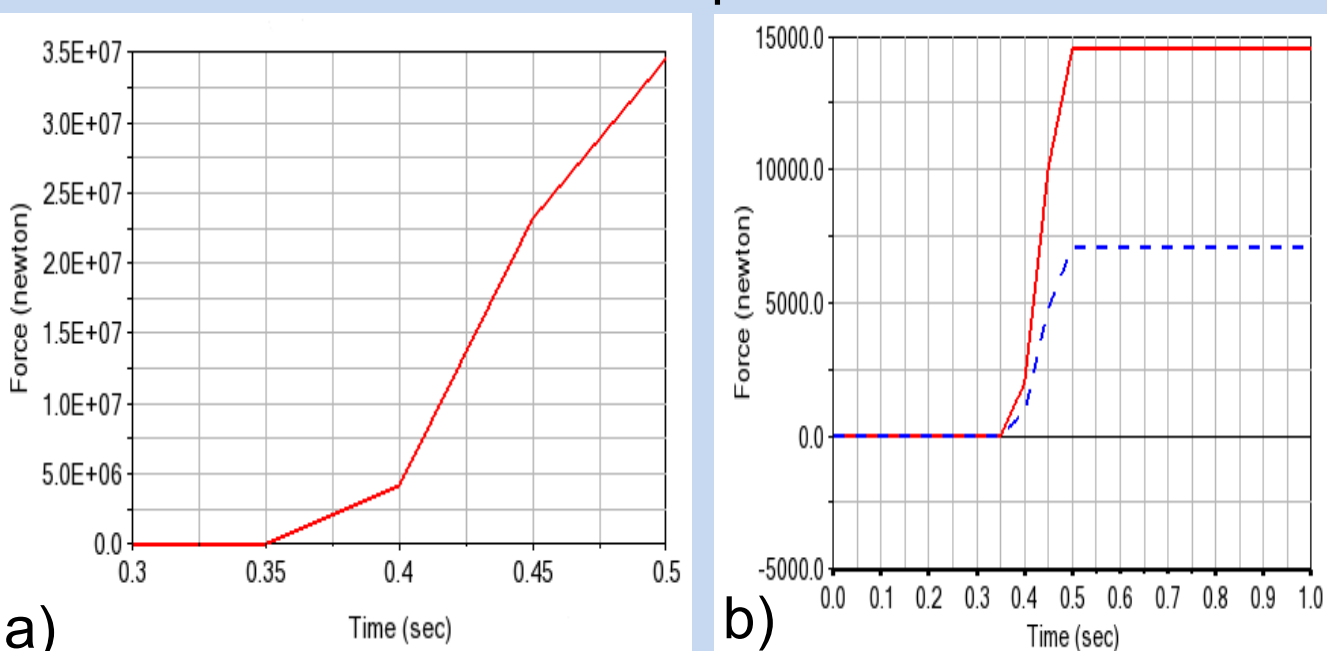


Fig 5. Simulation results in terms of: a) force on the head; b) actuator forces.

Results

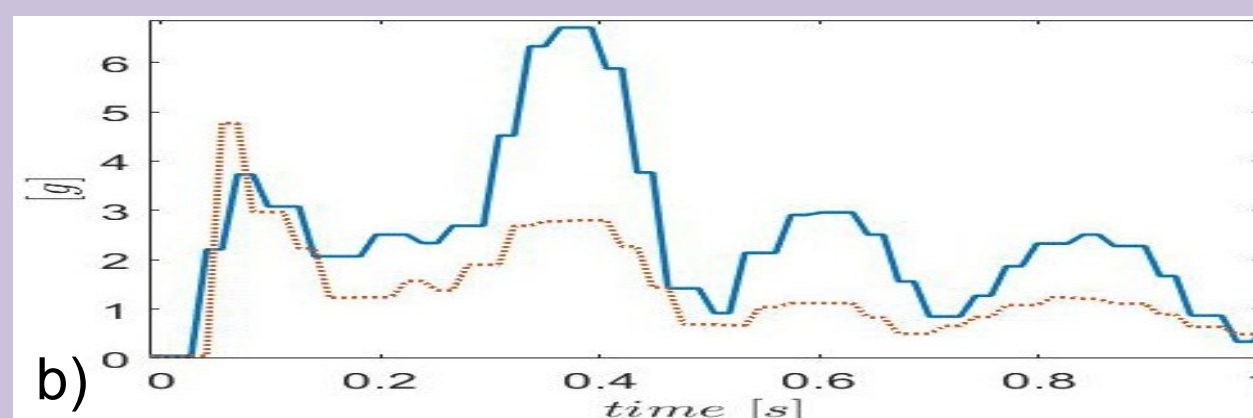
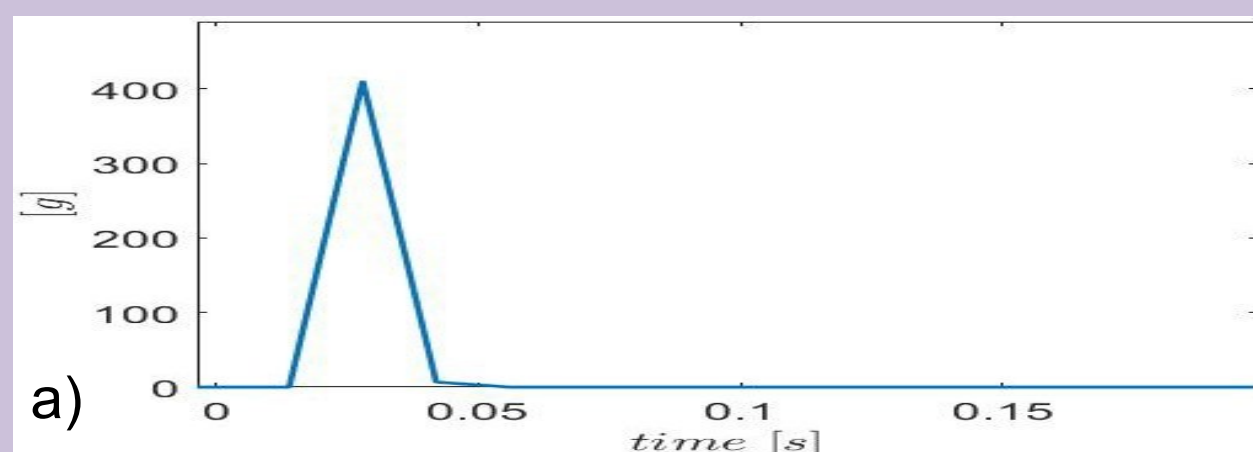


Fig.6. Experimental layout results for testing lateral impact in terms of: a) impact force by sensor 1; b) accelerations by IMU sensors.

Reference

- 1.- Rueda Arreguin J.L., Torres San Miguel, C. R., Ceccarelli, M., et. al., Design of a Test Bench to Simulate Cranial Sudden Impact, In Carbone, G., Ceccarelli, M., Pisla, D. (eds.) New Trends in Medical and Service Robotics, (65), pp. 225-234, Springer, Cham (2019).