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## Innovative Crutch Equipped with Sensors

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The present study wants to bring to light the search for a new type of crutch designed primarily for a chronic patient with perennial limited mobility and therefore with frequent use of this tool. Filter of our research is the selection of certain characteristics, compared with each other through relationship matrices (of importance and of relationship) and benchmarking (or competition analysis), which then defined the project requirements. The result is a sensorized crutch, functional, attentive to the use of the user to prevent incorrect use and the onset of other pains, adjustable and therefore conformable to the user's physiognomy. It is clear that there are few innovations in the area and that there are not many crutches suitable for a long period that can be customized. In fact, users who use crutches are people who have suffered injuries, various types of surgery in the lower limbs or amputations and so they need a comfortable and ergonomic support. Starting from these premises and placing at the center of the question the user who suffers a long-term disability, the project has opened to a phase of market and competition analysis, supported by the QFD method and by the Benchmarking. Through these methods, some qualitative and technical characteristics have been obtained, which constitute the project objectives. Then, through a careful analysis of product architecture, styles and trends, it has been defined a crutch shape more likely to the final product.

### Biography:

Giampiero Donnici Ph.D in Mechanical Sciences and Advanced Techniques at the University of Bologna<sup>1</sup> from 2017. In the academic field he deals with scientific issues related to Design Methods (CAD, QFD, TRIZ, 3D Printing). From 2000 until today he has been involved in mechanical design, particularly in the sectors of agricultural machinery and automatic machines. He also worked as a consultant in the fields of PLM and CAD-CAE systems. Companies where he worked: Orsi Group s.r.l., O.A.M. S.p.A., Sacmilmolac.c. Companies for which he has worked as a consultant: Pet Projectas.r.l., Sacmi Verona S.p.A., Sacmi Filling S.p.A., Sacmi Packaging S.p.A., Protesa S.p.A., Tonelli Group S.p.A., TiesseProgettis.r.l., Compomacs.r.l. From 2013 he has held teaching tutor positions in Mechanical and Automatic Design courses at the University of Bologna.