



Universitatea *Transilvania* din Braşov

HABILITATION THESIS

SUMMARY

**Conceptual and applied developing analyzes on
human bio-behavior in occupational and
environmental comfort**

Domain: Mechanical Engineering, Mechatronics and Robotics

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Habilitation thesis entitled **Conceptual and applied developing analyzes on human bio-behavior in occupational and environmental comfort** is part of the research of the author conducted after a PhD thesis in 1997 at the Transilvania University of Brasov and with the title confirmed in 16 January 1998.

Presenting researches conducted during this period, from 1997 to now reflect experience gained through research projects by dedicated and personalized research, by teaching activity conducted over almost 20 years in the Faculty of Mechanical Engineering (until 2012) and then at the Faculty of Product Design and Environment (2012-present).

The very generous topics of fine mechanics areas (PhD in Precision Mechanics), biomechanics, optometry, medical engineering were those that were addressed in the scientific research and very divers teaching activity, during this period. The central point of the habilitation thesis are the multiple analyzes on human bio-behavior in occupational and environmental state of comfort, enabling the development of a new concept of **comfo-havior (confortament)**, behavior in comfort, to determine and to obtain the improvements of activities in any field.

Habilitation thesis consists of two main modules:

Modul 1. Scientific and professional achievements conducted in three main directions:

- **I. Research direction - Human visual system analyse**
- **II. Research direction - Human biomechanic system analyse;**
- **III. Research direction - Human bio-behaviour analyse;**

Modul 2. Development's plans and career evolution with the presentation of four aspects of:

- **1. Professional experience and teaching;**
- **2. Experience in scientific research;**
- **3. Plans for the development of teaching activities;**
- **4. Plans for the development of scientific research;**

The first direction of research - analysis of the human visual system are presented research on the visual system as an extension of the PhD thesis and bringing a substantial contribution in terms of modeling of the eyeballs movements; applied research on the investigation and recovery of refractive dysfunctions of children, youth and adults eyeballs. In the same context I have developed research on the correlation of the visual system functioning with the human body biomechanics related to posture in relation to the visual system and the influence of external stimuli on behavior of the visual system. Following the development of these analyzes I have identified a very important aspect about the behavior of the visual system stimulated and simulated with complex components that I approached and I wish to develop in the future.

By the second direction of investigation we addressed a number of analyzes in the field of biomechanics of the human body especially on the state of bipodal stability, the plantar areas

of loco-motor system and not the last analysis on the different kinds of linear gait, on stage or detention.

Research in this segment of analysis were developed for subjects with different aspects of loco-motor disability and dysfunction, activity supported by financed research contracts in which I was the coordinator or member. Thus, studies and anthropometric and biomechanical modeling of human biomechanical system using dedicated software packages are presented in this habilitation thesis. In this research were conducted posture, stability and gait assessments for people with disorders and loco-neuro-motor disabilities and have sought solutions through applied studies on rehabilitation of posture using corrective insoles and their microscopic analysis. In the same chapter we paid attention on the action and skills applied research of arm-hand-fingers assembly and thermal effects on the facial surface and hand.

A third direction of research that I present in this habilitation thesis are focused on assessments of human behavior in occupational and ergonomic comfort by developing methodologies for evaluating behavior in the vibrator environment, determinations of the comfort coefficient, the performance and ergonomics areas of activity. The final part of this chapter is summarized and illustrated the techniques used for correlative and integrative investigations of human bio-behavior, such as video techniques, correlation techniques etc. As an important aspect, the research activity included in this area also the human behavior analyzes under the influence of induced emotions that can change the biomechanics of the human body, very important issues in dynamic postures and movements.

Because in my research there is an important component of the optical field, the habilitation thesis concludes with a presentation of short aspects of the analysis by digital microscopy of orthotic / prosthetic human body components (contact lenses, lens glasses and dental prosthesis).

The second module of this habilitation thesis contains a summary presentation of the evolution and development author plan of the teaching career, scientific and academic also punctuated several directions for future action.

The most important aspect of this personal development plan, I believe it is the desire of continuous improvement and self-improvement, the implementation of the most important new media and information in teaching and research, with the prospect of working with students and postgraduate students from Department of Product Design, Mechatronics and Environment, to training highly qualified specialists in the technical field.