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DC Motor Control Didactic Kit through Product Design Methodology

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Abstract — We propose an educational kit consisting on several modules aimed to control a DC motor, with the specification to be able of being regulated by several types of control schemes from a broad range of devices to accomplish such tasks. The purpose is to achieve different experiments and practices to be designed and covered, due to the flexibility, adaptation and modularity shown by this product.

The used methodology is an important part of this project, due to we have followed strict guidelines about potential users' needs, benchmarking and patents, and to scan all possible configurations in our prototypes, using convenient and accredited tests in order to obtained measures and values that indicate specific qualifications to grade our product.

I. INTRODUCTION

Learning in Control Theory has gained a respectful role in Engineering Schools in the last decades due to the evident technological development achieved until present days.

Different complexity levels are possible to see in those topics related to such a set of knowledge, ranging from very concrete concepts and definitions until those with a high level of abstraction.

However, independently of the themes related to Control Theory, most of the time the main objective is the application of such theoretical tools in real devices, machines and systems. It is then a matter of worry for educators to find ways to transmit theory and practice to students in the best possible way, leading a great portion of such a task to workshops and laboratories where students can find equipment, instruments and tools in order to confirm in a real manner what they have comprehend in classrooms.

This way of thinking has been translated in sophisticated approaches like remote laboratories [1] or virtual tools closely similar to those processes that try to emulate [2]. In the particular field of Control Theory, fundamental concepts like Feedback Signaling, Root Locus Control Design, Compensator Tuning, Regulation by State Variables or Estimators Design, can be covered in detail by such didactic-based devices and many authors are focusing in the design and development of these items [3, 4].

However, in most of the cases, physical nature and necessary manipulation of these instruments, together with the hardworking and massive use, force to take into account no little features to their conception, design and production. As a consequence, it is highly important to follow a methodology in order to achieve a product of the required quality, usability and cost, tasks that are not trivial if they are viewed in depth [5].

Product Development is a discipline involving the perception of the opportunity to cover a need and