REPORT PhD

EXPERT'S NAME
Prof. Dr. Andres PEREZ-URIBE

FILIATION
Reconfigurable and Embedded Digital Systems (REDS) Institute
University of Applied Sciences of Western Switzerland (HEIG-VD)

COUNTRY
Switzerland

EVALUATION

- ☒ **PASS**
- ☐ **PASS AFTER REVISION (INCOMPLETE)**
- ☐ **RESUBMIT (CONDITIONAL FAIL)**
- ☐ **DOES NOT PASS**

PhD CANDIDATE'S NAME
Juan Gonzalez-Gomez

TITLE OF PhD THESIS
Modular Robotics and Locomotion: Application to Limbless robots

Place and Date Yverdon-les-Bains,
Switzerland
9.10.2008

Signed:

GLOBAL EVALUATION

Modular robots are composed of multiple building blocks of a relatively small repertoire. These robots offer a robust and flexible framework for exploring the usefulness of diverse robot morphologies on different environments. They allow assembling robots of different types, e.g. snakelike robots, robots with limbs, and many other different shapes, with the aim of adapting the morphology of the robot according to the environment.

The design, control and characterization of modular robots is a challenging research domain. The PhD candidate proposes in this thesis a set of original contributions with the aim of dealing with many unsolved design and mathematical characterization problems regarding modular robot locomotion.

To address the study of modular robot locomotion, the author came up with an original modular robot classification system and concentrated on 1D and 2D locomotion.
A very interesting study was made on the identification of minimal configurations able to move on both one and two dimensions, and their corresponding mathematical and kinematics characterization.

Moreover, the PhD candidate developed a modular robotic platform, called Y1 to validate his research. His modular robotics building blocks are controlled by an electronic board, which was made available to the research community. It exploits a PIC microcontroller and allows the implementation of controller parts on FPGA reconfigurable circuits.

The PhD candidate has provided a very well organized and complete report on his research and a huge number of experiments characterizing his modular robot locomotion. He has published his results in a comprehensive way, whether on recognized international conferences or on the internet, thus contributing in a very important manner to the advancement of the field.

Based on all the aforementioned achievements, the reviewer has provided a very positive evaluation of the work being discussed and thus suggests to the promotion committee to grant the Dr title to M. Juan Gonzalez-Gomez.

To evaluate this thesis, please consider the following aspects:

1. - Originality and Innovation.
2. - Planning and Methodology.
3. - Concrete goals and interest in the research area of the thesis.
4. - Interest in the obtained results.
5. - Formal requirements of the thesis and bibliography.