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THESIS SUMMARY

INTELLIGENT MANAGEMENT OF ENERGY SYSTEMS

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BUCHAREST

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Energy is essential to life and survival. Energy may well be the item for which historians remember the last half of the twentieth century, as it marked the beginning of a new era of change, an era of possibly greater fundamental significance than the Industrial Revolution.

Due to limited energy resources, it must be used efficiently. This is an economic and ecological challenge and an imperative for sustainable growth. Much of the energy used is consumed to supply buildings, which means that there is great potential for savings. The global construction industry consumes almost 40% of primary energy and a considerable amount of water.

The thesis contains an introductory chapter in which the main purpose of the thesis is defined, general considerations and the case study in which the implementation part is included. The basic principles of energy systems management are established.

Energy management, the current state of research in the field, short history, catalysts for energy management, global energy consumption, policy issues and issues associated with energy cost are defined. In addition, I submitted a proposal for an energy management program in an organizational structure.

General methodologies for building energy management systems, general presentation of building energy management systems - their benefits and architecture are presented. Specific methods for saving energy in a building are also described.

I developed an API for the implementation part, by highlighting a co-simulation between EnergyPlus and MATLAB. The API was developed in the C # language so that it can be used with any software that can import .NET libraries.

Steps for accomplishing this goal, describing applications, describing the API, and its components are exemplified.

The developed API allows the user to perform complex simulations using EnergyPlus in a simple way, as it allows editing each simulation and analyzing the simulation results through MATLAB. In addition, it allows the user to run multiple simulations simultaneously, using either all the computer's processor cores or a selection of them (that is, it allows parallel computing), thus reducing simulation time.

Also, the experimental results following the simulation with EnergyPlus, MATLAB and API are presented, the obtained results are interpreted.

To the experimental results, I proposed a control based on a predictive model for the control of the air distribution system under the floor in an open office with several areas.

My contributions during the doctoral period are presented. The thesis can be considered a new research in the literature in the field, which has an enormous potential for the development of future studies.