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Future Generation Computer Systems

journal homepage: www.elsevier.com/locate/fgcs

IoFClime: The fuzzy logic and the Internet of Things to control indoor temperature regarding the outdoor ambient conditions

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HIGHLIGHTS

- Creation of a fuzzy system that controls the indoor temperature efficiently.
- Automation of indoor temperature using external climate conditions.
- Use of platforms from the IoT to improve the manage of the indoor temperature.
- Fuzzification of humidity and temperature variables.

ARTICLE INFO

Article history:

Received 20 November 2015

Received in revised form

17 November 2016

Accepted 21 November 2016

Available online xxxx

Keywords:

Internet of Things

Fuzzy logic

Temperature control

Temperature sensors

ABSTRACT

The Internet of Things is arriving to our homes or cities through fields already known like Smart Homes, Smart Cities, or Smart Towns. The monitoring of environmental conditions of cities can help to adapt the indoor locations of the cities in order to be more comfortable for people who stay there. A way to improve the indoor conditions is an efficient temperature control, however, it depends on many factors like the different combinations of outdoor temperature and humidity. Therefore, adjusting the indoor temperature is not setting a value according to other value. There are many more factors to take into consideration, hence the traditional logic based in binary states cannot be used. Many problems cannot be solved with a set of binary solutions and we need a new way of development. Fuzzy logic is able to interpret many states, more than two states, giving to computers the capacity to react in a similar way to people. In this paper we will propose a new approach to control the temperature using the Internet of Things together its platforms and fuzzy logic regarding not only the indoor temperature but also the outdoor temperature and humidity in order to save energy and to set a more comfortable environment for their users. Finally, we will conclude that the fuzzy approach allows us to achieve an energy saving around 40% and thus, save money.

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1. Introduction

The Internet of Things (IoT) is a term very popular nowadays. Every day we can listen people taking about Smart Homes [1, 2], Smart Cities [3,4], Smart Earth [3], and many other kinds of distributed intelligence around heterogeneous and ubiquitous objects. The IoT allows gathering a huge quantity of data that can be processed to help making different decisions. These data may

be very varied and confused and processing them might become inoperable.

Humans and computers make decisions in a different way. Whereas human reason uses words, computers use numbers [5]. Moreover, even though the logic applied by humans seems more primitive, they can make better decisions in the real-world when an unexpected problem appears. Computing with words could improve the capability of computers to deal with problems of real-world and thus, improving decision making [5].

The human capability to take decisions without computations is usually referred as 'common sense'. Common sense allows us to take decisions quickly although they are not always the best ones. For example, in the past, we thought that the Earth was flat due to common sense [5]. Moreover, common sense provides a way to get solutions to problems with incomplete or imprecise information

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<http://dx.doi.org/10.1016/j.future.2016.11.020>

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