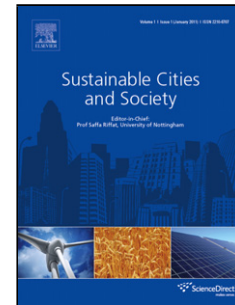


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## Authors

Azin Keshtkarbanaemoghadam<sup>1</sup>, Ali Dehghanbanadaki<sup>2,\*</sup>, Mohammad Hadi Kaboli<sup>1</sup>

<sup>1</sup>Department of Architecture, Damavand Branch, Islamic Azad University, Damavand, Iran.

Email: azinmoghadam@gmail.com

Email: hadikaboli@damavandiau.ac.ir

<sup>2</sup>Department of Civil Engineering, Damavand Branch, Islamic Azad University, Damavand, Iran.

Address of the authors: Islamic Azad University Damavand, Tehran Province, Iran

**\*Corresponding author:** Ali Dehghanbanadaki

Email: A.dehghan1916@yahoo.com

Tel: +989121728400

Fax: +982122895211

## Highlights

- Evaluating the heating energy demand of a mountain shelter in IRAN by Grasshopper software
- Presenting a new hybrid intelligent model for estimating energy in the shelter
- Providing and optimizing the heating energy demand by protective zones and number of shelter occupants
- Proposing a near-zero energy shelter based on local materials

## Abstract

In this study, the heating energy demand of a shelter located in mountainous areas (Damavand mountain) in Iran was simulated, estimated, and then optimized. The main focus was to improve the heating energy demand of existing shelter by different protective zones and heat body of occupants. In order to estimate the heating energy demand in the shelter, an expert artificial neural network (ANN) trained by back-propagation algorithm (BP) was developed in Neural Network

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