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Abstract:
In households, maintaining the occupant's comfort within a comfortable range is very important. In this paper, the mathematical model of three key aspects of occupant's comfort, which are thermal, air quality and visual comfort, has been developed and analysed in MATLAB. Also, the proposed model has been analyzed for five different cities' weather conditions in India: Jaipur, Delhi, Mumbai, Kolkata, and Chennai. The presented model is applied to a room in a single-storey standalone residential building. Further, the Particle Swarm Optimization (PSO) algorithm is applied to maximise the occupant's comfort. To maximise the overall comfort, the proposed model has been implemented in two cases, i.e. equal priority and variable priority for three individual comforts. The results for a typical household show that optimisation can achieve the desired comfort.

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☰ Contents

I. Introduction

As technology develops, the demand for indoor occupant's comfort is growing. The building automation system's goal is to provide good comfort requirements for indoor occupants [1]. Usually, indoor environmental quality is measured with regard to the occupant's comfort in a residential building [2]. Households must keep their residents comfortable, productive, healthy, and safe. A better household is not just about avoiding problems it is also about creating living spaces that are pleasurable and healthy for everyone in the household. As a whole, comfort is concerned with the physical environment [14][17]. The problems which are mostly connected with comfort are temperature, air quality, and lighting [3]. This paper considered these three comforts in a household for the maximization of the occupant's comfort.

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