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Improving user comfort in living room furniture by using artificial intelligence

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ABSTRACT:

Living rooms are essential elements in residential interior spaces because they provide comfort and relaxation to users. Therefore, designers should develop in the furniture industry using artificial intelligence and design interactive furniture that can adapt to consumers' routines with the advancement of technology. The study intends to improve and apply artificial intelligence to living room furniture design from the perspective of comfort and well-being. It attempts to generate such furniture solutions emphasizing healthy comfort but enabling adjustment according to people's requirements and quality of life. The study focuses on the basic elements that affect users' comfort during use and interaction with living room furniture, and we will also look at the positive and negative aspects of smart furniture supported by artificial intelligence from the users' point of view. The study focused on the factors that influence people's choice of smart living room furniture to suit their needs, lifestyle, and technological requirements. Through this, the study aims to draw attention to the importance of artificial intelligence in the field of interior design, especially regarding living room furniture. The research is expected to provide designers, manufacturers, and consumers with important information that supports the creation of living environments that focus on the comfort and health of users.

Keywords: *Living rooms- smart home furniture- artificial intelligence -- Interior Design with AI- Technology..*

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1. INTRODUCTION:

The living room is one of the most important spaces within residential spaces, as it is the center of gathering of family members because it provides comfort and relaxation. With the development of furniture design with technology and artificial intelligence, there is now what is called (smart furniture), which refers to pieces of furniture designed and connected to smart systems specific to it with a control unit. Smart furniture works using user data and energy sources, and the furniture must have the ability to communicate and predict the user's needs with multiple sensors and motors within living rooms or any environmental spaces, which leads to furniture customized for the user (Nicholls, 2020). With the recent developments in artificial intelligence, it has become possible to transform furniture design from fixed and traditional forms to interactive furniture that analyzes the user's behavioral patterns and needs (Radu, 2020).

This study addressed the integration of artificial intelligence into the design of living room furniture with the aim of improving the design of furniture to suit the needs of the user and designing more comfortable and healthy furniture for daily life.

Research Problem:

The research problem deals with using artificial intelligence technology to enhance the design of smart furniture for living rooms in such a way as to contribute to the comfort and health of its users

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adapting to their needs and daily lifestyles while exploring their implications for user experience and other associated dimensions

Aim and Objective:
Aim: Using artificial intelligence to improve the design of living room furniture to suit the user's needs.
Objective: Dissecting elements that would determine the comfort of users with living room furniture.
Users' perspectives regarding pros and cons of AI smart furniture.
To investigate the factors affecting individuals' choice of smart furniture for living rooms.

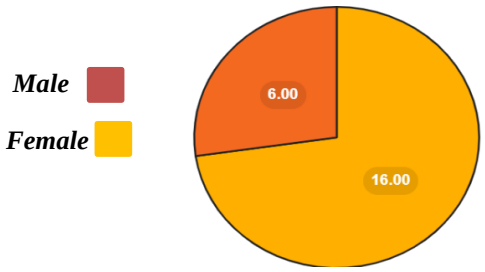
Significance of the study:
Research on the Use of Artificial Intelligence for Designing Comfortable and Healthy Furniture for Individual Daily Needs and Enhancement of Life Quality. Develop Innovative Design Solution to Answer Lifestyle Changes toward Building Adaptive Intelligent and Sustainable Living Environments for Better Comfort and Better Living

Research Question:
What are the most important factors that influence users to be comfortable by using the furniture living room?
What are advantages and disadvantages of using artificial intelligence-powered smart furniture, depending on the user?

What factors affect people's choices while selecting smart furniture in the living room?

Limitation Research:
Time Boundaries: First semester 2024-2025
Geological Boundaries: Amman – Jordan
Topic Boundaries: The research is limited to studying the use of artificial intelligence in designing smart furniture living room that suits the user.
Methodology:

Recently, the application of artificial intelligence in furniture design has led to the emergence of very useful techniques to enhance user comfort, especially with regard to living room furniture. Traditional design methods generally do not take into account the diversity of comfort that everyone experiences, instead resulting in a one-size-fits-all solution that does not suit different needs. One of the biggest problems in this field is trying to define subjective comfort as it is influenced by many physical, emotional and contextual factors. To collect data through questionnaires specifically designed to understand the comfort criteria of living room furniture, a descriptive quantitative approach will be followed in this study. The questionnaires will be administered to 20 respondents sampled from a group of young adults aged 20-25. This age group was deliberately targeted because they are in a category of physically demanding jobs were sitting on uncomfortable furniture would be very detrimental to their activities. This approach aims to identify their specific individual experiences and preferences for furniture in terms of materials and functions designed to enhance comfort after a stressful day at work.The Results Demographics: Most of the respondents were in the 20-25-year age range, since there were 13 participants in this category out of the total of 22, showing that this age bracket is more interested in AI-powered intelligent furniture. A greater percentage of participants was female, 16 out of 22, which could indicate that females may show more interest in smart furniture for living rooms. Most of the participants reported being employed with office jobs, 11 out of 22, which could mean that there is an interest in furniture that enhances comfort, especially for home environments where people spend most of their time.



Gender Distribution, Figure (1-1)

Comfort with Current Furniture:

Most participants reported that they agreed with the comfort level concerning their living room furniture, 10 out of 22, meaning that comfort needs are satisfied with the current furniture. However, a number of respondents were neutral-9 out of 22-meaning there are no serious issues, while remaining open for an improvement of comfort experiences.

Impact of AI-Powered Intelligent Furniture on Comfort:

Most of the respondents felt that AI-powered intelligent furniture could make very valuable contributions towards enhancing comfort, with 12 out of 22 agreeing and 8 out of 22 strongly agreeing. This evidences a general
belief in positive influential capabilities from AI on mat ters of comfort relating to furniture in the living room.

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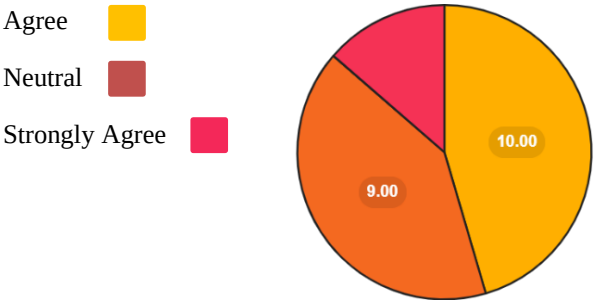
Only a few participant was indifferent, while a small number showed skepticism about its effect; 1 out of 22 participants did not strongly agree.

Features Preferred in Smart Furniture: The most desired features in smart furniture with the hel p of AI are seating adjustment, temperature control, and ergonomic design. These features reflect personalized comfort and adaptability in living rooms. They showed interest in self-adjusting furniture for comfort, such as posture adjustment and temperature adjustment. Engagement with Smart Furniture Though interested in smart furniture, 13 out of the 22 participants do not use smart furniture. There is a difference between interest in smart furniture
theoretically and engagement in real life; this could be b ecause they do not have access to smart furniture, or the cost of the furniture is too expensive. This gap has created the urge to educate the users better and involve them more in handling smart furniture for its improved adoption.



Comfort experience with current furniture, Figure (2-2)

Factors that influence smart furniture selection:

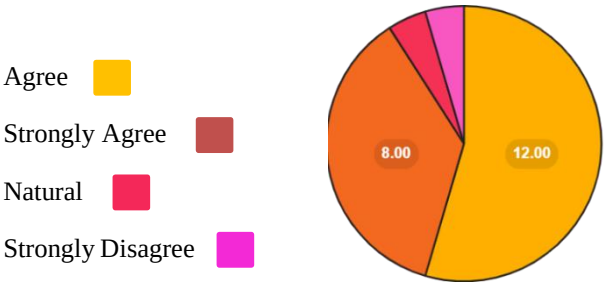
At the time of decision, comfort was the top reason; followed by the majority, who stated that comfort was the most important thing they considered when choosing furniture.
Other influencing factors in the survey were aesthetics, cost, and function; therefore, although participants valued design and function, cost was a major concern to illustrate how smart furniture could balance these aspects to be more attractive to a larger market.
Integration with other smart devices:

Some wanted to use it with other smart systems in their homes such as managing lighting, heating, or cooling of the space, thus suggesting that another strong feature of the furniture in some years to come could be its ease and compatibility with other technologies within the smart home.

Concerns related to smart furniture:

While they were generally enthusiastic about this type of solution, a couple complained about the cost and maintenance part:

Some participants claimed that they might be somewhat skeptical about purchasing smart furniture until a solution is found that makes it cheaper and more resistant.



Impact of Smart Furniture on Comfort, (Figure 3-3)

Literature Review:

The integration of artificial intelligence into the furniture industry has become important in recent years due to the tremendous and rapid development in the field. Industries have entered enhancing user comfort in living room furniture. With the development of consumers' use of modern furniture based on artificial intelligence, it is not only to meet the aesthetic needs, but also to meet the well-being and needs of users to a greater extent. The literature summarizes the extent of the application of artificial intelligence in smart home technology, user experience, and comfort design. As time advanced, technology and design collided and progress in artificial intelligence has transformed industries in various. Now that the consumers want comfort and personalization in their homes more than ever, researchers and designers have started considering how AI might be used to increase a user's comfort while sitting on living room furniture. That is why the importance of this research is in line with the increasing understanding that a user's comfort is not simply in terms of aesthetics but, rather, in physiological, psychological, and ergonomic understandings: that is, a nuanced understanding of individual needs and preferences.

Integrating artificial intelligence into smart home systems:

Homes that are smart can afford comfort, and the new development in artificial intelligence is for the improvement of user comfort. An advanced intelligent system is a smart home suitable for control based on deep learning models (Nicholls, Sustainable Practices in

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Furniture Design: A Literature Study on Customization, Biomimicry, Competitiveness, and Product Communication, 2020). They respond to the environment as well as to the user revealed preferences, so they adapt over time to changes in conditions or in the user. This can explain how artificial intelligence provides individualized settings in living areas like climate control and furniture adjustment and contributes toward the improvement of user experience (Leong Yee Rock, 2022)

The example of how to personalize comfort using AI for living areas, like in the control of room climate and furniture adjustments, enhances user experience (Leong Yee Rock, Usage and Impact of the Internet-of-Things-Based Smart Home Technology: A Quality-of-Life Perspective, 2022) in a study on how the Internet of Things impacts quality of life (Radu, Disruptive Technologies in Smart Cities: A Survey on Current Trends and Challenges) was suggesting that smart home technologies can really enhance the usability of technology. New technologies could be able to optimize the sets of furniture in living rooms by understanding user behavior, which will lead to a personalized adaptable living space (Olutosin Taiwo, 2021)

- User Experience and Artificial Intelligence:

The application of AI into furniture design has been beneficial with user experience being of great importance. The integration and transformation of AI technologies with users is studied in (Surajit Bag, 2021) in connection with designs that would meet user expectations and improve user happiness. The viewpoint is supported (Xie, 2022)who the user's happiness with AI-powered applications (Surajit Bag, Understanding the Role of Artificial Intelligence Technologies in User Engagement and Conversion, 2021).reiterated the importance of developing AI-powered experiences since, when correctly integrated with consumers, they can provide a long-lasting impact concerning user satisfaction (Chenxing XieORCID, 2022) .They emphasized that knowledge of customer preference with smart furniture (Surajit Bag, Understanding the Role of Artificial Intelligence Technologies in User Engagement and Conversion, 2021).showed that artificial intelligence powered furniture design paves the way for objects both visually appealing and functionally satisfactory.

- Design in Comfort and Health:

The triangle of efficiency, comfort, and health makes a profound impact on designing furniture (Liao, 2023), call for "smart desks" to define an environment beneficial to consumers' comfort and health in workspace environments and to implement similar principles while designing furniture for living rooms. Their vision suggests that AI can learn and automatically adjust furniture according to posture and comfort level, contributing to a better living environment (Aryal, 2019). support the above proposal by further underlining AI's contribution to measuring and improving user experience through design. AI could be a facilitator in the iterative design processes in the sense that whatever AI measures, it would be able to infer the progressive improvement and fit of the solution to the needs of user comfort and usability in the design process (Aryal, 2019)

Discussion:

This study shows an increased interest in using AI-powered intelligent furniture to comfort users of a living room. The findings support previous studies, which indicated that artificial intelligence is gaining importance as part of the development of design in comfort in personalized furniture settings. The features that this study found participants most appreciated were seating adjustment, temperature, and ergonomic design. This was expected because prior research has already identified that AI is able to enhance comfort by making possible its real-time adaptation to users' preferences (Leong Yee Rock, Usage and Impact of the Internet-of-Things-Based Smart Home Technology: A Quality-of-Life Perspective, 2022) (Olutosin Taiwo, 2021). Moreover, comfort, aesthetics, and cost were also important reasons for the choice of smart furniture by the participants, which again corroborates the literature that highlights the importance of a balanced consideration of these factors in AI-powered furniture design for user satisfaction (Xie, 2022)

However, it was also revealed that preference and reality differed: out of the 22 participants in this study, only 13 currently use smart furniture. This presents a gap that could be filled by more user education and hands-on experience to bridge the gap between interest and actual adoption-as identified by earlier studies (Radu, Disruptive Technologies in Smart Cities: A Survey on Current Trends and Challenges, 2020) (Olutosin Taiwo, 2021). Other participants showed interest in having smart furniture integrated with other smart devices; this again finds support in literature as; indeed, seamless integration of devices enhances users' experience and comfort.

While the overall response was positive, cost and maintenance remain concerns, similar to what has been noted in previous research where a call to reduce costs and increase durability for AI-enabled products is made to encourage wider adoption (Liao, 2023)results support the need for affordable, reliable, and easy-to-maintain smart furniture solutions if AI-powered furniture is ever to be available to a wider consumer base.

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Conclusion:

The integration of artificial intelligence into the design of smart furniture for living rooms presents a fresh approach to users in terms of comfort and satisfaction. Accordingly, the results indicate that AI-powered smart furniture, especially the attributes of seating adjustment, temperature control, and ergonomic design, are highly appreciated by users because it provides an option to manipulate comfort by setting personal preferences and fulfilling their needs. This corresponds to the literature, pointing out that AI can enhance comfort by responding to user preferences and environmental changes Despite the keen interest in smart furniture, this difference between preference and real use underlines that user education and hands-on experiences are needed for widening the adopter circle in smart furniture areas. Besides, there were expressed concerns about costs and maintenance. Thus, a further need for more affordable and long-lasting smart furniture solutions should be developed. It will possibly also involve the better integration of smart furniture with other smart home devices for users. The findings, overall, support the increased importance of AI within the framework of comfort in living creation but at the same time indicate serious challenges on grounds of accessibility and affordability. Further research must aim for these gaps, so that larger diffusion can take place inside private homes

Probabilistic possibilities abound when integrating artificial intelligence into the design of living room furniture, which may elevate comfort levels and enhance the user experience. AI has the potential to create spaces based on the user and adaptable to his/her specific conditions, according to research. Future empirical studies are required to examine applications of AI in furniture design, user attitudes, and the multidisciplinary nature of comfort design.

These gaps must be filled to advance the profession and produce innovative living spaces with the users at the centre

RECOMENDATIONS:

1. Educate the Users: let the imitation from interest to usage be easier by raising awareness and giving them hands on experience with the product

2. Cost Reduction: make artificial intelligence powered furniture cheaper to attain and bring it into a range where many users can afford

3. Durability: Improving its upkeep and increasing the life of smart furniture

4. Integration with smart Devices: Ensure smooth integration with home automation systems

5. Personalization: Providing more room for personalization will enable furniture to become more suited to the user

6. Health Designing ergonomic furniture (keeping health in perspective)

7. Collaboration: inclusive product development does consist of a healthy process between designers, engineers and customers:

However, most of the recommendations go towards bridging the gaps identified from the research and improving the latest technologies in AI-powered furniture toward user comfort and living standards improved through innovative and adaptive designs.

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