بسم الله الرحمن الرحيم

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شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

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شبكة المعلومات الجامعية

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التوثيق الإلكتروني والميكروفيلم

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Smart and Intelligent Buildings Achieving Architectural Concepts

A Thesis submitted in Partial Fulfillment of the Requirements for
Master of Science Degree in Architectural Engineering

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STATEMENT

This thesis is submitted to Ain Shams University for the M.Sc. degree in Architecture.

The work included in this thesis was carried out by the researcher at the Department of Architecture, Faculty of Engineering, Ain Shams University, during the Period from September 2019 to November 2021.

No Part of this thesis has been submitted for a degree of a qualification at any other university or institute.

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Abstract

With ongoing status of energy crisis in today's world now it's important for architects, engineers, and construction managers to create buildings that are energy efficient and intelligent by its functions and usage. The new technologies should be applied in intelligent buildings shall improve the building environment and functionality for occupants, and on the same time reduce operational costs.

The Smart and intelligent building systems concept distinguishes the true cost of the building is not only the cost of construction, but also the operating and maintenance costs over the structure's life span. Cost reductions over all these areas is achieved by optimizing energy use and guard against repair costs, time, productivity loss, revenue loss and loss of customers to competitors. It must be smart enough to vary the environment to suit the users and provide various means of networking internal or external. At more major level intelligent buildings can cope with social and technological change and adapt to human needs.

Smart buildings focus on control systems, but intelligent buildings go far beyond this. An Intelligent building is defined as the one use both technology and process to create a safe facility, healthy and comfortable and enables productivity, well-being of its occupants.

An intelligent building has an implied logic effectively evolves with changing user requirements and technology, to ensure continues improved intelligent operation, maintenance, and optimization. It revels key features of environmental sustainability to value present and future generations.

This thesis provides research in the area of Intelligent Building with supportive case studies. This thesis consists of six parts and ends with the conclusions and recommendations.

(Chapter 1) investigated the future innovations and building construction. It also discussed the new projects team structure and how project jobs may alter in the future. (Chapter 2) Smart and Intelligent buildings were addressed and defined.

Both buildings concept origin and how those buildings can save money in the form on energy and maintenance cost on the long term. Moreover, they can mostly achieve the user comfort and address all the features in the building successfully with no compromise and at the end target the owners' value for money spent and success in returning the funds and achieve high profits.

(Chapter 3) the thesis explains being Smart vs being Intelligent, the broader difference between them, best attributes, building's structure and how to enhance buildings performance adapting those concepts. The boundaries to achieve intelligent buildings fulfilling the human needs, replying to the question with analysis whether the people reaching the super intelligence era or still not ready Identifying the risks associated with both buildings.

(Chapter 4) focuses to address the New Vision of Intelligent buildings and Intelligent Architecture, the measurements of the Intelligence and how to verify this, the Holistic design approach, the technology road map and proper infrastructure planning, the data and services infrastructure and the new challenges may arise in achieving the intelligent building concept.

(Chapter 5) the thesis is analyzing old and new examples for the Smart and Intelligent Buildings, explaining the basic infrastructure and buildings distinct progression drivers.

(Chapter 6), the strategies for natural and Artificial intelligence were tackled and presented for the systems, and how the integration process takes place to achieve sustainability, users' comfort, economic benefits, innovative designs, and pollution reduction. A detailed Design Criteria was established for the building intelligence structure so that Architects can differentiate and work on a successful intelligent building design.

And finally, the conclusions and recommendations for the thesis study was explained and illustrated.

Keywords

Intelligence, Intelligent Buildings (IB), Intelligent Architecture (IA), Passive Intelligence (PI), Active Intelligence (AI). Intelligent Building Index (IBI)

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