

Taking advantage of microcontrollers in preparing smart prototypes to design a movable glass architectural facade

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Abstract:

The prototypes of glass architectural facades are early samples designed to test specific concepts before the implementation of the facades definitively, they are one of the final stages of design and in light of modern trends in architecture and with the currents and schools that appear in the current era and reflect social, cultural and technical changes and with modern trends represented in high-tech architecture, environmental architecture, green architecture, sustainable architecture, smart architecture and postmodern architecture. Solid three-dimensional stereoscopic models free of movement or interaction with the environment to smart models simulating modern glass architectural destinations by taking advantage of microcontrollers, programmable electronic chips, small motors, interactive electronics and others to prepare a smart prototype that can be moved and interacted for glass architectural facade designs commensurate with the modern era and its requirements. Therefore, the study is divided into some important axes, where the first axis is concerned with studying microcontrollers and determining their capabilities by addressing their components and Study Problem: - Despite the great development in the work of prototypes and the use of 3d printers, these rigid models do not really reflect the interactive glass architectural facades, and therefore models must be developed to become mobile interact with the surrounding environment to achieve the greatest possible simulation. - The scarcity of the presence of dynamic glass architectural facades, as the designs depend on the stability of the glass facades and leave the movement to other materials that advance them.

Research Assumptions: By studying the mobile architectural facades with different materials and studying the aspects of movement for each of them, mobile glass facades can be designed to achieve sustainability by ventilating the internal space and protecting it from weather factors by studying the appropriate types of glass for that and the aspects of movement of the facade, and microcontrollers can be used to prepare mobile prototypes simulating those facades in terms of movement and interaction with environmental variables.

Objective: -Design of movable glass architectural facades whose mobile prototypes can be prepared electronically in an intelligent interactive manner

Study Approach: Analytical and descriptive approach

Results: 1- The study resulted in the values of knowledge of microcontrollers and their capabilities and how to benefit from them in the preparation of a mobile interactive model 2- The study reached some aesthetic and functional considerations for architectural facades, which can be achieved by glass material with high efficiency, producing smart interactive mobile architectural facades. 3- The study shows that it is possible to make interactive moving glass architectural facades, as the glass facade has never been moved, as it is always fixed except from some windows or to be covered with a moving structure with other materials. 4- Shedding light on the importance of smart and interactive mobile models in the field of mobile architectural interfaces, which can be achieved with the help of microcontrollers through the Arduino panel and some sensors and auxiliary electronics. 5- Reaching the best type of glass that can be used in mobile architectural facades and how to install it.

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Microcontrollers; Arduino; Kinetic architectural facades; Movable glass facades; Smart prototypes.

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