

Summary of approved PhD theses

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THE DIY PRINCIPLE IN THE CONTEMPORARY RESIDENTIAL INTERIOR

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Producing objects for one's own consumption is a major strand in the historical development of material culture. Making things with one's own hands can be considered a natural means to satisfy human needs. In the present time, this form of production is covered by the term "do-it-yourself" (DIY). DIY has become a global social phenomenon, especially thanks to the opportunities enabled by the Internet. Websites provide a lively forum for discussion, sharing ideas, how-to guides, and galleries of the results of DIY projects. The subject of our research was the historical context, as well as the current starting points, motivations, and inspirations of so called do-it-yourselfers, especially in connection with the DIY home improvements. An interdisciplinary approach and a combination of several research methods were chosen for these purposes. The results of quantitative research carried out using the form of a questionnaire point to the significant benefits that self-production brings to individuals. The DIY home improvement can be a means of individual self-realisation and self-expression and is also related to subjective experience of craft activity. Qualitative research provides a view of current DIY home improvements in terms of unique stories of addressed do-it-yourselfers, who also work in creative professions. Personal statements about the DIY projects in the homes of a jeweler, designer, sculptor-designer, sculptor-ceramicist, architect, creator, and graphic designer-builder approach the researched issue primarily as an individual experience, which is shaped by various circumstances, but also previously gained experience. Research findings contribute to a better understanding of DIY production in the context of design as an academic discipline.

PhD thesis approved at the Faculty of Architecture and Design STU in Bratislava, Slovakia, in the study programme Design

APPLICATIONS OF VIRTUAL REALITY IN THE DESIGN PROCESS

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The research focuses on the use of virtual and mixed reality in transport design. Virtual reality hardware and software advancements also enable more extensive use of this technology in the design process. The possibility to visualize new designs in real scale is especially useful with larger objects, such as cars and motorbikes, in case of which the preparation of a physical model requires a significant amount of resources and work hours. Another advantage of virtual reality is the wide range of options for data configuration. 3D data of a new car exterior can be visualized through VR software in various colours and materials. Models can be placed and viewed in a studio or any outdoor environment. It is also possible to change individual parts in real time (e.g. lights, bumpers, etc.) and thus review design variants more quickly and efficiently. We can find similar configurators on car manufacturers' websites, where a customer can enter their chosen equipment specifications, based on which the configurator generates a rendering of the new car's exterior and interior. Car interior must be shaped to meet ergonomic requirements of a human body, while it also comprises a user interface for human-machine interaction. When testing car interiors in virtual reality, an ergonomically

adjustable structure – a simulator – is used. Modular simulators offer various levels of complexity. They include seats, a steering wheel, armrests, pedals, centre consoles, etc. All these elements are configurable according to the manufacturer's car model series portfolio. The primary feature of the simulator is its synchronization with virtual data. The person sitting inside the simulator is shown the new design in virtual reality and they are able to interact with it through the physical simulator. In this mixed reality scenario, the virtual steering wheel lines up with its physical counterpart to provide haptic feedback. The technology that combines a physical simulator with 3D digital data is applied in the author's doctoral thesis to visualize new motorcycle designs. A variable motorcycle simulator was constructed to simulate ergonomics of various types of motorcycles. The beginning of the thesis contains an overview on virtual reality technology. It classifies virtual and mixed reality in the reality-virtuality continuum and provides examples of other interactions between real world and virtual data. HTC and Oculus are companies that raised VR awareness among the consumers. The HTC Vive headset combined with HTC Tracker are used in the doctoral thesis to create mixed reality and explain its principles. The new VR hardware (i.e. headsets) options are involved with software development. Gaming engines like Unreal Engine and Unity, originally developed for creating computer games, are now used in the automotive industry. The software combines quality visualizations with the programming capabilities to programme material configurators or simulate door animations, car roof unfolding, interior mood light changes, and other featured simulations. The "VR – Application and Transport Design" section presents practical and conceptual examples of virtual reality application in development process. An important field where VR keeps improving is creative work. Hence, virtual reality is used not only for final visualization but also as a tool to capture the first thoughts or creating multiple variations of a design idea. Hand-sketching using paper and pen or digital sketching on a graphic tablet still dominate this field. VR modelling software (e.g. Gravity Sketch) is now being developed to enable virtual reality sketching. The user is able to capture an idea of a design directly in 3D space. "Research and Design" summarizes the results from the process of a motorcycle design using VR tools. First, a variable structure had to be constructed to simulate different types of motorcycles. The simulator was then synchronized with 3D data of an electric sports bike and, using the Unreal Engine software, a configurator for changing body and wheel colours was programmed. The simulator was then brought inside the VR modelling software Gravity Sketch. Sketching a motorcycle in real scale around a physical simulator allowed us to mount on and test the new design from the perspective of a rider, from the first sketch. During the last phase students from ŠKODA atelier were involved in the VR project. Each selected student was given an Oculus Quest headset. Consulting and modelling took place in virtual reality using Gravity Sketch co-creation mode and lasted for the whole semester.

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RESIDENTIAL COMPLEX AVION IN BRATISLAVA: INTERIOR AND ITS IDENTITY

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The dissertation deals with research of the interior of the functionalist residential complex Avion, designed by the architect Josef Marek in 1932 in Bratislava. Since 1985, Avion has been declared a national cultural monument. The research focus is on the factors of interior identity, responsible for the characteristic atmosphere of the interior. The hypothesis assumes that the material factor is the building's interior, the emotional factors are the inhabitants of the complex and how they perceive the interior. Research identifies individual elements of the building interior, and the hierarchy of their value is determined, necessarily taking into account the criteria of monument protection as well as the criteria of housing quality with respect to the current dwellers. The basis of the work is the theory of interior design and current standards for housing, the theory of protection of modernist architecture and restoration of interior in such buildings. Sources of knowledge are scientific works of Slovak and foreign authors and executed examples of renewal are compared with the author's own research of the interior. The design concept, which

is based on the theoretical part of the work, includes the design of: the communication space, formerly existing portal, passenger elevator, and the visual identity of the Avion residential complex. The dissertation is looking for a solution that will ensure the quality of housing, safe operation in the building. At the same time, the monumental values will be preserved, and the genius loci of the interior will be supported.

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