

## Handling human factors in engineering design projects

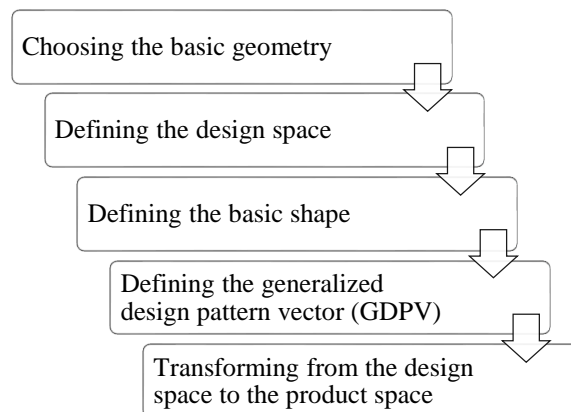
The result of this research would give a new approach to the design process, where the designers would know the reactions of consumers in advance, that is why they would be able to create or manipulate the product's surface, shape, or other product-related properties consciously. The PhD research is dealing with the patterns on car interior trim pieces specifically.

This multidisciplinary research is basically concerning product and industrial design but also related to three other major sciences:

- On the side of **mathematics**, besides measuring of numerical methods, different function types, geometries, and methods of pattern generation; human thinking, human emotions are need to be modelled, to which the theory of fuzzy logic is optimal.
- The relevant knowledge of **sociology** and **psychology** is needed to be researched, such as pattern recognition, perception, and the functioning of connection systems. In addition to this, the presentation of the neurophysiological mechanisms, the examination of vision and other information adapting processes are also important.

Since the literature studies have shown that there is no available process that can generate patterns automatically, one of the main goals is to create a new solution for pattern development that is fully automatized.

The main steps of this method can be seen here:



To connect the patterns to emotions it is important to know what emotions do patterns evoke. Qualitative and quantitative researches are already done: almost 700 survey answers and 3 focus group interviews are evaluated.

The result of this research would give an emotion based automated pattern generating software, called **EmPatGen (EMotional PATtern GENERator)** in order to help designers to create the most aesthetically-pleasing pattern on car interior elements.

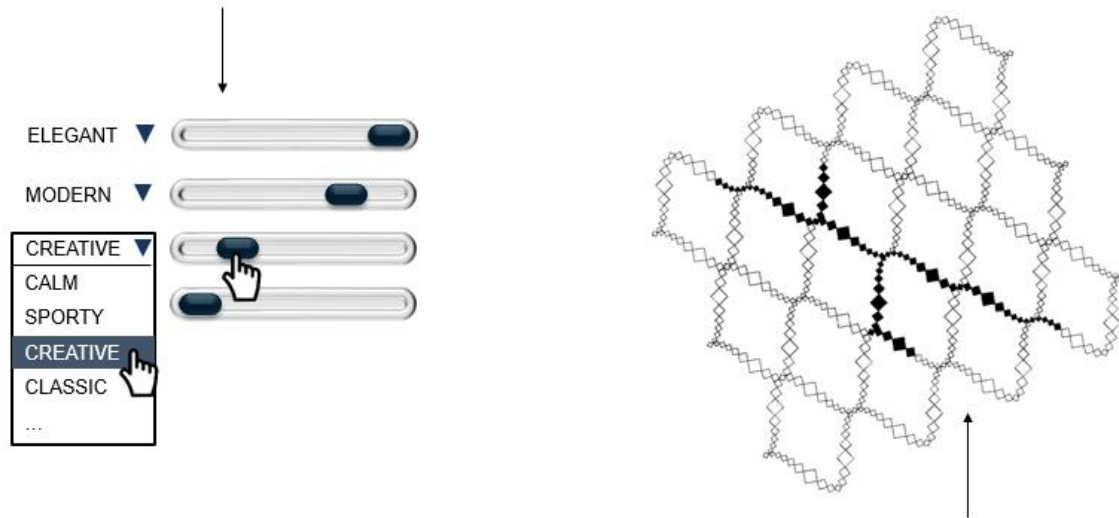
The application process has two main tasks. The first step is the usage of EmPatGen, followed by the usage of a technology that can place the pattern on the required car interior element. A possible solution for that is the laser texturing technology. For this technology only the output of EmPatGen, the 2D DXF pattern is required, and with the laser texturing software we can easily set the depth etc. The main idea behind this is that instead of using the laser on molds, if

we use it directly on the car interior panel, it could generate totally unique parts. Since **customization** of a car is becoming more important, it is another advantage of this research.

### The concept of EmPatGen software:

The consumers provide preferences (emotions, feelings, moods, attitudes)

- from a defined database – and rate them



While the EmPatGen software automatically generates  
a 2d dxf pattern according to the input data

### Related publications:

- Trautmann, Laura ; Piros, Attila ; Hámornik, Balázs  
Handling Human Factors in Car Interior Design  
In: HBiD - 2nd Human Behaviour in Design Conference (2019)
- Trautmann, Laura ; Piros, Attila  
A New Mathematical Method for Pattern Development  
PERIODICA POLYTECHNICA-MECHANICAL ENGINEERING 63 : 1 pp. 44-51.,  
8 p. (2019)
- Laura, Trautmann ; Attila, Piros  
Identifying the Emotions in Order to Design the Patterns of Consumer Products  
In: Sándor, Vajna (szerk.) Proceedings of the 11th International Workshop on Integrated  
Design Engineering  
Magdeburg, Németország: Otto von Guericke University Magdeburg, (2017) pp. 61-  
68., 8 p.
- Trautmann, Laura ; Piros, Attila  
Emberi tényezők integrálása a mintázatkészítés folyamatába  
GÉP 68: 4 pp. 81-84., 4 p. (2017)
- Trautmann, Laura ; Sáska, Dóra ; Piros, Attila  
Automatizálási lehetőségek a mintatervezésben  
GÉP 67: 7-8 pp. 125-128., 4 p. (2016)