



## Defining attributes of an immersive microcar configurator for exploring user requirements

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### Introduction and Motivation

- Microcars / Light Electric Vehicles (LEV) offer significant potential for sustainable mobility: 50 % of passenger car mileage in Germany is theoretically substitutable with LEVs, corresponding to a reduction of 44 % greenhouse gas emissions compared to a pure passenger car fleet with mixed propulsion technologies [1, 2].
- However, microcar sales numbers are low and a better understanding of user preferences and decision-making processes is necessary if the potential shall be exploited.
- A Mixed Reality Configurator (MIRCON) provides an intuitive way to explore user requirements, even if the interviewees have little prior knowledge of Microcars.
- The vehicle configuration options, i.e. the selectable vehicle attributes such as technical properties or costs and of the application design incl. degree of immersion and usability are decisive for the quality of the user preferences to be collected.

### Methodology of Defining Configuration Attributes

Attributes and user guidance are based on:

- A literature review on purchasing decisions for passenger cars (e.g. [3], [4]), identifying transferable attributes.
- Expert workshops to discuss, refine and validate attribute categories and values (e.g. three options for range). Prices are for large scale production.
- Usability testing to refine the MIRCON's user interface (UI).

### Results: Structured Set of Vehicle Attributes

The result is a structured set of LEV attribute options integrated in a virtual interface that guides the user through several categories with associated selection options. Thereby, in an immersive virtual environment, an LEV model can be configured. The changes are visualized on the LEV model in real-time and the corresponding costs are displayed at the UI.

Dimensions	Technical specification	Exterior	Equipment
<ul style="list-style-type: none"> <li>Two-seater (side-by-side) – 5.000 €</li> <li>Two-seater (tandem) – 5.000 €</li> <li>Four-seater – 6.500 €</li> </ul>	<ul style="list-style-type: none"> <li>Maximum speed                             <ul style="list-style-type: none"> <li>45 km/h – incl.</li> <li>90 km/h – 3.000 €</li> <li>120 km/h – 5.000 €</li> </ul> </li> <li>Range                             <ul style="list-style-type: none"> <li>100 km – incl.</li> <li>150 km – 1.000 €</li> <li>200 km – 1.500 €</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Panorama roof – 1.000 €</li> <li>Body shape                             <ul style="list-style-type: none"> <li>Round – incl.</li> <li>Square – incl.</li> <li>Sporty – 1.000 €</li> </ul> </li> <li>Color                             <ul style="list-style-type: none"> <li>White – incl.</li> <li>Red/black/silver/blue – 200 €</li> </ul> </li> <li>Rims/tires                             <ul style="list-style-type: none"> <li>Standard – incl.</li> <li>Premium – 800 €</li> <li>Luxury – 1.200 €</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Interior                             <ul style="list-style-type: none"> <li>Seats standard – incl.</li> <li>Seats w. heating – 300 €</li> <li>Seats premium – 600 €</li> <li>Isofix – 200 €</li> <li>+ more options</li> </ul> </li> <li>Trunk standard – incl.</li> <li>Trunk large – 1.000 €</li> <li>Swappable battery – 1.500 €</li> <li>Fast charging – 1000 €</li> <li>Air conditioning – 750 €</li> <li>Assistance systems                             <ul style="list-style-type: none"> <li>Cruise control – 300 €</li> <li>Traffic jam assist + LDWS – 600 €</li> <li>+ more options</li> </ul> </li> <li>Safety                             <ul style="list-style-type: none"> <li>Airbag – 800 €</li> <li>ABS – 750 €</li> <li>Emergency brake assist – 600 €</li> <li>Safety-optimised bodywork – 1.000 €</li> </ul> </li> </ul>



### MIRCON

#### - Mixed Reality Configurator

Screenshots showing the interaction with the LEV and the user interface in the Mixed Reality Configurator with VR



### Summary and Outlook

The selection of attributes embedded in the intuitive UI for MIRCON introduce an innovative tool for researching user preferences. Complementary pre- and post-study questionnaires will capture data on participants' VR experience, demographics, and mobility behavior. Future research will evaluate the effectiveness and might revise values of the selectable attributes. Additional data collection with real driving with two LEV models will be used to evaluate the MR methodology and to gain insights into the reliability of the collected data.