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# Smart Neighbourhood Design: Architecture Enhanced by Mechatronics and AI

**Abstract**

The article presents the outcomes of the multi-year experimental research project ROBOstudio, conducted at the Faculty of Architecture of the Warsaw University of Technology. The aim of the study was to explore the potential of responsive architecture and kinetic systems in urban spaces through the method of research by design. Subsequent editions of the course focused on different scales of intervention—from urban squares, through pandemic-related microstructures, to street infrastructure—and the developed scenarios included both conceptual designs and moving models based on simple mechatronic systems. The analysis of the projects demonstrated that responsive architecture can serve as a tool for enhancing the quality of urban life by supporting flexible use of space, increasing inclusivity, and enabling adaptation to changing environmental and social conditions. At the same time, the research revealed significant technical and social challenges, such as ensuring safety in contact with kinetic elements and addressing public acceptance of solutions that require the collection of user data.

The findings indicate that the integration of architecture, mechatronics, and artificial intelligence opens new perspectives for shaping flexible, inclusive, and data-driven public spaces, representing an important step toward the development of intelligent and adaptive urban environments.