This research re-visits kinetic architecture and establishes a “kinetic architecture matrix” that summarizes and categorizes a comprehensive scan of contemporary kinetic design. The matrix is a database of kinetic architecture projects, providing classification methods through the implementation of our dynamic matrix tool. The matrix’ unique interface allows for sorting the precedents according to different categories, interest or viewpoints, as well as visualizing interdependencies that cannot be observed in a traditional database. This project continues and re-examines the line of research that was done by Michael Fox and the “Kinetic Design Group” at MIT in the late 1990’s. The intention of creating the matrix is to make a valuable contribution to the discourse of kinetic architecture in reference to current technology. We aim to facilitate the understanding of the system’s inherent technologies, moving mechanisms and performative potentials, and their implementation in individual design projects. We are also investigating the motivation, aim and goals for designing kinetic buildings, as well as its potential advantages versus non-kinetic-architecture. Within the scope of this research, “kinetic architecture” is explored as defined by Fox, where “physical movement is an integral part of the primary functional and formal nature of the building component” (Fox 2002), and, as added by Moloney, “architecture that cannot be
reduced to a single moment in time, but is changing by geometric translation, rotation, scaling and material deformation” (Moloney 2011). In the selection process for our database, we focus on architectural projects at a “single building” scale that are built or have a built working prototype. The projects in the matrix are listed by title, location and year of completion, as well by architect, designer or engineer.

Our novel approach explores the functional possibilities and examines the technologies that enable the kinetic systems. We use “dynamic analysis” from the field of mechanical engineering. Looking at new parameters and technologies that facilitate kinetic and responsive movement, such as advanced materials, we analyze different dynamic mechanisms and establish a new type of classification. After surveying categories used in previous related research, we established a series of useful and innovative categories to sort our matrix:

1. **Typology of the kinetic system:**
   building element that embeds movement: kinetic structure, operable roof, moveable building floor, kinetic apertures and building facades, and flexible interior partitions.

2. **Motivation for the kinetic design:**
   reason of movement and its advantages.

3. **Type of kinetic mechanism**

4. **Mechanical analysis of the kinetic mechanism:**
   - **mechanism implementation:** discrete mechanism for a single operation, or repetitive mechanism for systems that contain a pattern of basic elements creating a dynamic surface or group effect
   - **degree of freedom (DOF) type:** DOF relates to the joints and the kinetic connection between the mechanism links, i.e. prismatic, revolute
   - **number of degree of freedom (DOF):** one DOF, two DOF or multiple DOF system for chained elements mechanism
   - **sensors, actuator and control:** relates to the input, mechanism of operation, technology and control

The “kinetic architecture matrix” is intended to be implemented as a dynamic online database that will be maintained and constantly updated, available to the community. Users can browse the matrix according to their interest and get a better understanding of the complex database by visualizing similarities, differences and cross-references.

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