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Generative CAD model sampling and Generative (additive manufacturing) print-path design

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Abstract:
Generative design helps designers or engineers to explore high-performing and innovative design alternatives that they may never think of. Given a shape, CAD model is obtained via sketches and parametrization. Important features of the model are chosen as design parameters. After setting lower and upper limits of these parameters, a design space can be formed. Effectively sampling designs in the design space is crucial in many applications. First, a shape sampling technique that can be useful in conceptual design will be introduced. Another sampling techique for a computational fluid dynamics application will then be described. Main objective in this application is to obtain a machine learning model that can be used to predict drag coefficient of car side silhouttes. Finally, a new class of lattice structure family (called G-Lattice) will be detailed, which is obtained via a generative design algoritm considering additive manufacturing and user-defined criteria.

Last part of the talk contains generative (additive manufacturing) print-path design. First a helical printing technique will be introduced, where different print-paths are obtained by changing helix parameters. A print-path generation method (inspired from fluid flow) from hexahedral meshes will then be explained. All these print-paths can be manufactured via multi-axis additive manufacturing.