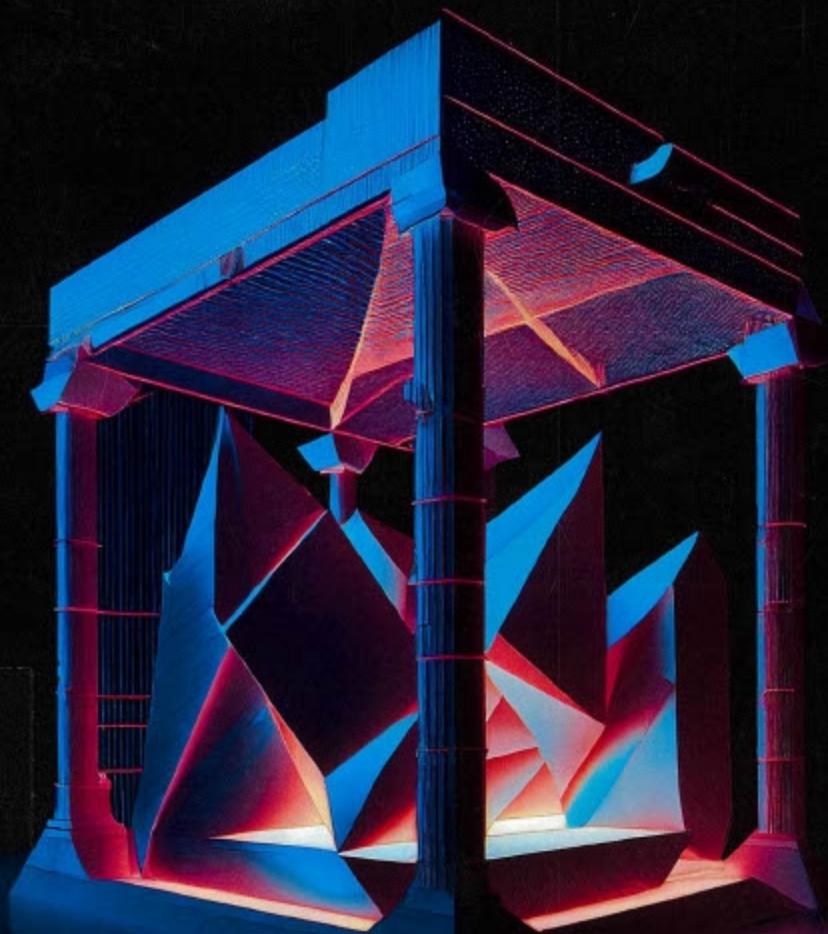


DESIGN AND 3D PRINTING OF ORIGAMI STRUCTURE



SHAJAHAN MAIDIN
JUFRI HANINI HASAN

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This book introduces folding techniques from origami to evolve from flat material to the additive manufacturing application's deployed state. This book explores the design of various origami structures from different folding techniques, understands their underlying mechanisms, and creates physical models and simulations to demonstrate and compare their feasibility. Mountain and valley folds have been identified among other folding techniques and origami shapes. All these concepts were applied in the design of the origami structure. Seven origami ideas were developed to determine the structural abilities of origami on folding. The model was developed using CAD tools (SolidWorks, Origa, and Origami Simulator). Three analyses on three folding ideas have demonstrated the outcomes of design deformation using strain analysis. The research revealed that the change in the strain at the fold has a safe value for folding many times. The difference in strain values between the valley and mountain folds on folds with holes (maximum strain is $7.917E-03$, maximum strain when folding occurs is $5.9387E-03$) is lower than on folds without holes (maximum strain is $5.957E-03$, maximum strain when folding occurs is $5.957E-03$), proving that folds with holes in the centre point are stronger and safer. Lastly, The FDM 3D Printer was used to test the origami structure's viability on PETG materials. The result demonstrates that an FDM 3D printer can create origami structures with a variety of design origami.

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