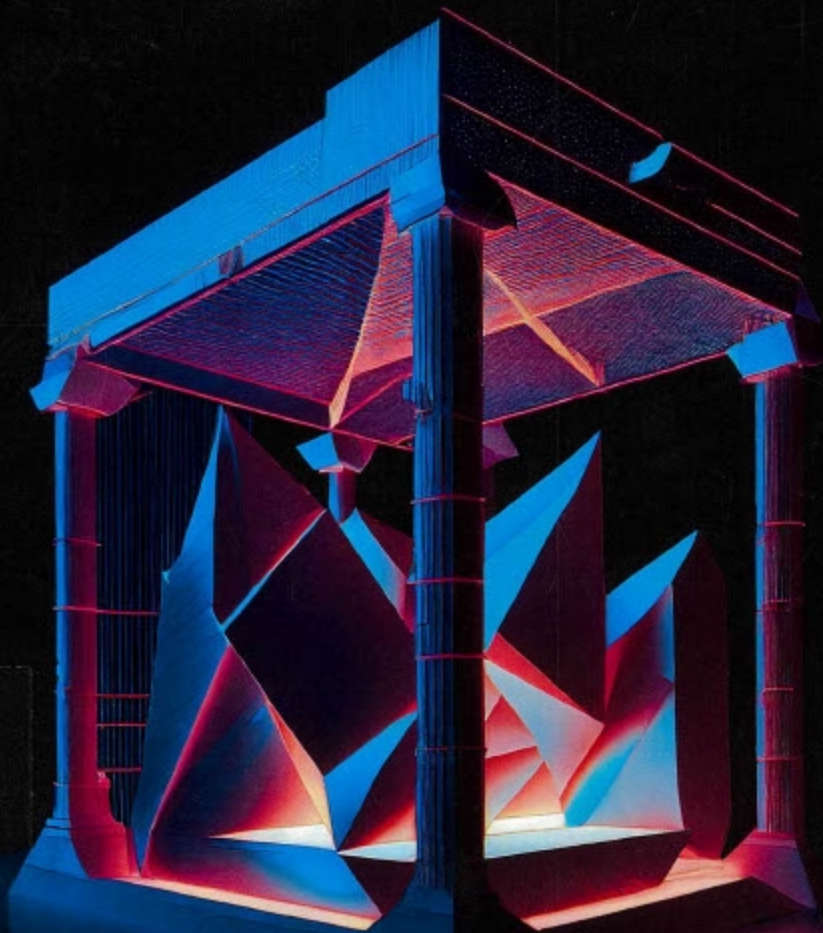


# DESIGN AND 3D PRINTING OF ORIGAMI STRUCTURE



SHAJAHAN MAIDIN  
JUFRI HANINI HASAN

# DESIGN AND 3D PRINTING OF ORIGAMI STRUCTURE

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, Oripa, 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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Website : [www.utem.edu.my/penerbit](http://www.utem.edu.my/penerbit)  
Books Online : [utembooks.utem.edu.my](http://utembooks.utem.edu.my)  
Email : [penerbit@utem.edu.my](mailto:penerbit@utem.edu.my)

ISBN 978-629-7658-24-7



9 786297 658247

© Universiti Teknikal Malaysia Melaka

ISBN: 978-629-7658-24-7

FIRST PUBLISHED 2025

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Member of the Malaysian Scholarly Publishing Council (MAPIM)

Member of Malaysian Book Publishers Association (MABOPA)

Member of Clarivate Analytics

**Editor and Proof Reader:**

Mohd Rizal Alkahari

**Manuscript Editor:**

Rahizah Abdul Rahman

**Book Cover Designer and Typesetter:**

A.S. Jaffar

**Published and Printed in Malaysia by:**

Penerbit UTeM Press

Universiti Teknikal Malaysia Melaka

Hang Tuah Jaya, 76100 Durian Tunggal, Melaka, Malaysia.

Tel: +606 270 1241 Fax: +606 270 1038



Cataloguing-in-Publication Data

Perpustakaan Negara Malaysia

A catalogue record for this book is available  
from the National Library of Malaysia

ISBN 978-629-7658-24-7



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