AI-based design for 4D printed polymers

Introduction:
The development of 4D printed polymer-based parts is gaining increasing attention in engineering and medicine due to their advantages of programmable and reversible shape deformation, particularly active composites. The design for 4D printed parts and their respective target deformation is complex and computationally taxing, and face challenges in efficiency and design robustness relative to material and property distributions. The recent progress in artificial intelligence (AI) and machine learning have shown promise in supporting the design process, surpassing numerical models and trial-and-error approaches, however, there are limited studies on ML-guided design for shape change response as related works primarily focus on the optimization of mechanical properties.

Objectives:
The primary objective of this project is to develop an AI-based design platform for 4D printed polymers. The platform must be able to generate optimal design solutions that take into account multiple design criteria and material properties, while also reducing the time and effort required for the design process.