

Graduate Student Fellows:
 SOURAV SAHA, LICHAO FANG,
 UMAR FAROOQ GHUMMAN

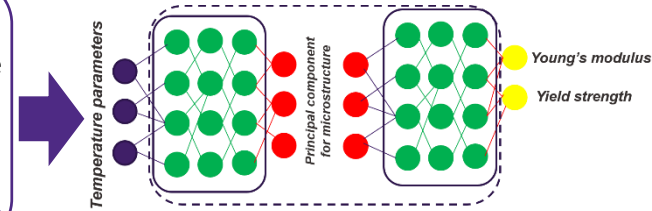
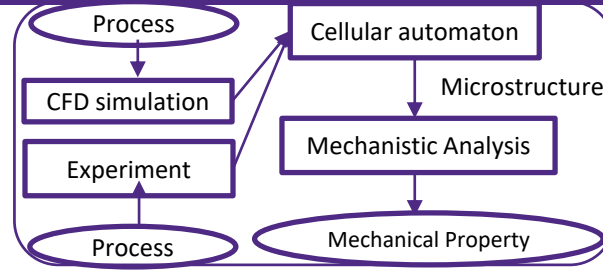
Faculty Advisors:
 WING KAM LIU, GREGORY WAGNER,
 WEI CHEN

Academic Disciplines:
 THEORETICAL AND APPLIED MECHANICS,
 MECHANICAL ENGINEERING

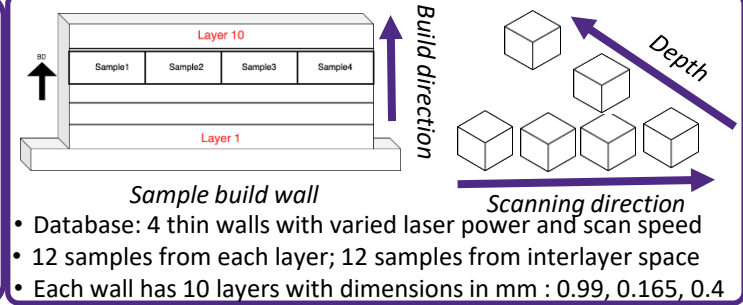
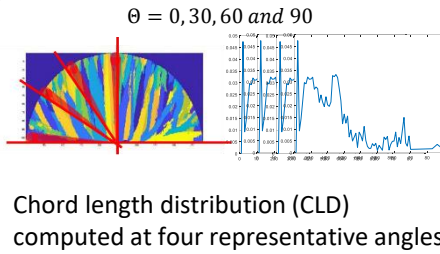
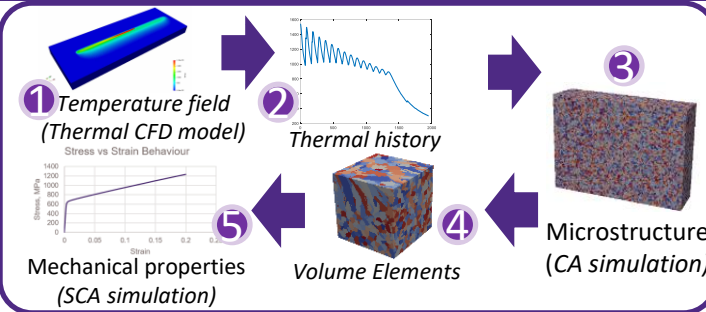
11 June, 2020

Research Objective

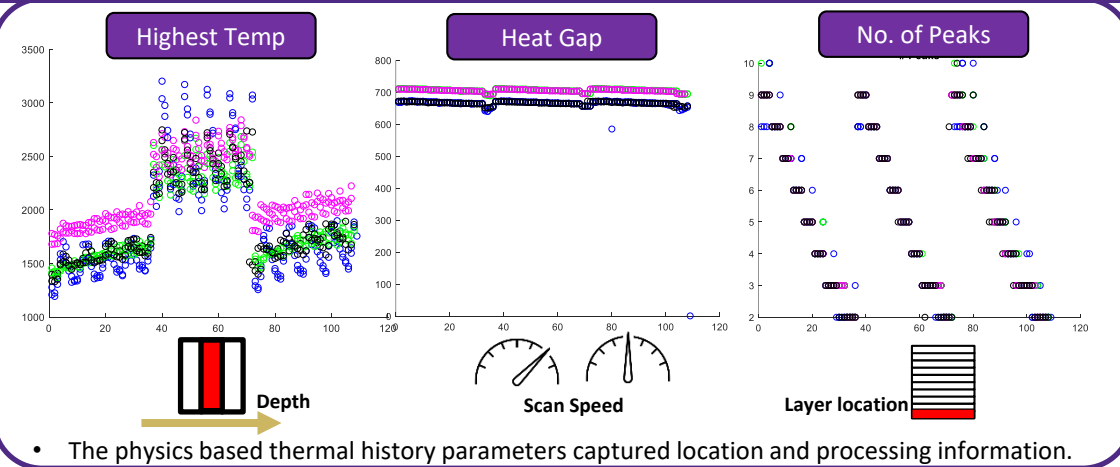
- The goal of the project is to use deep learning to predict local mechanical properties from local thermal history in AM alloys thus avoiding expensive simulations.
- Underlying hypothesis is *thermal history contains sufficient information on process history and solidification conditions to be used as the primary feature.*
- The work proposes new techniques for dimension reduction of thermal history and microstructure.



Computational Methods for Data Generation



Outcomes



- We used smaller neural networks to explore process-structure-property to judge the sufficiency of data.
- The neural network has: 3 hidden layers, 20 neurons per layer, 856 samples, hyperbolic tangent and relu activation functions.
- The prediction suggests we have insufficient data for deep learning. Larger database is required.

