

DEPARTMENT OF MECHANICAL AND MATERIALS ENGINEERING  
COLLEGE OF ENGINEERING AND APPLIED SCIENCE

SUMMER RESEARCH OPPORTUNITIES FOR UNDERGRADUATE students

APPLICATION DEADLINE: 03/01/2024

PROJECT TITLE: Developing an AI-based predictive spatiotemporal model for epidemic dynamics

Manish Kumar  
Department of Mechanical and Materials  
Engineering  
University of Cincinnati  
629 Rhodes Hall, ML 0072  
Email: manish.kumar@uc.edu  
Ph. No.: 513-556-5311 (office)

**Project Description**

Modeling epidemics plays a pivotal role in understanding and managing the intricate dynamics of infectious diseases. By employing mathematical models, researchers and healthcare professionals gain the ability to simulate and predict the spread of diseases, assess potential outcomes of different intervention strategies, and make informed decisions to mitigate the impact on public health. Epidemic models provide invaluable insights into factors such as transmission rates, population susceptibility, and the effectiveness of vaccination campaigns. They serve as vital tools for policymakers, aiding in the formulation of evidence-based strategies to control and prevent outbreaks. In the face of global health challenges, accurate and insightful epidemic modeling stands as a cornerstone in safeguarding communities and shaping effective public health responses. Therefore, the objectives of the proposed project are to:

1. Utilize Machine Learning (ML) and Artificial Intelligence (AI) techniques to extract patterns and insights from large-scale spatiotemporal data which has been acquired from our pre-existing model.
2. Integrate data-driven insights into the model to improve predictive accuracy and real-time responsiveness.
3. Explore innovative methods for adapting the pre-existing model as new data becomes available, enabling dynamic calibration.

This research project will be completed in the Cooperative Distributed Systems Lab in the Department of Mechanical and Materials Engineering. You will work as part of a multidisciplinary team to develop an AI/ML model for predicting epidemic dynamics.