

# Disease Informed Neural Network and Mathematical Modeling of COVID-19 with Human Behavior Modification

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The NSF-IHBEM Project INSIGHT collaboration between teams from IAUPR and GMU present a Disease Informed Neural Network (DINN) trained using synthetic data obtained from mathematical modeling and its analysis. The compartmental model of COVID-19 integrates an informed human that alters a normal behavior responding to a perceived increase of the infections in the local environment.

In this talk we will present the DINN model and analyze its results and performance. Sensitivity analysis has been introduced calculating the sensitivity index of the Basic Reproduction Number ( $\mathcal{R}_0$ ). The impact of parameters on the variables using forward sensitivity has been introduced along with pertinent model modifications. Results will be discussed to gain valuable insight, and to showcase the importance of mathematics and these diverse tools in health emergencies such as COVID-19.