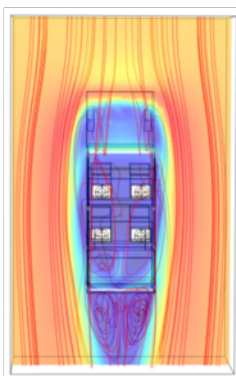
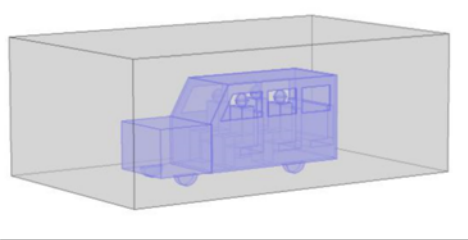
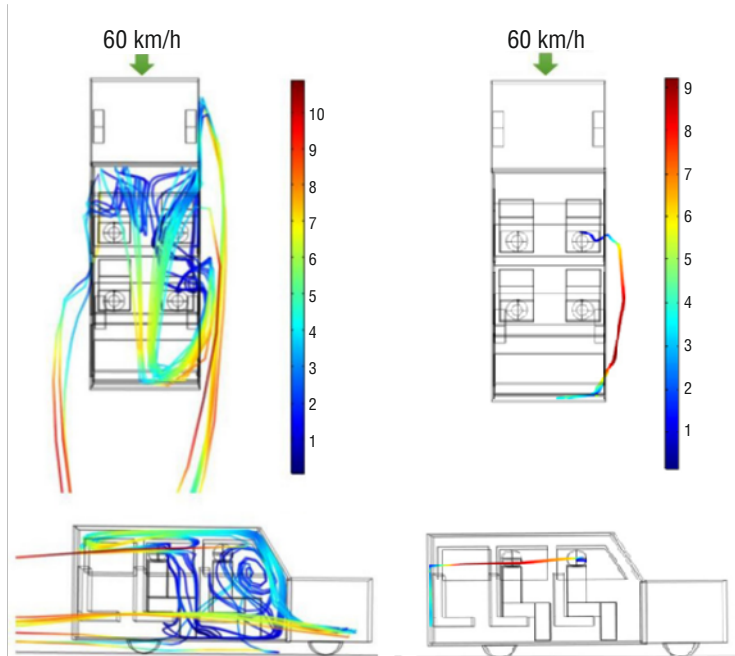


Dispersion of aerosols inside SUV



Computational domain (top) and streamlines showing formation of wakes behind the SUV (bottom)



Trajectories of the ejected aerosols when a person sitting in 2nd row speaks (left) and when a person sitting in driver's seat speaks (right). The colour scales show the velocity (in m/s)

Risk assesment for each passenger travelling in a SUV for four different scenarios. Significant recirculation of aerosols is possible even if all windows are completely open.*

COVID-19 rages on. Now that we need to live with the virus the onus is on us to prevent ourselves from contracting it. As life limps back to normalcy travelling of more than one person in a car/taxi becomes common. In Indian context we often travel in a non-air-conditioned car with windows open. In a recent study, (Sen & Singh, 2021, Physics of Fluids, 33(9): pp.095117) we have reported how aerosols (produced as one of the passengers speaks without mask on) can spread across the vehicle and affect other three co-passengers in a SUV (6 seater). Air exchange with the surroundings through open windows strongly affect the state of dispersion. An Euler-Lagrangian 3D CFD model implemented in COMSOL Multiphysics is used for the study.

Four sets of scenarios of practical interest have been considered. The first set shows the effect of vehicle speed on aerosol transport, the second set describes what happens when some of the windows are closed while the third describes how aerosol transport is affected by position of the passenger speaking. The fourth set of simulations describe how a gush of cross-wind affects aerosol transport. Simulation results reveal that when all windows are open aerosols can go out of one window and then return back to the vehicle interior through another window. Results also reveal that when passenger sitting in the second row speaks the aerosols generated may sweep the entire volume of the vehicle interior before going out through the open windows.

*Nirvik Sen
Chemical Engineering Division
Chemical Engineering Group, BARC