

ABSTRACT

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Thesis title: **Stop-and-Go Trajectory Data of Disordered Traffic Using a Swarm of Unmanned Aerial Vehicles**

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Trajectory data of disordered congested traffic serves as a crucial resource for calibrating and validating microscopic and macroscopic traffic flow models. It is useful to analyse stop-and-go waves and identify traffic wave speed, traffic perturbations in spatiotemporal regions, and traffic state in congested conditions. It also provides longitudinal and lateral positional information for all vehicles in certain spatiotemporal regions. For this purpose, we collected traffic video data from an urban arterial road in Chennai city using six unmanned aerial vehicles (UAVs) in disordered congested traffic, especially capturing the stop-and-go waves. Collected video data were then stabilized to remove the drift due to wind and vibrations in UAVs, followed by stitching video frames to get a unified frame covering the entire study stretch. We trained a deep-learning model for multi-class vehicle detection using SAHI algorithm in the trained model and performed multi-class vehicle detection on large-scale and high-resolution frames. Then multi-vehicle tracking was done using the Deep OC-SORT tracking

algorithm and the trajectories of vehicles were extracted. Then the trajectories have been post-processed to get data in a real-world coordinate system using georeferencing. The extracted trajectory for 45-minute duration has been plotted and discussed, and the stop-and-go trajectory of disordered congested traffic has been extracted efficiently.