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AI Smart Bus Stop Crowd Detection System

Ankita Vikas Kurkute[1], Vedanti Nitin Ballal[2], Sanskruti Bhimraj Bhogade[3], Ankita Vijay Gadekar[4], Mrs. V. M. Khanapure[5]
Department of Information Technology[1-5]
Government Polytechnic, Pune, India

Abstract: *Urban public transport systems face growing pressure from increasing passenger volumes and unpredictable demand patterns, leading to overcrowded stops, inefficient fleet allocation, and reduced passenger comfort. The AI Smart Bus Stop Crowd Detection System integrates computer vision, time-series forecasting and conversational AI to provide real-time crowd monitoring, arrival-time prediction and a passenger-oriented query interface. The system uses camera feeds processed by a fine-tuned YOLOv8 model (person detection) running on edge or cloud GPUs to estimate instantaneous occupancy. A buffering layer with simple smoothing reduces frame-to-frame jitter. A Prophet- based forecasting module fuses historical bus GPS traces and live counts to produce robust ETA estimates.*

Keywords: Crowd detection, YOLOv8, real-time monitoring, bus arrival prediction, Prophet, Flask API, React dashboard, LLM chatbot, smart transit

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