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Live Bus Tracking System

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Abstract: *Public transport is essential to urban mobility, but its effectiveness is compromised by the absence of real-time monitoring, risky driving habits, unreliable arrival times that can be due to various reasons in major metropolitans such as Delhi and Mumbai. These issues affect passenger experience severely, resulting in lower ridership and higher use of personal vehicles, thus increasing traffic jams and air pollution in already congested urban areas. This study is an examination into the building of a low-cost, cost-effective accessible real-time bus location system without costly capital expenditures or significant changes in fleets. The solution in question utilizes off- the- shelf technologies to achieve a rich, end-to- end networked tracking setup. Using conventional GPS capabilities built into smartphones carried by the bus driver and transit staff, our system avoids the need for any dedicated hardware installations yet provides efficient tracking functionality. The gathered location information is sent via a well-optimized protocol that manages update frequency versus resource use, providing accurate tracking without wasting battery or network load. The architecture of the system utilizes cloud computing for backend processing, which adds scalability to handle increasing ridership and maintain stable deployment with less downtime even at times of high usage. The cloud-based solution allows for swift data processing of key features like arrival times. The system has various features to enhance the quality of the public transit experience, such as an overall alert system that informs passengers of delays, route alterations or emergency conditions. By solving these underlying problems in public transport our system seeks to promote higher ridership by improving passenger convenience and service dependability. This transition towards more public transport use contributes to environmental pursuits on a larger level by minimizing the introduction of new personal vehicles into the road network, thus lowering carbon emission with growing climate change and global warming issues..*

Keywords: Real-Time Bus Tracking, Android Application, Firebase, A* Algorithm, ETA Prediction

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