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Ashwitha K. Shetty; R. Madhusudhan Goud; Krishnamoorthy K; Pathipati Srihari; Bethi Pardhasaradhi; Linga Reddy Cenkeramaddi

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Indoor-Outdoor GNSS Performance Across Various Android Smartphones

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Document Sections

- I. Introduction
- II. Gns Sensors in Android Based Smartphones
- III. Data Monitoring Plan
- IV. Result and Discussion
- V. Conclusion

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Abstract:

This study investigates the performance of multi-GNSS systems on Android smartphones in both outdoor and indoor environments. With these systems fully operational since early 2017, research has largely overlooked smartphone-specific performance. This paper fills that gap by examining satellite visibility, usability, and positioning accuracy in eastern India using two smartphones. Data was collected in "Aeroplane Mode" to eliminate cellular interference, focusing on GNSS satellite detection and accuracy. Outdoor results revealed an average of 30–33 usable satellites and low DOP values (1), indicating high positioning accuracy with 2D precision within 4 m and 3D precision within 2.5m. Conversely, indoor environments showed fewer usable satellites (7–13) and higher DOP values (2.6), leading to reduced accuracy with 2D precision around 9m and 3D precision about 7m. This study highlights the significant impact of environmental factors on GNSS performance and underscores the need for optimisation in both outdoor and indoor settings to enhance navigation accuracy for smartphone users.

Published in: [2024 IEEE 21st India Council International Conference \(INDICON\)](#)

Date of Conference: 19-21 December 2024

DOI: [10.1109/INDICON63790.2024.10958489](#)

Date Added to IEEE Xplore: 21 April 2025

Publisher: IEEE

ISBN Information:

Electronic ISBN:979-8-3503-9128-2

Print on Demand(PoD) ISBN:979-8-3503-9129-9

Conference Location: Kharagpur, India

ISSN Information:

Electronic ISSN: 2325-9418

Print on Demand(PoD) ISSN: 2325-940X

I. Introduction

Recent advancements in smartphone navigation have leveraged GPS, GLONASS, GALILEO, BeiDou, and NavIC, which became fully operational by early 2017 [1]–[8]. While extensive studies have explored the availability and reliability of these GNSS systems with various smartphones [9]–[18]. Investigating how these systems perform on smartphones across different environments can offer valuable insights into optimizing navigation for Indian users.

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