

## **A STUDY USING MULTI GNSS SERVICES IN INDIA SEMI URBAN ENVIRONMENT**

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### **Abstract**

Global Navigation Satellite System (GNSS) now has entered into an era when multiple systems operating together. For solutions using any of the individual GNSS components, an issue is signal strength and quality degradation while operating within natural and mad-made obstructions. The situation is common for urban and semi-urban areas where mixed environment exists consisting of buildings and trees within which the GNSS receivers operate. Severe obstructions in some cases may result in complete loss of position solution and interruption of continuous service that needs suitable augmentation. India is favorably located in a geographical position having opportunity for receiving signals from all the GNSS constellations, and therefore has the potential for efficiently utilizing this Multi-GNSS environment. An effort has been made in this paper to present the results of the studies on benefit of Multi GNSS signal availability in such mixed-environment situation in India. Using two different types of GNSS receivers mounted on motorbike, standalone GPS operation is compared with GPS+GLONASS+Galileo and GPS+NavIC operations and the results presents the advantages and challenges of such hybrid operations.

This paper is also presents the initial results of static and dynamic condition of various multi GNSS constellation from a road laying within moderately dense forest (Birbhum district) in India. The results show that, with some limitation of lesser number of used Satellite. Fast fluctuating satellite geometry, Multi GNSS supports uninterrupted GNSS operation in such scenarios.

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## References

Watson, Ryan M., and Jason N. Gross. "Robust Navigation in GNSS Degraded Environment Using Graph Optimization." ION GNSS+ 2017, Portland, September 2017.

Isbell, L.A., Bidner, L.R., Crofoot, M.C., Matsumoto-Oda, A. and Farine, D.R., "GPS-identified, low-level nocturnal activity of vervets (*Chlorocebus pygerythrus*) and olive baboons (*Papio anubis*) in Laikipia, Kenya" American Journal of Physical Anthropology, 19 May 2017, pp. 1-9.

Skog and P. Händel, "In-Car Positioning and Navigation Technologies—A Survey", IEEE Transactions on Intelligent Transportation Systems, Vol. 10, No. 1, March 2009, pp. 4-21.

K., Fateme, F. Masson, F. Nilfouroushan, P. Vernant, S. A. Saadat, H. Nankali, S. Hosseini, and A. Aghamohamadi. "An up-to-date GPS velocity field of Iran." In EGU General Assembly Conference Abstracts, vol. 19, April 2017 p. 7268.

Raghu N., Manjunatha K.N. and Kiran B., "Determination and Preliminary Analysis of Position Accuracy on IRNSS Satellites", International Conference on Communication and Signal Processing, 6-8 April 2016, pp. 765-769

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