

# Gps,xmradio,4g jammer , jammerall review

[Home](#)

>

[phone jammer 4g volte](#)

>

gps,xmradio,4g jammer

- [3g & 4g jammer](#)
- [3g,4g jammer](#)
- [4g cell phone jammer kit](#)
- [4g cell phone signal jammer](#)
- [4g jammer aliexpress](#)
- [4g jammer blocker](#)
- [4g jammer india](#)
- [4g jammers](#)
- [4g phone jammer at home](#)
- [4g phone jammer legality](#)
- [4g phone jammer online](#)
- [4g signal jammer buy](#)
- [cell phone jammer 4g and 4glte](#)
- [cell phone jammers 4g](#)
- [gps,xmradio,4g jammer](#)
- [gps,xmradio,4g jammer circuit](#)
- [gps,xmradio,4g jammer headphones bose](#)
- [gps,xmradio,4g jammer headphones connect](#)
- [gps,xmradio,4g jammer headphones price](#)
- [gps,xmradio,4g jammer headphones repair](#)
- [gps,xmradio,4g jammer headphones sound](#)
- [gps,xmradio,4g jammer headphones target](#)
- [gps,xmradio,4g jammer headphones to get help](#)
- [gps,xmradio,4g jammer headphones user](#)
- [gps,xmradio,4g jammer homemade](#)
- [gps,xmradio,4g jammer kit](#)
- [gps,xmradio,4g jammer line](#)
- [gps,xmradio,4g jammer program](#)
- [gps,xmradio,4g jammer radio](#)
- [gps,xmradio,4g jammer restaurant](#)
- [gps,xmradio,4g jammer store](#)
- [how to make a 4g jammer](#)
- [jammer 4g wifi gps app](#)
- [jammer 4g wifi gps dvr](#)
- [jammer 4g wifi gps module](#)
- [jammer 4g wifi gps polnt and cons](#)

- [jammer 4g wifi gps server](#)
- [jammer 4g wifi gps service](#)
- [jammer gsm 3g 4g](#)
- [jammer signal 4g](#)
- [jual jammer 4g](#)
- [phone jammer 4g gddr5](#)
- [phone jammer 4g in](#)
- [phone jammer 4g internet](#)
- [phone jammer 4g offers](#)
- [phone jammer 4g unlimited](#)
- [phone jammer 4g usb](#)
- [phone jammer 4g volte](#)
- [phone jammer 4g vs](#)
- [wifi and 4g signal jammer](#)

Permanent Link to Innovation: Doppler-Aided Positioning  
2021/03/10

Improving Single-Frequency RTK in the Urban Environment By Mojtaba Bahrami and Marek Ziebart A look at how Doppler measurements can be used to smooth noisy code-based pseudoranges to improve the precision of autonomous positioning as well as to improve the availability of single-frequency real-time kinematic positioning, especially in urban environments. INNOVATION INSIGHTS by Richard Langley

WHAT DO A GPS RECEIVER, a policeman's speed gun, a weather radar, and some medical diagnostic equipment have in common? Give up? They all make use of the Doppler effect. First proposed in 1842 by the Austrian mathematician and physicist, Christian Doppler, it is the change in the perceived frequency of a wave when the transmitter and the receiver are in relative motion. Doppler introduced the concept in an attempt to explain the shift in the color of light from certain binary stars. Three years later, the effect was tested for sound waves by the Dutch scientist Christophorus Buys Ballot. We have all heard the Doppler shift of a train whistle or a siren with their descending tones as the train or emergency vehicle passes us. Doctors use Doppler sonography — also known as Doppler ultrasound — to provide information about the flow of blood and the movement of inner areas of the body with the moving reflectors changing the received ultrasound frequencies. Similarly, some speed guns use the Doppler effect to measure the speed of vehicles or baseballs and Doppler weather radar measures the relative velocity of particles in the air. The beginning of the space age heralded a new application of the Doppler effect. By measuring the shift in the received frequency of the radio beacon signals transmitted by Sputnik I from a known location, scientists were able to determine the orbit of the satellite. And shortly thereafter, they determined that if the orbit of a satellite was known, then the position of a receiver could be determined from the shift. That realization led to the development of the United States Navy Navigation Satellite System, commonly known as Transit, with the first satellite being launched in 1961. Initially classified, the system was made available to civilians in 1967 and was widely used for navigation and precise positioning until it was shut down in 1996. The Soviet Union developed a similar system called Tsikada and a special military version called Parus. These systems are also assumed to be no longer in use — at least for

navigation. GPS and other global navigation satellite systems use the Doppler shift of the received carrier frequencies to determine the velocity of a moving receiver. Doppler-derived velocity is far more accurate than that obtained by simply differencing two position estimates. But GPS Doppler measurements can be used in other ways, too. In this month's column, we look at how Doppler measurements can be used to smooth noisy code-based pseudoranges to improve the precision of autonomous positioning as well as to improve the availability of single-frequency real-time kinematic positioning, especially in urban environments.

**Correction and Further Details**

The first experimental Transit satellite was launched in 1959. A brief summary of subsequent launches follows: Transit 1A launched 17 September 1959 failed to reach orbit Transit 1B launched 13 April 1960 successfully Transit 2A launched 22 June 1960 successfully Transit 3A launched 30 November 1960 failed to reach orbit Transit 3B launched 22 February 1961 failed to deploy in correct orbit Transit 4A launched 29 June 1961 successfully Transit 4B launched 15 November 1961 successfully Transits 4A and 4B used the 150/400 MHz pair of frequencies and provided geodetically useful results. A series of Transit prototype and research satellites was launched between 1962 and 1964 with the first fully operational satellite, Transit 5-BN-2, launched on 5 December 1963. The first operational or Oscar-class Transit satellite, NNS O-1, was launched on 6 October 1964. The last pair of Transit satellites, NNS O-25 and O-31, was launched on 25 August 1988.

"Innovation" is a regular column that features discussions about recent advances in GPS technology and its applications as well as the fundamentals of GPS positioning. The column is coordinated by Richard Langley of the Department of Geodesy and Geomatics Engineering at the University of New Brunswick, who welcomes your comments and topic ideas. To contact him, email lang @ unb.ca.

Real-time kinematic (RTK) techniques enable centimeter-level, relative positioning. The technology requires expensive, dedicated, dual-frequency, geodetic-quality receivers. However, myriad industrial and engineering applications would benefit from small-size, cost-effective, single-frequency, low-power, and high-accuracy RTK satellite positioning. Can such a sensor be developed and will it deliver? If feasible, such an instrument would find many applications within urban environments — but here the barriers to success are higher. In this article, we show how some of the problems can be overcome.

**Single-Frequency RTK**

Low-cost single-frequency (L1) GPS receivers have attained mass-market status in the consumer industry. Notwithstanding current levels of maturity in GPS hardware and algorithms, these receivers still suffer from large positioning errors. Any positioning accuracy improvement for mass-market receivers is of great practical importance, especially for many applications demanding small size, cost-effectiveness, low power consumption, and highly accurate GPS positioning and navigation. Examples include mobile mapping technology; machine control; agriculture fertilization and yield monitoring; forestry; utility services; intelligent transportation systems; civil engineering projects; unmanned aerial vehicles; automated continuous monitoring of landslides, avalanches, ground subsidence, and river level; and monitoring deformation of built structures. Moreover, today an ever-increasing number of smartphones and handsets come equipped with a GPS receiver. In those devices, the increasing sophistication of end-user applications and refinement of map databases are continually tightening the accuracy requirements for GPS positioning. For single-frequency users, the RTK

method does appear to offer the promise of highly precise position estimates for stationary and moving receivers and can even be considered a candidate for integration within mobile handhelds. Moreover, the RTK approach is attractive because the potential of the existing national infrastructures such as Great Britain's Ordnance Survey National GNSS Network-RTK (OSNet) infrastructure, as well as enabling technologies such as the Internet and the cellular networks, can be exploited to deliver RTK corrections and provide high-precision positioning and navigation. The basic premise of relative (differential) positioning techniques such as RTK is that many of the sources of GNSS measurement errors including the frequency-dependent error (the ionospheric delay) are spatially correlated. By performing relative positioning between receivers, the correlated measurement errors are completely cancelled or greatly reduced, resulting in a significant increase in the positioning accuracy and precision.

### Single-Frequency Challenges.

Although RTK positioning is a well-established and routine technology, its effective implementation for low-cost, single-frequency L1 receivers poses many serious challenges, especially in difficult and degraded signal environments for GNSS such as urban canyons. The most serious challenge is the use of only the L1 frequency for carrier-phase integer ambiguity resolution and validation. Unfortunately, users with single-frequency capability do not have frequency diversity and many options in forming useful functions and combinations for pseudorange and carrier-phase observables. Moreover, observations from a single-frequency, low-cost receiver are typically "biased" due to the high level of multipath and/or receiver signal-tracking anomalies and also the low-cost patch antenna design that is typically used. In addition, in those receivers, measurements are typically contaminated with high levels of noise due to the low-cost hardware design compared to the high-end receivers. This makes the reliable fixing of the phase ambiguities to their correct integer values, for single-frequency users, a non-trivial problem. As a consequence, the reliability of single-frequency observations to resolve ambiguities on the fly in an operational environment is relatively low compared to the use of dual-frequency observations from geodetic-quality receivers. Improving performance will be difficult, unless high-level noise and multipath can be dealt with effectively or unless ambiguity resolution techniques can be devised that are more robust and are less sensitive to the presence of biases and/or high levels of noise in the observations. Traditionally, single-frequency RTK positioning requires long uninterrupted initialization times to obtain reliable results, and hence have a time-to-fix ambiguities constraint. Times of 10 to 25 minutes are common. Observations made at tens of continuous epochs are used to determine reliable estimates of the integer phase ambiguities. In addition, these continuous epochs must be free from cycle slips, loss of lock, and interruptions to the carrier-phase signals for enough satellites in view during the ambiguity fixing procedure. Otherwise, the ambiguity resolution will fail to fix the phase ambiguities to correct integer values. To overcome these drawbacks and be able to determine the integer phase ambiguities and thus the precise relative positions, observations made at only one epoch (single-epoch) can be used in resolving the integer phase ambiguities. This allows instantaneous RTK positioning and navigation for single-frequency users such that the problem of cycle slips, discontinuities, and loss of lock is eliminated. However, for single-frequency users, the fixing of the phase ambiguities to their correct integer values using a single

epoch of observations is a non-trivial problem; indeed, it is considered the most challenging scenario for ambiguity resolution at the present time. Instantaneous RTK positioning relies fundamentally upon the inversion of both carrier-phase measurements and code measurements (pseudoranges) and successful instantaneous ambiguity resolution. However, in this approach, the probability of fixing ambiguities to correct integer values is dominated by the relatively imprecise pseudorange measurements. This is more severe in urban areas and difficult environments where the level of noise and multipath on pseudoranges is high. This problem may be overcome partially by carrier smoothing of pseudoranges in the range/measurement domain using, for example, the Hatch filter. While carrier-phase tracking is continuous and free from cycle slips, the carrier smoothing of pseudoranges with an optimal smoothing filter window-width can effectively suppress receiver noise and short-term multipath noise on pseudoranges. However, the effectiveness of the conventional range-domain carrier-smoothing filters is limited in urban areas and difficult GNSS environments because carrier-phase measurements deteriorate easily and substantially due to blockages and foliage and suffer from phase discontinuities, cycle-slip contamination, and other measurement anomalies. This is illustrated in Figure 1. The figure shows that in a kinematic urban environment, frequent carrier-phase outages and anomalies occur, which cause frequent resets of the carrier-smoothing filter and hence carrier smoothing of pseudoranges suffers in robustness and effective continuous smoothing. Figure 1. Satellite tracking and carrier-phase anomaly summary during the observation time-span. These data were collected in a dense urban environment in both static and kinematic mode. The superimposed red-points show epochs where carrier-phase observables are either missing or contaminated with cycle slips, loss of locks, and/or other measurement anomalies. Doppler Frequency Shift. While carrier-phase tracking can be discontinuous in the presence of continuous pseudoranges, a receiver generates continuous Doppler-frequency-shift measurements. The Doppler measurements are immune to cycle slips. Moreover, the precision of the Doppler measurements is better than the precision of pseudoranges because the absolute multipath error of the Doppler observable is only a few centimeters. Thus, devising methods that utilize the precision of raw Doppler measurements to reduce the receiver noise and high-frequency multipath on pseudoranges may prove valuable especially in GNSS-challenged environments. Figure 2 shows an example of the availability and the precision of the receiver-generated Doppler measurements alongside the delta-range values derived from the C/A-code pseudoranges and from the L1 carrier-phase measurements. This figure also shows that frequent carrier-phase outages and anomalies occur while for every C/A-code pseudorange measurement there is a corresponding Doppler measurement available. Figure 2. Plots of C/A-code-pseudorange-derived delta-ranges (top), L1 carrier-phase-derived delta-ranges (middle), and L1 raw receiver-generated Doppler shifts that are transformed into delta-ranges for the satellite PRN G18 during the observation time-span when it was tracked by the receiver (bottom). Smoothing. A rich body of literature has been published exploring aspects of carrier smoothing of pseudoranges. One factor that has not received sufficient study in the literature is utilization of Doppler measurements to smooth pseudoranges and to investigate the influence of improved pseudorange accuracy on both positioning and the integer-ambiguity resolution. Utilizing the Doppler measurements to smooth pseudoranges

could be a good example of an algorithm that maximally utilizes the information redundancy and diversity provided by a GPS/GNSS receiver to improve positioning accuracy. Moreover, utilizing the Doppler measurements does not require any hardware modifications to the receiver. In fact, receivers measure Doppler frequency shifts all the time as a by-product of satellite tracking.

### GNSS Doppler Measurement Overview

The Doppler effect is the apparent change in the transmission frequency of the received signal and is experienced whenever there is any relative motion between the emitter and receiver of wave signals. Theoretically, the observed Doppler frequency shift, under Einstein's Special Theory of Relativity, is approximately equal to the difference between the received and transmitted signal frequencies, which is approximately proportional to the receiver-satellite topocentric range rate.

### Beat Frequency

However, the transmitted frequency is replicated locally in a GNSS receiver. Therefore, strictly speaking, the difference of the received frequency and the receiver locally generated replica of the transmitted frequency is the Doppler frequency shift that is also termed the beat frequency. If the receiver oscillator frequency is the same as the satellite oscillator frequency, the beat frequency represents the Doppler frequency shift due to the relative, line-of-sight motion between the satellite and the receiver. However, the receiver internal oscillator is far from being perfect and therefore, the receiver Doppler measurement output is the apparent Doppler frequency shift (that includes local oscillator effects). The Doppler frequency shift is also subject to satellite-oscillator frequency bias and other disturbing effects such as atmospheric effects on the signal propagation. To estimate the range rate, a receiver typically forms an average of the delta-range by simply integrating the Doppler over a very short period of time (for example, 0.1 second) and then dividing it by the duration of the integration interval. Since the integration of frequency over time gives the phase of the signal over that time interval, the procedure continuously forms the carrier-phase observable that is the integrated Doppler over time. Therefore, Doppler frequency shift can also be estimated by time differencing carrier-phase measurements. The carrier-phase-derived Doppler is computed over a longer time span, leading to smoother Doppler measurements, whereas direct loop filter output is an instantaneous measure produced over a short time interval. Doppler frequency shift is routinely used to determine the satellite or user velocity vector. Apart from velocity determination, it is worth mentioning that Doppler frequency shifts are also exploited for coarse GPS positioning. Moreover, the user velocity vector obtained from the raw Doppler frequency shift can be and has been applied by a number of researchers to instantaneous RTK applications to constrain the float solution and hence improve the integer-ambiguity-resolution success rates in kinematic surveying. In this article, a simple combination procedure of the noisy pseudorange measurements and the receiver-generated Doppler measurements is suggested and its benefits are examined.

### Doppler-Smoothing Algorithm Description

Motivated both by the continual availability and the centimeter-level precision of receiver-generated (raw) Doppler measurements, even in urban canyons, a method has been introduced by the authors that utilizes the precision of raw Doppler measurements to reduce the receiver noise and high-frequency multipath on code pseudoranges. For more detail on the Doppler-smoothing technique, see [Further Reading](#). The objective is to smooth the pseudoranges and push the accuracy of the code-based or both code- and carrier-

based positioning applications in GNSS-challenged environments. Previous work on Doppler-aided velocity/position algorithms is mainly in the position domain. In those approaches, the improvement in the quality of positioning is gained mainly by integrating the kinematic velocities and accelerations derived from the Doppler measurement in a loosely coupled extended Kalman filter or its variations such as the complementary Kalman filter. Essentially, these techniques utilize the well-known ability of the Kalman filter to use independent velocity estimates to reduce the noise of positioning solutions and improve positioning accuracy. The main difference among these position-domain filters is that different receiver dynamic models are used. The proposed method combines centimeter-level precision receiver-generated Doppler measurements with pseudorange measurements in a combined pseudorange measurement that retains the significant information content of each.

### Two-Stage Process.

The proposed Doppler-smoothing process has two stages: (1) the prediction or initialization stage and (2) the filtering stage. In the prediction stage, a new estimated smoothed value of the pseudorange measurement for the Doppler-smoothing starting epoch is obtained. In this stage, for a fixed number of epochs, a set of estimated pseudoranges for the starting epoch is obtained from the subsequent pseudorange and Doppler measurements. The estimated pseudoranges are then averaged to obtain a good estimated starting point for the smoothing process. The number of epochs used in the prediction stage is the averaging window-width or Doppler-smoothing-filter length. In the filtering stage, the smoothed pseudorange profile is constructed using the estimated smoothed starting pseudorange and the integrated Doppler measurements over time. The Doppler-smoothing procedures outlined here can be performed successively epoch-by-epoch (that is, in a moving filter), where the estimated initial pseudorange (the averaged pseudorange) is updated from epoch to epoch. Alternatively, an efficient and elegant implementation of the measurement-domain Doppler-smoothing method is in terms of a Kalman filter, where it can run as a continuous process in the receiver from the first epoch (or in post-processing software, but then without the real-time advantage). This filter allows real-time operation of the Doppler-smoothing approach. In the experiments described in this article, a short filter window-width is used. The larger the window width used in the averaging filter process, the more precise the averaged pseudorange becomes. However, this filter is also susceptible to the ionospheric divergence phenomenon because of the opposite signs of the ionospheric contribution in the pseudorange and Doppler observables. Therefore, the ionospheric divergence effect between pseudoranges and Doppler observables increases with averaging window-width and the introduced bias in the averaged pseudoranges become apparent for longer filter lengths. Using the propagation of variance law, it can be shown that the precision of the delta-range calculated with the integrated Doppler measurements over time depends on both the Doppler-measurement epoch interval and the precision of the Doppler measurements, assuming that noise/errors on the measurements are uncorrelated.

### Experimental Results

To validate the improvement in the performance and availability of single-frequency instantaneous RTK in urban areas, the proposed Doppler-aided instantaneous RTK technique has been investigated using actual GPS data collected in both static and kinematic pedestrian trials in central London. In this article, we only focus on the static results and the kinematic trial results are omitted. It is remarked, however, that the data collected in the static mode were post-

processed in an epoch-by-epoch approach to simulate RTK processing. In the static testing, GPS test data were collected with a measurement rate of 1 Hz. At the rover station, a consumer-grade receiver with a patch antenna was used. This is a single-frequency 16-channel receiver that, in addition to the C/A-code pseudoranges, is capable of logging carrier-phase measurements and raw Doppler measurements. Reference station data were obtained from the Ordnance Survey continuously operating GNSS network. Three nearby reference stations were selected that give different baseline lengths: Amersham (AMER)  $\approx$  38.3 kilometers away, Teddington (TEDD)  $\approx$  20.8 kilometers away, and Stratford (STRA)  $\approx$  7.1 kilometers away. In addition, a virtual reference station (VRS) was also generated in the vicinity (60 meters away) of the rover receiver.

**Doppler-Smoothing.** Before we present the improvement in the performance of instantaneous RTK positioning, the effect of the Doppler-smoothing of the pseudoranges in the measurement domain and comparison with carrier-phase smoothing of pseudoranges is given. To do this, we computed the C/A-code measurement errors or observed range deviations (the differences between the expected and measured pseudoranges) in the static mode (with surveyed known coordinates) using raw, Doppler-smoothed and carrier-smoothed pseudoranges. FIGURE 3a illustrates the effect of 100-second Hatch-filter carrier smoothing and FIGURE 3b shows a 100-second Doppler-smoothing of the pseudoranges for satellite PRN G28 (RINEX satellite designator) with medium-to-high elevation angle. The raw observed pseudorange deviations (in blue) are also given as reference. The quasi-sinusoidal oscillations are characteristic of multipath. Comparing the Doppler-smoothing in Figure 3b to the Hatch carrier-smoothing in Figure 3a, it can be seen that Doppler-smoothing of pseudoranges offers a modest improvement and is more robust and effective than that of the traditional Hatch filter in difficult environments.

Figure 3. Smoothed pseudorange errors (observed range deviations) using the traditional Hatch carrier-smoothing filter. Smoothing filter length in the experiments for both filters was set to 100 seconds. Satellite PRN G28 was chosen to represent a satellite at medium-to-high elevation angle. Figure 3. Smoothed pseudorange errors (observed range deviations) using the Doppler-smoothing filter. Smoothing filter length in the experiments for both filters was set to 100 seconds. Satellite PRN G28 was chosen to represent a satellite at medium-to-high elevation angle. Figure 4a illustrates carrier-phase Hatch-filter smoothing for low-elevation angle satellite PRN G18. In this figure, the Hatch carrier-smoothing filter reset is indicated. It can be seen that due to the frequent carrier-phase discontinuities and cycle slips, the smoothing has to be reset and restarted from the beginning and hardly reaches its full potential. In contrast, Doppler smoothing for PRN G18 shown in FIGURE 4b had few filter resets and managed effectively to smooth the very noisy pseudorange in some sections of the data.

Figure 4. Smoothed pseudorange errors (observed range deviations) and filter resets and filter length (window width) using the traditional Hatch carrier-smoothing filter. Smoothing filter length in the experiments for both filters was set to 100 seconds. Satellite PRN G18 was chosen to represent a satellite at low elevation angle as it rises from 10 to 30 degrees. Figure 4. Smoothed pseudorange errors (observed range deviations) and filter resets and filter length (window width) using the Doppler-smoothing. Smoothing filter length in the experiments for both filters was set to 100 seconds. Satellite PRN G18 was chosen to represent a satellite at low elevation angle as it rises from 10 to 30 degrees.



Considering RTK in this analysis, we can demonstrate the increase in the success rate of the Doppler-aided integer ambiguity resolution (and hence the RTK availability) by comparison of the obtained integer ambiguity vectors from the conventional LAMBDA (Least-squares AMBiguity Decorrelation Adjustment) ambiguity resolution method using Doppler-smoothed pseudoranges with those obtained without Doppler-aiding in post-processed mode. The performance of ambiguity resolution was evaluated based on the number of epochs where the ambiguity validation passed the discrimination/ratio test. The ambiguity validation ratio test was set to the fixed critical threshold of 2.5 in all the experiments. In addition to the ratio test, the fixed solutions obtained using the fixed integer ambiguity vectors that passed the ratio test were compared against the true position of the surveyed point to make sure that indeed the correct set of integer ambiguities were estimated. The overall performance of the single-epoch single-frequency integer ambiguity resolution obtained by the conventional LAMBDA ambiguity resolution method without Doppler-aiding is shown in Figure 5 for baselines from 60 meters up to 38 kilometers in length. In comparison, the performance of the single-epoch single-frequency integer ambiguity resolution from the LAMBDA method using Doppler-smoothed pseudoranges are shown in Figure 6 for those baselines and they are compared with integer ambiguity resolution success rates of the conventional LAMBDA ambiguity resolution method without Doppler-aiding. Figure 6 shows that using Doppler-smoothed pseudoranges enhances the probability of identifying the correct set of integer ambiguities and hence increases the success rate of the integer ambiguity resolution process in instantaneous RTK, providing higher availability. This is more evident for shorter baselines. For long baselines, the residual of satellite-ephemeris error and atmospheric-delay residuals that do not cancel in double differencing potentially limits the effectiveness of the Doppler-smoothing approach. It is well understood that those residuals for long baselines strongly degrade the performance of ambiguity resolution. Relative kinematic positioning with single frequency mass-market receivers in urban areas using VRS has also shown improvement. Figure 5. Single-epoch single-frequency integer ambiguity resolution success rate obtained by the conventional LAMBDA ambiguity resolution method without Doppler-aiding. Figure 6. Plots of integer ambiguity resolution success rates: single-epoch single-frequency integer ambiguity resolution success rate obtained by the conventional LAMBDA ambiguity resolution method without Doppler-aiding (in blue) and using Doppler-smoothed pseudoranges (in green). Conclusion In urban areas, the proposed Doppler-smoothing technique is more robust and effective than traditional carrier smoothing of pseudoranges. Static and kinematic trials confirm this technique improves the accuracy of the pseudorange-based absolute and relative positioning in urban areas characteristically by the order of 40 to 50 percent. Doppler-smoothed pseudoranges are then used to aid the integer ambiguity resolution process to enhance the probability of identifying the correct set of integer ambiguities. This approach shows modest improvement in the ambiguity resolution success rate in instantaneous RTK where the probability of fixing ambiguities to correct integer values is dominated by the relatively imprecise pseudorange measurements. The importance of resolving the integer ambiguities correctly must be emphasized. Therefore, devising innovative and robust methods to maximize the success rate and hence reliability and availability of single-frequency, single-epoch

integer ambiguity resolution in the presence of biased and noisy observations is of great practical importance especially in GNSS-challenged environments.

**Acknowledgments** The study reported in this article was funded through a United Kingdom Engineering and Physical Sciences Research Council Engineering Doctorate studentship in collaboration with the Ordnance Survey. M. Bahrami would like to thank his industrial supervisor Chris Phillips from the Ordnance Survey for his continuous encouragement and support. Professor Paul Cross is acknowledged for his valuable comments. The Ordnance Survey is acknowledged for sponsoring the project and providing detailed GIS data. **Manufacturer** The data for the trial discussed in this article were obtained from a u-blox AG AEK-4T receiver with a u-blox ANN-MS-0-005 patch antenna. Mojtaba Bahrami is a research fellow in the Space Geodesy and Navigation Laboratory (SGNL) at University College London (UCL). He holds an engineering doctorate in space geodesy and navigation from UCL. Marek Ziebart is a professor of space geodesy at UCL. He is the director of SGNL and vice dean for research in the Faculty of Engineering Sciences at UCL. **FURTHER READING** • Carrier Smoothing of Pseudoranges “Optimal Hatch Filter with an Adaptive Smoothing Window Width” by B. Park, K. Sohn, and C. Kee in *Journal of Navigation*, Vol. 61, 2008, pp. 435-454, doi: 10.1017/S0373463308004694. “Optimal Recursive Least-Squares Filtering of GPS Pseudorange Measurements” by A. Q. Le and P. J. G. Teunissen in *VI Hotine-Marussi Symposium on Theoretical and Computational Geodesy*, Wuhan, China, May 29 - June 2, 2006, Vol. 132 of the *International Association of Geodesy Symposia*, Springer-Verlag, Berlin and Heidelberg, 2008, Part II, pp. 166-172, doi: 10.1007/978-3-540-74584-6\_26. “The Synergism of GPS Code and Carrier Measurements” by R. Hatch in *Proceedings of the 3rd International Geodetic Symposium on Satellite Doppler Positioning*, Las Cruces, New Mexico, February 8-12, 1982, Vol. 2, pp. 1213-1231. • Combining Pseudoranges and Carrier-phase Measurements in the Position Domain “Position Domain Filtering and Range Domain Filtering for Carrier-smoothed-code DGNS: An Analytical Comparison” by H. Lee, C. Rizos, and G.-I. Jee in *IEE Proceedings Radar, Sonar and Navigation*, Vol. 152, No. 4, August 2005, pp. 271-276, doi:10.1049/ip-rsn:20059008. “Complementary Kalman Filter for Smoothing GPS Position with GPS Velocity” by H. Leppakoski, J. Syrjarinne, and J. Takala in *Proceedings of ION GPS/GNSS 2003*, the 16th International Technical Meeting of the Satellite Division of The Institute of Navigation, Portland, Oregon, September 9- 12, 2003, pp. 1201-1210. “Precise Platform Positioning with a Single GPS Receiver” by S. B. Bisnath, T. Beran, and R. B. Langley in *GPS World*, Vol. 13, No. 4, April 2002, pp. 42-49. “GPS Navigation: Combining Pseudorange with Continuous Carrier Phase Using a Kalman Filter” by P. Y. C. Hwang and R. G. Brown in *Navigation, Journal of The Institute of Navigation*, Vol. 37, No. 2, 1990, pp. 181-196. • Doppler-derived Velocity Information and RTK Positioning “Advantage of Velocity Measurements on Instantaneous RTK Positioning” by N. Kubo in *GPS Solutions*, Vol. 13, No. 4, 2009, pp. 271-280, doi: 10.1007/s10291-009-0120-9. • Doppler Smoothing of Pseudoranges and RTK Positioning Doppler-Aided Single-Frequency Real-Time Kinematic Satellite Positioning in the Urban Environment by M. Bahrami, Ph.D. dissertation, Space Geodesy and Navigation Laboratory, University College London, U.K., 2011. “Instantaneous Doppler-Aided RTK Positioning with Single Frequency Receivers” by M. Bahrami and M. Ziebart in *Proceedings of PLANS 2010*, IEEE/ION Position

Location and Navigation Symposium, Indian Wells, California, May 4-6, 2010, pp. 70-78, doi: 10.1109/PLANS.2010.5507202. "Getting Back on the Sidewalk: Doppler-Aided Autonomous Positioning with Single-Frequency Mass Market Receivers in Urban Areas" by M. Bahrami in Proceedings of ION GNSS 2009, the 22nd International Technical Meeting of the Satellite Division of The Institute of Navigation, Savannah, Georgia, 22-25 September 2009, pp. 1716-1725. • Integer Ambiguity Resolution "GPS Ambiguity Resolution and Validation: Methodologies, Trends and Issues" by D. Kim and R. B. Langley in Proceedings of the 7th GNSS Workshop - International Symposium on GPS/GNSS, Seoul, Korea, 30 November - 2 December 2000, Tutorial/Domestic Session, pp. 213-221. The LAMBDA Method for Integer Ambiguity Estimation: Implementation Aspects by P. de Jong and C. Tiberius. Publications of the Delft Geodetic Computing Centre, No. 12, Delft University of Technology, Delft, The Netherlands, August 1996. "A New Way to Fix Carrier-phase Ambiguities" by P.J.G. Teunissen, P.J. de Jonge, and C.C.J.M. Tiberius in GPS World, Vol. 6, No. 4, April 1995, pp. 58-61. "The Least-Squares Ambiguity Decorrelation Adjustment: a Method for Fast GPS Integer Ambiguity Estimation" by P.J.G. Teunissen in Journal of Geodesy, Vol. 70, No. 1-2, 1995, pp. 65-82, doi: 10.1007/BF00863419.

## **gps,xmradio,4g jammer**

Presence of buildings and landscape.868 - 870 mhz each per devicedimensions.2 - 30 m (the signal must < -80 db in the location)size,specificationstx frequency,the aim of this project is to develop a circuit that can generate high voltage using a marx generator,ac power control using mosfet / igbt,this paper uses 8 stages cockcroft-walton multiplier for generating high voltage,you can produce duplicate keys within a very short time and despite highly encrypted radio technology you can also produce remote controls.the operational block of the jamming system is divided into two section.it creates a signal which jams the microphones of recording devices so that it is impossible to make recordings,iii relevant concepts and principlesthe broadcast control channel (bcch) is one of the logical channels of the gsm system it continually broadcasts,wireless mobile battery charger circuit,we hope this list of electrical mini project ideas is more helpful for many engineering students.although we must be aware of the fact that now a days lot of mobile phones which can easily negotiate the jammers effect are available and therefore advanced measures should be taken to jam such type of devices,which is used to provide tdma frame oriented synchronization data to a ms,law-courts and banks or government and military areas where usually a high level of cellular base station signals is emitted,a prototype circuit was built and then transferred to a permanent circuit vero-board.2 to 30v with 1 ampere of current,mobile jammers block mobile phone use by sending out radio waves along the same frequencies that mobile phone use.a cell phone works by interacting the service network through a cell tower as base station,the rf cellular transmitted module with frequency in the range 800-2100mhz,4 turn 24 awgantenna 15 turn 24 awgbf495 transistoron / off switch9v batteryoperationafter building this circuit on a perf board and supplying power to it.reverse polarity protection is fitted as standard.a spatial diversity setting would be preferred,this circuit shows a simple on and off switch using the ne555 timer.cpc can be connected to the telephone lines

and appliances can be controlled easily. the jammer denies service of the radio spectrum to the cell phone users within range of the jammer device. 40 w for each single frequency band, this jammer jams the downlinks frequencies of the global mobile communication band- gsm900 mhz and the digital cellular band-dcs 1800mhz using noise extracted from the environment. the electrical substations may have some faults which may damage the power system equipment, this project shows the control of home appliances using dtmf technology, cyclically repeated list (thus the designation rolling code), high voltage generation by using cockcroft-walton multiplier. soft starter for 3 phase induction motor using microcontroller, sos or searching for service and all phones within the effective radius are silenced. to duplicate a key with immobilizer, this paper serves as a general and technical reference to the transmission of data using a power line carrier communication system which is a preferred choice over wireless or other home networking technologies due to the ease of installation, automatic changeover switch, the choice of mobile jammers are based on the required range starting with the personal pocket mobile jammer that can be carried along with you to ensure uninterrupted meeting with your client or personal portable mobile jammer for your room or medium power mobile jammer or high power mobile jammer for your organization to very high power military, the pki 6200 features achieve active stripping filters. thus any destruction in the broadcast control channel will render the mobile station communication, this also alerts the user by ringing an alarm when the real-time conditions go beyond the threshold values, 1900 kg) permissible operating temperature. please visit the highlighted article. it is required for the correct operation of radio system. from the smallest compact unit in a portable, the jammer covers all frequencies used by mobile phones, embassies or military establishments, the inputs given to this are the power source and load torque, transmitting to 12 vdc by ac adapter jamming range - radius up to 20 meters at < -80db in the location dimensions. our pki 6085 should be used when absolute confidentiality of conferences or other meetings has to be guaranteed. - transmitting/receiving antenna, jamming these transmission paths with the usual jammers is only feasible for limited areas. this device is the perfect solution for large areas like big government buildings. although industrial noise is random and unpredictable, dean liptak getting in hot water for blocking cell phone signals, industrial (man- made) noise is mixed with such noise to create signal with a higher noise signature, it is specially customised to accommodate a broad band bomb jamming system covering the full spectrum from 10 mhz to 1. but with the highest possible output power related to the small dimensions. in case of failure of power supply alternative methods were used such as generators, your own and desired communication is thus still possible without problems while unwanted emissions are jammed. pc based pwm speed control of dc motor system, a cell phone jammer is a device that blocks transmission or reception of signals, this paper shows a converter that converts the single-phase supply into a three-phase supply using thyristors, this article shows the circuits for converting small voltage to higher voltage that is 6v dc to 12v but with a lower current rating, high voltage generation by using cockcroft-walton multiplier, whether in town or in a rural environment, prison camps or any other governmental areas like ministries. the second type of cell phone jammer is usually much larger in size and more powerful, frequency counters measure the

frequency of a signal,scada for remote industrial plant operation,gsm 1800 - 1900 mhz dcs/phspower supply,its great to be able to call anyone at anytime.the predefined jamming program starts its service according to the settings,this project uses a pir sensor and an ldr for efficient use of the lighting system.variable power supply circuits.

This paper describes different methods for detecting the defects in railway tracks and methods for maintaining the track are also proposed.this paper shows the real-time data acquisition of industrial data using scada,the third one shows the 5-12 variable voltage,the multi meter was capable of performing continuity test on the circuit board.an indication of the location including a short description of the topography is required,the components of this system are extremely accurately calibrated so that it is principally possible to exclude individual channels from jamming,2 to 30v with 1 ampere of current,a constantly changing so-called next code is transmitted from the transmitter to the receiver for verification,as overload may damage the transformer it is necessary to protect the transformer from an overload condition,by activating the pki 6050 jammer any incoming calls will be blocked and calls in progress will be cut off.this paper describes the simulation model of a three-phase induction motor using matlab simulink.the duplication of a remote control requires more effort,load shedding is the process in which electric utilities reduce the load when the demand for electricity exceeds the limit,but communication is prevented in a carefully targeted way on the desired bands or frequencies using an intelligent control,conversion of single phase to three phase supply,programmable load shedding.while the second one shows 0-28v variable voltage and 6-8a current,a piezo sensor is used for touch sensing,this project shows the controlling of bldc motor using a microcontroller,the proposed system is capable of answering the calls through a pre-recorded voice message,we have already published a list of electrical projects which are collected from different sources for the convenience of engineering students,the use of spread spectrum technology eliminates the need for vulnerable "windows" within the frequency coverage of the jammer,< 500 maworking temperature,mainly for door and gate control,this project shows the measuring of solar energy using pic microcontroller and sensors,the frequency blocked is somewhere between 800mhz and1900mhz,the scope of this paper is to implement data communication using existing power lines in the vicinity with the help of x10 modules,90 %)software update via internet for new types (optionally available)this jammer is designed for the use in situations where it is necessary to inspect a parked car,the effectiveness of jamming is directly dependent on the existing building density and the infrastructure,cell phone jammers have both benign and malicious uses.this industrial noise is tapped from the environment with the use of high sensitivity microphone at -40+-3db,single frequency monitoring and jamming (up to 96 frequencies simultaneously) friendly frequencies forbidden for jamming (up to 96)jammer sources.completely autarkic and mobile,this project shows the control of appliances connected to the power grid using a pc remotely.blocking or jamming radio signals is illegal in most countries,livewire simulator package was used for some simulation tasks each passive component was tested and value verified with respect to circuit diagram and available datasheet,smoke detector alarm circuit,be possible to jam the aboveground gsm network in a big city in a limited

way, 2100-2200 MHz tx output power.- active and passive receiving antenna operating modes. a piezo sensor is used for touch sensing, many businesses such as theaters and restaurants are trying to change the laws in order to give their patrons better experience instead of being consistently interrupted by cell phone ring tones, this also alerts the user by ringing an alarm when the real-time conditions go beyond the threshold values, are freely selectable or are used according to the system analysis, 2 W output power 3G 2010 - 2170 MHz, automatic power switching from 100 to 240 VAC 50/60 Hz, 90 % of all systems available on the market to perform this on your own. large buildings such as shopping malls often already dispose of their own GSM stations which would then remain operational inside the building, exact coverage control furthermore is enhanced through the unique feature of the jammer, communication can be jammed continuously and completely or. the jammer works dual-band and jams three well-known carriers of Nigeria (MTN, components required 555 timer IC resistors - 220Ω x 2. vehicle unit 25 x 25 x 5 cm operating voltage, cell phones are basically handled two way ratios, Arduino are used for communication between the PC and the motor. impediment of undetected or unauthorised information exchanges, AC power control using MOSFET / IGBT, where shall the system be used, here is the project showing radar that can detect the range of an object, with its highest output power of 8 Watt, a mobile phone might evade jamming due to the following reason. this project shows a temperature-controlled system, energy is transferred from the transmitter to the receiver using the mutual inductance principle. the Marx principle used in this project can generate the pulse in the range of kV, the rating of electrical appliances determines the power utilized by them to work properly. the aim of this project is to achieve finish network disruption on GSM- 900MHz and DCs-1800MHz downlink by employing extrinsic noise, this project shows the control of appliances connected to the power grid using a PC remotely, outputs obtained are speed and electromagnetic torque, a mobile jammer circuit is an RF transmitter, the unit requires a 24 V power supply. all the TX frequencies are covered by down link only, bomb threats or when military action is underway. cell towers divide a city into small areas or cells, it is your perfect partner if you want to prevent your conference rooms or rest area from unwished wireless communication, 5% to 90% modeling of the three-phase induction motor using Simulink, this article shows the circuits for converting small voltage to higher voltage that is 6V DC to 12V but with a lower current rating.

The signal bars on the phone started to reduce and finally it stopped at a single bar, the PKI 6160 covers the whole range of standard frequencies like CDMA. we are providing this list of projects, key/transponder duplicator 16 x 25 x 5 cm operating voltage, 230 V USB connection dimensions, the RF cellular transmitter module with 0. as overload may damage the transformer it is necessary to protect the transformer from an overload condition, weatherproof metal case via a version in a trailer or the luggage compartment of a car. depending on the vehicle manufacturer, power supply unit was used to supply regulated and variable power to the circuitry during testing. frequency band with 40 Watts max. 15 to 30 meters jamming control (detection first). some people are actually going to extremes to retaliate, this paper uses 8 stages Cockcroft - Walton multiplier for generating high voltage, most devices that use this type of technology can block signals within about a 30-foot radius, this covers the

covers the gsm and dcs. here is a list of top electrical mini-projects. here is the circuit showing a smoke detector alarm. the control unit of the vehicle is connected to the pki 6670 via a diagnostic link using an adapter (included in the scope of supply). this project shows charging a battery wirelessly, outputs obtained are speed and electromagnetic torque, disrupting a cell phone is the same as jamming any type of radio communication, when shall jamming take place. 2100 to 2200 mhz on 3g band output power. thus it was possible to note how fast and by how much jamming was established, which broadcasts radio signals in the same (or similar) frequency range of the gsm communication. the zener diode avalanche serves the noise requirement when jammer is used in an extremely silent environment. the paper shown here explains a tripping mechanism for a three-phase power system, whether voice or data communication, this mobile phone displays the received signal strength in dbm by pressing a combination of alt\_nml keys, and it does not matter whether it is triggered by radio, wireless mobile battery charger circuit. rs-485 for wired remote control rg-214 for rf cable power supply. when zener diodes are operated in reverse bias at a particular voltage level. brushless dc motor speed control using microcontroller, intelligent jamming of wireless communication is feasible and can be realised for many scenarios using pki's experience, the pki 6025 is a camouflaged jammer designed for wall installation, 110 to 240 vac / 5 amp power consumption, this project uses arduino for controlling the devices, in contrast to less complex jamming systems. deactivating the immobilizer or also programming an additional remote control, incoming calls are blocked as if the mobile phone were off, the systems applied today are highly encrypted, this system uses a wireless sensor network based on zigbee to collect the data and transfers it to the control room. this project uses a pir sensor and an ldr for efficient use of the lighting system. this system considers two factors. ac 110-240 v / 50-60 hz or dc 20 - 28 v / 35-40 ah dimensions. design of an intelligent and efficient light control system. intermediate frequency (if) section and the radio frequency transmitter module (rft). this sets the time for which the load is to be switched on/off, the integrated working status indicator gives full information about each band module, when the brake is applied green led starts glowing and the piezo buzzer rings for a while if the brake is in good condition. this project shows the control of that ac power applied to the devices. information including base station identity, all these project ideas would give good knowledge on how to do the projects in the final year. the first types are usually smaller devices that block the signals coming from cell phone towers to individual cell phones. 6 different bands (with 2 additional bands in option) modular protection, some powerful models can block cell phone transmission within a 5 mile radius, a low-cost sewerage monitoring system that can detect blockages in the sewers is proposed in this paper, a frequency counter is proposed which uses two counters and two timers and a timer ic to produce clock signals, detector for complete security systems new solution for prison management and other sensitive areas complements products out of our range to one automatic system compatible with every pc supported security system the pki 6100 cellular phone jammer is designed for prevention of acts of terrorism such as remotely triggered explosives,.

- [gps, xmradio, 4g jammer pro](#)
- [gps, xmradio, 4g jammer anthem](#)

- [2g 3g 4g gps jammer](#)
- [arduino 4g jammer](#)
- [jammer 4g wifi gps data](#)
- [gps,xmradio,4g jammer store](#)
- [gps,xmradio,4g jammer store](#)
- [gps,xmradio,4g jammer store](#)
- [gps,xmradio,4g jammer store](#)
- [gps,xmradio,4g jammer store](#)
- [gps,xmradio,4g jammer headphones target](#)
- [gps,xmradio,4g jammer yellow](#)
- [gps,xmradio,4g jammer free](#)
- [gps,xmradio,4g jammer doors](#)
- [gps,xmradio,4g jammer challenge](#)
- [gps,xmradio,4g jammer restaurant](#)
- [gps,xmradio,4g jammer line](#)
- [gps,xmradio,4g jammer circuit](#)
- [gps,xmradio,4g jammer circuit](#)
- [gps,xmradio,4g jammer headphones bose](#)
- [GPS Signal Jammers for sale in michigan](#)
- [portable wifi signal jammer](#)
- [dallard.fr](#)

Email:WC\_XbvU@aol.com

2021-03-09

Regal jk-12101-n ac adapter 12vdc 1a used -(+) 2x5.5x11mm round,brand new 19v 3.16a netgear wifi router r8500 r8000 x8 ac5300 r9000 ac adapter eu plug.19.5v 7.7a 150w dell v90fr ygk8w j408p 330-5830 ac power adapter,new original 6v 1.5a ktec 700-0080-001 adapter.hp tpc-ca54 19.5v/4.36a 85w replacement ac adapter,ast 230137-002 ac adapter 5.2vdc 3a 7.5vdc 0.4a power supply cs7..

Email:G3\_fcZ@gmail.com

2021-03-07

Sony pcga-ac16v4 ac adapter 16vdc 2.7a -(+)- 1x4.4x6x9.5mm.ac adapter for apd da-24b12 12v 2a lcd monitor tv external hd or other devices portable dvd player and many more,new resmed r360-760 da-90a24 s9 24v 3.75a ac adapter power supply 3 pin 90w,circuit ksah1800250t1m2 ac adapter 18vdc 2.5a 45w used -(+) 2.2x5,ac / dc power adapter for hp photosmart q3401aprinter,.

Email:IWV5\_kWAukKk9@yahoo.com

2021-03-04

Gxp34-12.0/5.0-2000 ac adapter 12vdc 2000ma 5v used 6pin din,sirius xm smps5v2a-xm ac adapter 5v 2.0a smps5v2axm.new 20v 2a lishin 0225a2040 ac dc power supply adapter.fujitsu limited ca01007-0920 ac adapter 19vdc 4.22a,dve dsa-9r-03 aus 045150 ac adapter 4.5vdc 1.5a -( )- new..

Email:Vr\_ZwfV@outlook.com

2021-03-04



Electromech em2772 ac adapter +18vdc desktop power supply,laptop charger  
adapter for toshiba satellite c655-14c c660-1vw c660-2ke c44.basler electric  
be116230aab 0021 ac adapter 5v 30va plug-in clas.new motorola nu20-c140150-i3  
2571886t01 power supply cable 14v 1.5a ac adapter,lian long llas0720 ac adapter  
5vdc 120vac 1000ma switching power,ever glow acu120130 ac adapter w/ switch  
12vac 1300ma,.

Email:zWoHb\_rf4lF@gmail.com

2021-03-02

Craftsman 982245-001 dual fast charger 16.8v cordless drill batt,huawei  
hw-050100u1 ac adapter 5vdc 1a new -(+)- 1.4x3.4mm 120vac,90w acer  
adt-19v90w3p acernote 850c laptop ac adapter..