Chapter 1 : CiteSeerX â€” Citation Query GPS: Theory and Practice

*Global Positioning System: Theory and Practice [B. Hofmann-Wellenhof, H. Lichtenegger, J. Collins] on calendrierdelascience.com *FREE* shipping on qualifying offers. This new edition adds the most recent advances in GPS technology, although the overall structure essentially conforms to the former editions.*

We describe a dataset of several thousand calibrated, time-stamped, geo-referenced, high dynamic range color images, acquired under uncontrolled, variable illumination conditions in an outdoor region spanning several hundred meters. The image data is grouped into several regions which have little The image data is grouped into several regions which have little mutual inter-visibility. For each group, the calibration data is globally consistent on average to roughly five centimeters and 0. All image, feature and calibration data is available for interactive inspection and downloading at http: Show Context Citation Context We reexpress global coordinates wit Most current methods for Some recent systems have incorporated surveying by users. Through deployment of an organic location system in our nine-story building, which contains nearly 1, distinct spaces, we evaluate new algorithms for addressing these challenges. We describe the use of Voronoi regions for conveying uncertainty and reasoning about gaps in coverage, and a clustering method for identifying potentially erroneous user data. Our algorithms facilitate rapid coverage while maintaining positioning accuracy comparable to that achievable with survey-driven indoor deployments. Much of the research into alternatives to GPS has converged on methods that rely on existing wireless and cel Wireless Sensor Networks and Apps , " We consider the problem of synchronization of all clocks in a sen-sor network, in the regime of asymptotically high node densities. We formulate this problem as one in which all clocks must line up with the clock of an arbitrary node in the network of course without assuming that this clock can be We formulate this problem as one in which all clocks must line up with the clock of an arbitrary node in the network of course without assuming that this clock can be observed everywhere in the network, nor assuming that this node has any special hardwareâ€"this node could be any. We give a state-space description for the gen-eration of observable data as a function of the ideal clock, and we derive an optimal estimator for determining the state of the ideal clock. A salient feature of our approach is that nodes collaborate to generate an aggregate waveform that can be observed simulta-neously by all nodes, and that contains enough information to syn-chronize all clocks. We present some discussion of related work in Section 5, and concluding remarks in Section 6. The contents of this report reflect the views of the authors who are responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the State of California. This report does not constitute a standard, specification, This report does not constitute a standard, specification, or regulation. Finally, we provide suggestion for improvement. PN signals provide excellent accuracy in range measurement due to their correlation and autocorrelation properties. However, a system such as GPS may not be the right solution for automated vehicles Reliable broadcast of safety messages in vehicular ad hoc networks by Farzad Farnoud, Shahrokh Valaee - in Proc. Abstractâ€"Broadcast communications is critically important in vehicular networks. Many safety applications need safety warning messages to be broadcast to all vehicles present in an area. We present a detailed mathematical analysis for obtaining the probability of success and the average delay. We show, by analysis and simulations, that the proposed protocol outperforms existing repetition-based ones and provides reliable broadcast communications and can reliably deliver safety messages under load conditions deemed to be common in vehicular environments. Our focus in this work is on designing a medium access protocol that is capable of delivering position information messages, as well as other data. The principal novelty of our system is its organic nature; it builds signal strength maps from the natural mobili The principal novelty of our system is its organic nature; it builds signal strength maps from the natural mobility and lightweight contributions of ordinary users, rather than dedicated effort by a team of site surveyors. Realizing a working system deployment required three novel elements: We describe an experimental deployment of our method in a nine-story building with more than 1, distinct spaces served by more than wireless access points. Users C and D need not contribute location data. Other methods have emerged to support indoor location discovery e. Like GPS, indoor location-determination methods require som Abstractâ€"Many indoor localization methods are based on the association of However, signal variation due to device heterogeneity may degrade localization performance. We analyze the diversity of those signal characteristics pertinent to indoor localization â€" signal strength and AP detection â€" as measured by a variety of We first analyze signal strength diversity, and show that pairwise linear transformation alone does not solve the problem. We propose kernel estimation with a wide kernel width to reduce the difference in probability estimates. We also investigate diversity in access point detection. We demonstrate that localization performance may degrade significantly when AP detection rate is used as a feature for localization, and correlate the loss of performance to a device dissimilarity measure captured by Kullback-Leibler divergence. Based on this analysis, we show that using only signal strength, without incorporating negative evidence, achieves good localization performance when devices are heterogeneous. This failure typically occurs indoors, but may happen outdoors as well, Iltis, Senior Member " A space-time adaptive processing STAP algorithm for delay tracking and acquisition of the GPS signature sequence with interference rejection capability is developed. The interference can consist of both broadband and narrowband jammers, and is mitigated in two steps. The narrowband jammers are mod The narrowband jammers are modeled as vector autoregressive VAR processes and rejected by temporal whitening. The spatial nulling is implicitly achieved by estimating a sample covariance matrix and feeding its inverse into the extended Kalman filter EKF. The EKF estimates of the code delay and the fading channel are used for a t-test for acquisition detection. Computer simulations demonstrate robust performance of the algorithm in severe jamming, and also show that the algorithm outperforms the conventional delay-locked loop DLL. Manuscript received November 20, ; revised August 7, ; released for publication September 30, Summary , " A swept tone jamming signal is modeled as an autoregressive AR process and estimated jointly with the timing delay. A novel Mean-Value Theorem Particle Filter MVT-PF is applied to address the highly nonlinear measurement model and its performance is compared to that of conventional nonlinear estimation algorithms. Typically, the timing phase of the pseudorandom noise sequence is first acquired coarsely by means of a correlation technique and then accurately tracked using a delay-locked loop DLL [2]. The growing use of real time high accuracy Global Positioning System GPS techniques has resulted in an increase in the number of critical decisions made on the basis of a GPS derived position. When making these Powered by:

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In my opinion, the knowledge ofthe three authors should cover the wide spectrum of GPS. Dr. Lichtenegger is a geodesist with broad experience in both theory and practice. He has specialized his research to geodetic astronÂ- omy including orbital theory and geodynamical phenomena.

Double to Single Precision Float Conversion: One of the many challenges that arouse right as we were extracting the raw satellite data was that some of the ephemeris parameters which the THALES DG14 receiver sent out were double precision floats 64 bit while the Code Vision AVR is restricted to single precision 32 bit floating point arithmetic. This meant that unlike the other parameters which were easily parsed using the methods of the previous subsection these ephemerides needed to be converted before we could use them. The IEEE single precision floating point number consists of a sign bit S , followed by eight exponent bits E , the 32 bit word is completed by 23 fraction F bits see Figure IEEE single precision floating point representation Figure Converting the exponent bits of the floating point value is a quite more complex. But notice that we still have eleven exponent bits and the single precision float must have only eight. This final conversion is achieved by subtracting and adding to offset the value leaving only eight 0 bits followed by eight exponent bits. This result is then casted into a 32 bit unsigned long format, and shifted left by 23 bits to set the bit in the correct position. We call this new word E. Single precision floating point Exponent bits To convert the fraction bits we simple took the first 23 of the original 52 bits in the double precision fraction bits. The values are assigned to temporary variables and casted into unsigned long format and later shifted left by 28, 20, 16, and 4, respectively see Figure 13 below. These four 32 bit words are then concatenated and to guarantee that only the most significant 23 bits are used we AND the result of the concatenation with 0b Finally, to set the bits in the correct position we shift the bits in this new F word to the right by 9. Single precision float fraction bits The S, E, and F words are then concatenated to obtain the single precision floating point value V. Single precision float complete bit representation Satellite Tracking: Figure 15 shows a screenshot of the Java application developed by Roberto Torralbas that was used to display satellites on a world map. The program consist of tabs to also allow display of some of the raw data extracted ephemerides, pseudoranges and the calculated satellite coordinates as well as the navigation solution. Notice that in the screenshot there are two markers white ,and red of different colors currently tracking satellite 6 and Satellite 26 we are given the ECEF coordinate by the DG14 receiver and the pseudoranges and is the one we use to calculate the navigational solution. This caused for us not to have pseudoranges for some of the satellites positions we were calculating and therefore had to use their calculations which came with the corresponding pseudoranges. We are updating the satellite calculation about every second. We will not enter in detail of the implementation of the user interface in Java, but if interested in writing your own , please refer to www. Essentially the application serves as a custom, sophisticated version of HyperTerminal. The problem arises with the elliptical shape of the orbit, which does not allow the True Anomaly to be calculated as trivially is if we were dealing with circular orbit for which the True Anomaly would had been a linear function of time. Theory and Practice by B. Hofmann-Wellenhof to see more of the theory as its beyond the scope of this paper to explain terms such as Mean Anomaly and Eccentric Anomaly which are used to derive the equations of motion. Once the ephemerides and the pseudorange have been extracted for every satellite and we know the ECEF coordinates for at least four satellites it is time to calculate the navigation solution. The technique implemented in this project is based on the code range determined by pseudoranges. By the code range we mean the pseudorange obtained at a known time tagged as the receiver time. The pseudorange from satellite j to the receiver measured at time t is. The pseudo range may be represented mathematically as: The later is the true distance from the jth satellite at to the receiver at , or just simply: If we plug the equation for the true range into that of the pseudo range and rearrange it so that the left side has the known measured values and the four unknown values X, Y, Z, are on the right then we are left with: Since we have one equation like this for every satellite that we are tracking then we only need to track four satellites to have four equations and hence solve for our four unknowns. The Newton-Raphson method which we previously explained was used to solve the equation above. We first chose an initial guess which differs from the true position by. We need to calculate these differences in order to correct this initial guess as to approach the true position. We begin by performing a first-order Taylor expansion on expanding of the actual range: This equation is then substituted into that of the pseudorange and rearranged moving all known value to the left and leaving the unknowns on the right to obtain: Given that we need four satellite hence four sets of equations to solve for the four unknowns it is most convenient to use the following matrix notation: This linear system has a solution which is calculated using the Gauss-Jordan Elimination method which we described earlier. The differences are then added to the initial guess to calculate de actual position. To improve the accuracy of this method it must be repeated several times, and at each point the previous actual position becomes the new guess position.

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Furthermore, the augmentation of GPS by satellite-based and ground-based systems leading to future Global Navigation Satellite Systems (GNSS) is discussed. Although developed as a classroom text, the book is also useful as a reference source for professional surveyors and other GPS users.

The advent of technology has also increased the traffic hazards and the road accidents take place frequently which causes huge loss of life and property because of the poor emergency facilities. Our project will provide an optimum solution to this draw back. An accelerometer can be used in a car alarm application so that dangerous driving can be detected. It can be used as a crash or rollover detector of the vehicle during and after a crash. With signals from an accelerometer, a severe accident can be recognized. According to this project when a vehicle meets with an accident immediately Vibration sensor will detect the signal or if a car rolls over, and Micro electro mechanical system MEMS sensor will detects the signal and sends it to ARM controller. Then after conforming the location necessary action will be taken. This paper is useful in detecting the accident precisely by means of both vibration sensor and Micro electro Mechanical system MEMS or accelerometer. Life of the people is under high risk. This is because of the lack of best emergency facilities available in our country. An automatic alarm device for vehicle accidents is introduced in this paper. This design is a system which can detect accidents in significantly less time and sends the basic information to first aid centre within a few seconds covering geographical coordinates, the time and angle in which a vehicle accident had occurred. This alert message is sent to the rescue team in a short time, which will help in saving the valuable lives. A Switch is also provided in order to terminate the sending of a message in rare case where there is no casualty, this can save the precious time of the medical rescue team. When the accident occurs the alert message is sent automatically to the rescue team and to the police station. The message is sent through the GSM module and the location of the accident is detected with the help of the GPS module. The accident can be detected precisely with the help of both Micro electro mechanical system MEMS sensor and vibration sensor. This application provides the optimum solution to poor emergency facilities provided to the roads accidents in the most feasible way. Complete layout of the whole set up will be drawn in form of a block diagram. A piezoelectric sensor will first sense the occurrence of an accident and give its output to the microcontroller. The GPS detects the latitude and longitudinal position of a vehicle. The latitudes and longitude position of the vehicle is sent as message through the GSM. Whenever an accident has occurred the position is detected and a message has been sent to the pre-saved number. It has its own deterministic character. Hence no need to waste time by manual operation and transportation. Hence it is considered as highly efficient communication through the mobile which will be useful in industrial controls, automobiles, and appliances which would be controlled from anywhere else. It is also highly economic and less expensive; hence GSM is preferred most for this mode of controlling. Tracking systems enable a base station to keep track of the vehicles without the intervention of the driver where, as navigation system helps the driver to reach the destination. Whether navigation system or tracking system, the architecture is more or less similar. When an accident occurred in any place then GPS system tracks the position of the vehicle and sends the information to the particular person through GSM by alerting the person through SMS or by a call. The research work is going on for tracking the position of the vehicle even in dark clumsy areas where there is no network for receiving the signals. Hence with this project implementation we can detect the position of the vehicle where the accident has occurred so that we can provide the first aid as early as possible. This simplicity results in a high instruction throughput and impressive real-time interrupt response from a small and cost-effective processor core. Pipeline techniques are employed so that all parts of the processing and memory systems can operate continuously. Typically, while one instruction is being executed, its successor is being decoded and a third instruction is being fetched from memory. The ARM7TDMI-S processor also employs a unique architectural strategy known as Thumb, which makes it ideally suited to high-volume applications with memory restrictions, or applications where code density is an issue. The key idea behind Thumb is that of a super-reduced instruction set. A piezoelectric sensor is used as accident detection sensor. A piezoelectric transducer has very high DC output impedance and can be modeled as a proportional voltage source and filter network. The voltage V at the source is directly proportional to the applied force, pressure, or strain. The output signal is then related to this mechanical force as if it had passed through the equivalent circuit. These receivers have a typical threshold of 1. HDU is used in the project. It can be configured to drive a dot-matrix liquid crystal display under the control of a 4- or 8-bit microprocessor. A single HDU can display up to one 8-character line or two 8-character lines. The HDU character generator ROM is extended to generate 5X8 dot character fonts and 32 5X10 dot character fonts for a total of different character fonts. It is a simple variable resistor preset with linear characteristics. This is used to adjust the contrast of the display. Reset control circuit is used to reset the microcontroller at any stage of work. This section also comprises of auto power on reset. If the reset switch is pressed, the microcontroller restarts and the function will start from the beginning. This circuit is connected to 9th pin of microcontroller. A crystal is used to supply clock frequency to the microcontroller. The clock frequency is Despite the "oddball" value, these crystals are readily available and commonly used.