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Identifying the Available Parking Area by the Assistance of Parked-Vehicle

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ABSTRACT

By increasing auto demands, efficient parking management is by no means less important than road traffic congestion control. Identification of parking available in metropolitan areas during the peak hours is most complex process for the driving people. This is due to shortages of parking spaces within the limited land areas of the city centers in many metropolises. Identification of parking available in metropolitan areas during the peak hours is most complex process for the driving people. It requires a certain level of human interference or interaction to initiate the communication between the devices or between the system. The problem of parking information identification can be solved by collecting the information about vehicle parked in the parking area. The solution is proposed to solve the problem of identifying the parking lot with the assistance of parked vehicles in the parking area. To achieve the localization, a GPS module is installed on the device to actively send ranging requests to some fixed modules at known positions. Due to emerging of large set vehicles and limited parking area,identifying the availability of the vehicle parkinglot is becoming critical problem. The VANET Technology oriented model can assist the vehicles to localize the parking information in an efficient way. The system is designed as completely automated and its require a certain level of human interference or interaction to initiate the communication between the devices or between the system. The localization and adaptive parking structure formation with parking reservation is applied to detect the parking area. The direction to the destination coordinates are routed using the simple multi-diversion routing algorithm.

Keywords : Dijkstra Algorithm , GSM system, AoA, TDOA, NLOS, TDOA, DTOA, RSSI, VANET

I. INTRODUCTION

VANET

The rapid advances of VANET make it possible for a large number of vehicles to communicate efficiently. The hybrid architecture opens the door to a wide variety of promising applications, with goals ranging from improving road safety to enhancing people's daily parking experiences. Such assistance systems call for reliable localization methods to track available parking spaces and guide drivers to the available parking spaces.A VANET is a technology which uses moving vehicles as nodes to form an adhoc network.VANET'S is a subgroup of MANET.VANET'S are a subset of MANETs in which communication nodes are mainly vehicles. As such, this kind of network should deal with a great number of highly mobile nodes, eventually dispersed indifferent roads. In VANET's, vehicles can communicate each other V2V. Moreover, they can connect to an infrastructure V2I to get some service.

This infrastructure is assumed to be located along the roads.The vehicular networks can provide a wide variety of services, range of safety-related warning systems to improved navigation mechanisms as well as information and entertainment applications. Applications like collision alert, road surroundings warning, etc., will be classified undersafety associated applications where the main accent is on the timely broadcasting of safety critical alerts to nearby vehicles. Some challenges of VANET's are security, reliability, confidentiality in data transmission that also affects the QOS.

VANET's poses number of challenges in terms of QoS and its performance. QoS depends on numerous parameters such as bandwidth, packet delivery ratio, data latency, delay variance, etc. Security is provided by different ways like authentication, encryption, etc. In VANET's, each vehicle is equipped with an OBU which is used to communicate with other vehicles and RSU.Capability of VANET's has to provide safety and traffic management: vehicles can notify other vehicles of hazardous road conditions, traffic jamming, or rapid stops. The vehicles within a particular range can form a network and communicate with each other. Since the vehicles move with a high speed, any node can join and leave the group frequently.

The primary purpose of VANET's is to provide public safety applications such as application to save lives and also to improve the traffic control. Thus, in VANET's, each vehicle is equipped with technology to communicate with each other and also with infrastructure.The Vehicle uses the OBU for communication with other vehicles and RSU.OBU is the communication device present in the vehicle. RSU is the base stations which are placed at the critical sections of the road such as any traffic signals, road intersection, etc.In 1999, the FCC allocated a frequency spectrum for V2V and V2I wireless communication. Then DSRC was introduced that uses 5.850-5.925GHz band for public safety and private applications.

VANET's are a sub-group of the MANET.VANET's share some characteristics with general MANETs. Both VANET's and MANETs are characterized by the movement and self-organization of nodes. Because of the high nodes mobility and unreliable channel conditions, VANET'save unique characteristics such as data dissemation, data sharing and security issues. VANET's can support infotainment, traffic efficiency and most important, safety related applications.

II. METHODS AND MATERIAL

A VANET's can be seen as a specific type of MANET, in which the following characteristics appear:

1. High node mobility
2. Need for scalability of solutions due to the usual high height of VANET's.
3. Nodes do not have restrictions on their power, processing
and storage capacities.
4. Need to consider the development scenarios.

In particular, among the characteristics indicated in as unique of VANET's, we want to remark the following ones:

1. Need of trust and real-time communication.
2. Confidentiality is not required when the information is related tothe safety.
3. Need for privacy.
4. Possible access to a fixed infrastructure along the road side Existence of a central registry of vehicles, and periodic contact with it.
5. Qualified mechanisms for the exigency of the fulfillment of the law.

OBU

OBU is a wireless communication device, equipped with vehicles.Each vehicle uses the OBU for communication purpose, i.e., V2V and V2I. Once the vehicle gets started, OBU of that vehicle will be automatically switched ON. It remains active until the vehicle is turnedoff, i.e., OBU cannot be switched off separately while the vehicle is inmotion. In addition to verify the validity of the message, a VANET's participants need to verify the validity of other OBUs or RSU. OBU has an event data recorder, GPS, Forward and backward Radar, computing facilities and short range wireless interface

RSU

VANET's are a network of Vehicles and infrastructure points. In VANET's, infrastructure points are referred as RSU.RSUs are placed at certain distance on the road to provide necessary infrastructure support for network setup and communications. RSU can form a network and communicate with the vehicles within a certain range.The stay time of a vehicle in a RSU region is in the order of minutes.

Such assistance systems call for reliable localization methods to track available parking spaces and guide drivers to the available parking spaces. For example, the vehicle of interest may need to be navigated to an empty parking spot in an almost full parking lot, or to be navigated to the parking spot with convenience. In order to guide drivers to the parking spot,it is necessary to estimate the target vehicle position. While GPS iswidely used for on-road navigation,it does not work well in parking lots due to the precision of localization requirement. In many proposed solutions to this problem, the parking lot regularly communicates with the vehicle of interest through the RF signal.The navigation system in the target vehicle can estimate its position relative to the parking lot with the received RFsignal from RSUs. In this case, RSS,TOA and TDOA technologies are widely used in indoor localization.

Internet and computer geolocation can be performed by associating a geographic location with the IP address, MAC address, RFID, hardware embedded article/production number, embedded software number invoice, Wi-Fi positioning system, device fingerprint, canvas fingerprinting or device GPS coordinates, or other, perhaps self-disclosed information. Geolocation usually works by automatically looking up an IP address on a WHOIS service and retrieving the registrant's physical address.

IP address location data can include information such as country, region, city, postal/zip code, latitude, longitude and time zone. Deeper data sets can determine other parameters such as domain name, connection speed, ISP, language, proxies, company name, US DMA/MSA, NAICS codes, and home/business.At times geolocation can be more deductive, as with crowd sourcing efforts to determine the position of videos of training camps, combats, and beheadings in Syria by comparing features detected in the video with publicly available map databases such as Google Earth, as practiced by sites such as Bellingcat.

NLOS

Without NLOS mitigation,such NLOS offsets will greatly reduce the localization accuracy. Most existing NLOS mitigation methods rely on a priori statistical information,which can be expensive to collect and maintain in a dynamic environment.Thus,their applications are very limited in our specific scenarios. In contrast, the improved least median squares method uses the least median to weight all the anchors without requiring any a priori information. The anchors with high probabilityto be LOS links will be assigned larger weights and will be used to estimate the final target vehicle position. However, the computation complexity of the ILMedS method increases significantly with the number of anchors.When the number of the parked vehicles is small, it can efficiently detect the NLOS links; when the number of the parked vehicles is large, it will be too computationally complicated for the target vehicle to estimate its position, which generally only has limited computational resources.

The improved least median squares algorithm is a promising method to detect the NLOS links without any prior knowledge of the LOS and NLOS links. It divides all the anchorsinto subsets. Then the estimation with each subset is used to assign weights to the anchors in that subset. Only the anchors with significant weights will be included in the final estimation. When the number of the parked anchor cars is small, the ILMedS method can efficiently detect the NLOS links.Satellite navigation systems such as GPS or Galileo are increasingly popular and used in strategic as well as public applications. If the safety of persons or property is involved, like in civil aviation, the GPS accuracy is insufficient to be certified as the primary means of navigation. One of the solutions is to integrate the GPS withother sensors that provide a good availability such as INS and odometry.

Integrated navigation systems havebeen used intensively in many domains such as aeronautics. However, their application to the automotive industry shows a big increase due to lower cost IMU. INS is a system that delivers the position, velocity and attitude of a vehicle by exploiting the output of inertial sensors. The measurements of the inertial sensors are affected by errors due to physical limitations. The accumulation of these errors leads to the decrease of the accuracy of navigation solution. Therefore, if the error is not compensated with additional sensors, the navigation solution of INS can only be trusted during a short period of time.Nowadays, GPS is very often used as an aiding source to the INS, and the GPS/INS integrated system with goodGPS availability provides more precise dynamic positioning than a stand-alone GPS or INS.

However, GPS has a low sampling rate thus the satellite signals are not always available due to high buildings, tunnels and mountains, multi-path reflections and bad weather conditions. To achieve a high level of positioning estimation in an urban area, a new developed integration navigationsystem is detailed in this paper. This additional sensor is the odometer. All modern cars are equipped with the ABS that includes an odometer which measures wheel angular rates and estimate the traveled distance. It is an alternative to satellite-based navigation technology when the GPS measures are not available. The purpose of our work is topropose a global modeling of the GPS/INS/Odometer fusion problem with long GPS outages.The estimation of dynamic characteristics of the vehicle is solved by a KF that fuses the measurements of each sensor to estimate position, velocity and attitude of the vehicle.

In the development of web services, we often excluded embedded hardware due to lack of resources e.g., computing power and memory. There is one solution of interoperability in networking system known as Device centric SOA.This SOA have standardized interface. Power consumption and also consumption of memory will be enhanced due to communication between devices and this communication performed by web services protocols, but some limitations exist in the profile which is described by Microsoft for web services which are related to resources for constrained devices.

As there are so many researchers which are doing work on embedded mobile devices regarding WoT, but until now location aware applications are static because of model relation between places and mobile things. As mobile things are often changes their location e.g. home, office, college, etc. In web embedded devices, one of the main problems is a memory limitation, therefore it is hard for these devices to use web services widely. For this problem a research on GPS navigation system is very helpful through which devices can use geo data and geo processing through web service. Moreover, we know that everything is now connected to Internet e.g. home appliances, factory machines etc.

This revolution is increasing the vastness of the IoT. Through IoT, WoT field is becoming more and more vast and broad. In this race of things our web server has become embedded web server on internet and facilitating the world through a web browser. This internet technology can work efficiently on software and hardware as long as it is connected. Ethernet and TCP/IP protocol is the way to access any information on server. The user can access this information by using web browser. The big advantage of this is that it eliminates the need of client software.

SYSTEM ANALYSIS

REVIEW OF LITERATURE

Y. Morales et al, "DGPS, RTK-GPS and starfire DGPS performance under tree shading environments", Mar.2007.

The author proposed the LPS based approach to calculate the position of an object.

In a correlation-based method, which utilizes the correlated RSS readings that are collected from a local areato fit the theoretical log-distance propagation model. The objective is to obtain more accurate distance estimations for the wireless device, whose location belongs to that local area, based on the fitted model. Our correlation-based method refines the localization result iteratively by using the correlated RSS in the local area. It starts with a coarse-grained location estimation by using all the training data. Then, inthe subsequent iterative steps, it gradually reduces the size of the training data by just using the data that is close to the location estimate from the previous step. The iterative process stops when the estimated location falls outside of the local area where the training data comes from.

M. Gholami, et al, "A concave–convex procedure for TDOA based positioning," Apr. 2013.

In geometry, trilateration is the process of determining absolute or relative locations of points by measurement of distances, using the geometry of circles, spheres or triangles. In addition to its interest as a geometric problem, trilateration does have practical applications in surveying and navigation, including global positioning systems (GPS). In contrast to triangulation, it does not involve the measurement of angles.In two-dimensional geometry, it is known that if a point lies on two circles, then the circle centers and the two radii provide sufficient information to narrow the possible locations down to two. Additional information may narrow the possibilities down to one unique location.

Qiao, et al, "Robust coarse position estimation for TDOA localization, Dec. 2013.

In three-dimensional geometry, when it is known that a point lies on the surfaces of three spheres, then the centers of the three spheres along with their radii provide sufficient information to narrow the possible locations down to no more than two (unless the centers lie on a straight line).The intersections of the surfaces of three spheres is found by formulating the equations for the three sphere surfaces and then solving the three equations for the three unknowns, x, y, and z. To simplify the calculations, the equations are formulated so that the centers of the spheres are on the z = 0 plane. Also, the formulation is such that one center is at the origin, and one other is on the x-axis. It is possible to formulate the equations in this manner since any three non-collinear points lie on a unique plane. After finding the solution, it can be transformed back to the original three dimensional Cartesian coordinate system.

T. Qiao et al, "Improved least median of squares localization for non-line-of-sight mitigation," Aug.2014.

Multilateration is a common technique in radio navigation systems, where it is known as hyperbolic navigation. These systems are relatively easy to construct as there is no need for a common clock, and the difference in the signal timing can be measured visibly using an oscilloscope.Multilateration is a proven technology that has been in use for many decades. It was developed for military purposes to accurately locate aircraft — many of which did not wish to be "seen" — by using a method known as Time Difference of Arrival (TDOA).Multilateration employs a number of ground stations, which are placed in strategic locations around an airport, its local terminal area or a wider area that covers the larger surrounding airspace.

B. L. Le, et al, "Mobile location estimator with NLOS mitigation using Kalman filtering," Mar.2003.

Geolocation is the identification of the real-world geographic location of an object, such as a radar source, mobile phone or Internet-connected computer terminal. Geolocation may refer to the practice of assessing the location, or to the actual assessed location. Geolocation is closely related to the use of positioning systems but may be distinguished from it by a greater emphasis on determining a meaningful location (e.g. a street address) rather than just a set of geographic coordinates. In the field of animal biology and ecology, the word geolocation is also used to refer to the process of inferring the location of a tracked animal based, for instance, on the time history of sunlight brightness or the water temperature and depth measured by an instrument attached to the animal. Such instruments are commonly called archival tags (including microchip implants, Pop-up satellite archival tags, and data storage tags) or dataloggers.

M. Boban,et al,"Impact of vehicles as obstacles in vehicular ad hoc networks," Jan. 2011.

Using advanced computer processing techniques, these individual time differences allow an aircraft's position to be precisely calculated.Multilateration requires no additional avionics equipment, as it uses replies from Mode A, C and S transponders, as well as military IFF and ADS-B transponders. Furthermore, while the radar and multilateration "targets" on a controller's screen are identical in appearance, the very high update rate of the multilateration-derived targets makes them instantly recognizable by their smooth movement across the screen. A screen displaying multilateration information can be set to update as fast as every second, compared with the 4 - 12 second position "jumps" of the radar-derived targets.The coordinates and distance to a point can be found by calculating the length of one side of a triangle, given measurements of angles and sides of the triangle formed by that point and two other known reference points.The following formula apply in flat or Euclidean geometry. They become inaccurate if distances become appreciable compared to the curvature of the Earth, but can be replaced with more complicated results derived using spherical trigonometry.

Y. Shen et al, "On the accuracy of localization systems using wide band antenna arrays," Jan. 2010.

Radiolocating is the process of finding the location of something through the use of radio waves. It generally refers to passive uses, particularly radar—as well as detecting buried cables, water mains, and other public utilities. It is similar to radionavigation, but radiolocation usually refers to passively finding a distant object rather than actively one's own position. Both are types of radiodetermination. Radiolocation is also used in real-time locating systems (RTLS) for tracking valuable assets.One technique measures a distance by using the difference in the power of the received signal strength (RSSI) as compared to the originating signal strength. Another technique uses the time of arrival (TOA), when the time of transmission and speed of propagation are known. Combining TOA data from several receivers at different known locations (differential time of arrival, DTOA) can provide an estimate of position even in the absence of knowledge of the time of transmission. The angle of arrival (AOA) at a receiving station can be determined by the use of a directional antenna, or by differential time of arrival at an array of antennas with known location. AOA information may be combined with distance estimates from the techniques previously described to establish the location of a transmitter or backscatterer.

N. Akhtar,et al, "Vehicle mobility and communication channel models for realistic and efficient highway VANET simulation,"Jan.2015.

Use of RSSI to locate a transmitter from a single receiver requires that both the transmitted (or backscattered) power from the object to be located are known, and that the propagation characteristics of the intervening region are known. In empty space, signal strength decreases as the inverse square of the distance for distances large compared to a wavelength and compared to the object to be located, but in most real environments, a number of impairments can occur: absorption, refraction, shadowing, and reflection. Absorption is negligible for radio propagation in air at frequencies less than about 10 GHz, but becomes important at multi-GHz frequencies where rotational molecular states can be excited. Refraction is important at long ranges (tens to hundreds of kilometers) due to gradients in moisture content and temperature in the atmosphere.

R. Ye et al, "Ultra-wideband localization with collocated receivers,"Sep.2011.

In urban, mountainous, or indoor environments, obstruction by intervening obstacles and reflection from nearby surfaces are very common, and contribute to multipath distortion: that is, reflected and delayed replicates of the transmitted signal are combined at the receiver. Signals from different paths can add constructively or destructively: such variations in amplitude are known as fading. The dependence of signal strength on position of transmitter and receiver becomes complex and often non-monotonic, making single-receiver estimates of position inaccurate and unreliable. Multilateration using many receivers is often combined with calibration measurements ("fingerprinting") to improve accuracy.TOA and AOA measurements are also subject to multipath errors, particularly when the direct path from the transmitter to receiver is blocked by an obstacle. Time of arrival measurements are also most accurate when the signal has distinct time-dependent features on the scale of interest.

M. Ferreira et al, "Self-automated parking lots for autonomous vehicles based on vehicular ad hoc networking,"Jun. 2014.

For example, to create a pulse of about 1 ns duration, roughly sufficient to identify location to within 0.3 m (1 foot), a bandwidth of roughly 1 GHz is required. In many regions of the radio spectrum, emission over such a broad bandwidth is not allowed by the relevant regulatory authorities, in order to avoid interference with other narrowband users of the spectrum. In the United States, unlicensed transmission is allowed in several bands, such as the 902-928 MHz and 2.4-2.483 GHz Industrial, Scientific, and Medical ISM bands, but high-power transmission cannot extend outside of these bands. However, several jurisdictions now allow ultrawideband transmission over GHz or multi-GHz bandwidths, with constraints on transmitted power to minimize interference with other spectrum users. UWB pulses can be very narrow in time, and often provide accurate estimates of TOA in urban or indoor environments. H. Zhao, L. Lu, C. Song, and Y. Wu,

H. Zhao, et al,"Location-aware-based intelligent parking guidance over infrastructureless VANETs,"

Mobile phone tracking is the ascertaining of the position or location of a mobile phone, whether stationary or moving. Localization may occur either via multilateration of radio signals between (several) radio towers of the network and the phone, or simply via GPS. To locate a mobile phone using multilateration of radio signals, it must emit at least the roaming signal to contact the next nearby antenna tower, but the process does not require an active call. The Global System for Mobile Communications (GSM) is based on the phone's signal strength to nearby antenna masts.
Advanced systems determine the sector in which the mobile phone is located and roughly estimate also the

distance to the base station. Further approximation can be done by interpolating signals between adjacent antenna towers. Qualified services may achieve a precision of down to 50 meters in urban areas where mobile traffic and density of antenna towers (base stations) is sufficiently high. Rural and desolate areas may see miles between base stations and therefore determine locations less precisely.

R. Lu,et al, "Spark: A new VANET-based smart parking scheme for large parking lots,"

GSM localization is the use of multilateration to determine the location of GSM mobile phones, or dedicated trackers, usually with the intent to locate the user. The location of a mobile phone can be determined in a number of ways. The location of a mobile phone can be determined using the service provider's network infrastructure. The advantage of network-based techniques (from a service provider's point of view) is that they can be implemented non-intrusively without affecting handsets. Network-based techniques were developed many years prior to the widespread availability of GPS on handsets.The accuracy of network-based techniques is both dependent on the concentration of cell base station, with urban environments achieving the highest possible accuracy, and the implementation of the most current timing methods.

C. Rohrig et al, "Indoor location tracking in non-line-of-sight environments using a IEEE 802.15.4a wireless network," Oct. 2009.

One of the key challenges of network-based techniques is the requirement to work closely with the service provider as it entails the installation of hardware and software within the operator's infrastructure. Frequently the compulsion associated with a legislative framework is required before a service provider will deploy a solution.For either geolocating or positioning, the locating engine often uses radio frequency (RF) location methods, for example Time Difference Of Arrival (TDOA) for precision. TDOA systems often utilise mapping displays or other geographic information system. When a GPS signal is unavailable, geolocation applications can use information from cell towers to triangulate the approximate position, a method that is not as accurate as GPS but has greatly improved in recent years. This is in contrast to earlier radiolocation technologies, for example Direction Finding where a line of bearing to a transmitter is achieved as part of the process.

N. Liu,et al, "PVA in VANETs: Stopped cars are not silent,"

Time of arrival (TOA or ToA), sometimes called time of flight (ToF), is the travel time of a radio signal from a single transmitter to a remote single receiver.Compared to the TDOA technique, time of arrival uses the absolute time of arrival at a certain base station rather than the measured time difference between departing from one and arriving at the other station. The distance can be directly calculated from the time of arrival as signals travel with a known velocity. Time of arrival data from two base stations will narrow a position to a position circle; data from a third base station is required to resolve the precise position to a single point. Many radiolocation systems, including GPS, use ToA.

As with TDOA, synchronization of the network base station with the locating reference stations is important. This synchronization can be done in different ways:

1. With exact synchronous clock on both sides. Inaccuracy in the clock synchronization translates directly to an imprecise location.
2. With two signals which have different frequency, hence different speed. Sound ranging to a lightning strike works this way (speed of light and sound velocity).
3. Via measurement to or triggering from a common reference point.
4. Without direct synchronization, but with compensation of clock phase differences,

Two way ranging is a cooperative method for determining the range between two radio transceiver units. When synchronization of the oscillators of the involved transmitters is not viable, hence the clocks differ, then applying the measurement as a two ways travel to the receiver and mirrored back to the transmitter compensates for some of the phase differences between the oscillators involved.

M. Boban,et al,"Impact of vehicles as obstacles in vehicular ad hoc networks,"Jan. 2011.

AoA is generally used to discover the location of pirate radio stations or of any military radio transmitter. In submarine acoustics, AoA is the method to localize objects with active or passive ranging. In optics, AoA is considered from the perspective of interferometry.Estimates are improved when the transmission characteristics of the medium is factored into the calculations. For RSSI this means electromagnetic permeability; for TOA it may mean non-line-of-sight receptions. Radiolocation is employed in a wide variety of industrial and military activities. Radar systems often, use a combination of TOA and AOA to determine a backscattering object's position using a single receiver. In Doppler radar, the Doppler shift is also taken into account, determining velocity rather than the location (though it helps determine the future location). Real Time Location Systems RTLS use calibrated RTLS, and DTOA, are commercially available. The widely used Global Positioning System (GPS) is based on TOA of signals from satellites at known positions.

M. Caliskan,et al, "Predicting parking lot occupancy in vehicular ad hoc networks,"

Initially, the purpose of any of these in mobile phones is so that the public safety answering point (PSAP) which answers calls to an emergency telephone number can know where the caller is and exactly where to send emergency services. This ability is known within the NANP (North America) as wireless enhanced 911. Mobile phone users may have the option to permit the location information gathered to be sent to other phone numbers or data networks, so that it can help people who are simply lost or want other location-based services. By default, this selection is usually turned off, to protect privacy.

EXISTING SYSTEM

A LPS is a navigation system that provides location information in all weather, anywhere within the coverage of the network, where there is an unobstructed line of sight for three or more signaling beacons of which the exact position on earth is known. A special type of LPS is the real-time locating system; which also allows real-time tracking of an object or person in a confined area such as a building. Unlike GPS or other global navigation satellite systems,LPS don't provide global coverage. Instead, they use beacons which have a limited range, hence requiring the user to be near these. Beacons include cellular base stations, Wi-Fi access points, and radio broadcast towers.

To solve this problem, this paper also incorporates an effective NLOS detection method to make the PVA based localization effective without greatly increasing the computational complexity. After estimating the range measurements from RSUs and the parked vehicles,the proposed coarse NLOS detection method is applied to filter out thea nchors which are obviously suffered from NLOS links. Then, the ILMedS method is applied on the remaining anchors for fine NLOS detection. Finally, the anchors with high probability to be LOS links are used to estimate the target vehicle position.

In contrast to the RSUs, we emphasize here a second group of anchors that include all the parked vehicles scattered in the parking lot,which can provide more range measurements to the target vehicle to improve the localization accuracy. However, different than the RSUs,the RF signal from the parked vehicles may be easily blocked by others. Even after the coarse NLOS detection, care still needs to be taken for the remaining anchors in position estimation, since the LOS pathmay still be blocked by many other objects scattered in the parking lot,such as the people, the infrastructure, etc. Without further processing,the range measurements from the remaining anchors may not be able to enhance the performance. In this case, the ILMedS method can be applied to detect the NLOS links from the remaining anchors.

When the predicted position noise variance is large, the positioning error increases since the coarse NLOS detection may filter out some LOS links. While the predicted position noise variance is small, the error curve tends to be flat and it will not greatly affect the performance.Since the range measurements from the parked vehicles may suffer from severe NLOS conditions, the existing system developes a two-step algorithm to efficiently detect the NLOS links.By introducing the simple coarse NLOS detection method, the computational complexity of the fine NLOS detection is greatly reduced.

Nowadays, local positioning systems are often used as complementary positioning technology to GPS, especially in areas where GPS does not reach or is weak, for example, inside buildings, or urban canyons.

Local positioning using cellular and broadcast towers can be used on cell phones that do not have a GPS receiver. Even if the phone has a GPS receiver, battery life will be extended if cell tower location accuracy is sufficient.

AoA measurement is a method for determining the direction of propagation of a radio-frequency wave incident on an antenna array. AoA determines the direction by measuring the TDOA at individual elements of the array -- from these delays the AoA can be calculated. Generally, this TDOA measurement is made by measuring the difference in received phase at each element in the antenna array. This can be thought of as beam forming in reverse. In beamforming, the signal from each element is delayed by some weight to "steer" the gain of the antenna array. In AoA, the delay of arrival at each element is measured directly and converted to an AoA measurement.

In trigonometry and geometry, triangulation is the process of determining the location of a point by measuring angles to it from known points at either end of a fixed baseline, rather than measuring distances to the point directly. The point can then be fixed as the third point of a triangle with one known side and two known angles. Triangulation can also refer to the accurate surveying of systems of very large triangles, called triangulation networks. Surveying error is minimized if a mesh of triangles at the largest appropriate scale is established first. Points inside the triangles can all then be accurately located with reference to it. Such triangulation methods were used for accurate large-scale land surveying until the rise of global navigation satellite systems.

Optical 3D measuring systems use this principle as well in order to determine the spatial dimensions and the geometry of an item. Basically, the configuration consists of two sensors observing the item. One of the sensors is typically a digital camera device, and the other one can also be a camera or a light projector. The projection centers of the sensors and the considered point on the object’s surface define a spatial triangle. Within this triangle, the distance between the sensors is the base band must be known. By determining the angles between the projection rays of the sensors and the basis, the intersection point, and thus the 3D coordinates, is calculated from the triangular relations.

FEASIBILITY STUDY

The development of a computer-based system is more likely plagued by scarcity of resources and difficult in delivery dates. It is both necessary and prudent to evaluate the feasibility of a project at the earliest possible time.

The feasibility studies are:

- Economic feasibility
- Operational feasibility
- Technical feasibility

Every project is feasible with unlimited resources and infinite time. Feasibility study is an evaluation of the proposed system regarding its work ability, impact on the organization, ability to meet user needs and effective use of resources. Thus when a new application is proposed it normally has to go through a feasibility study, before it is approved for further development.

ECONOMICAL FEASIBILITY

In economic feasibility whether the resources and human power apply for the purpose make enough returns have to be considered. Any system developed must be good investment for the organization. One of the most important information contained in feasibility study is economic analysis- an assessment of the economic justification for a computer based system project. Economic analysis reduces the costs for the project development and weights them against tangible and intangible benefits of the system. Additional costs incurred in the system construction, maintenance and mobilizing manpower to work on puts forward a very big challenge to the organization. Especially in the present scenario the objective is towards centralization, reduced cost of software and hardware and cutting exponential growth of the size of the organization. Cost of the proposed system is not very high when compared to the operating cost of the existing system. In the system human power is for data entry. Since the system provides very fast accurate and access and retrieval data it is economically feasible.

OPERATIONAL FEASIBILITY

This feasibility determines whether there are any major barriers in the implementation of the software and how much effort will be spend in selling and training the user staff about the proposed system. People are inherently resistant top changes and computers have been known to facilitate changes. An estimate should be made regarding the reaction the user staff is likely to have towards the development of a computerized system. Operational feasibility involves the capability of the infrastructures of a process to achieve and sustain process improvement. Management support, employee involvement and commitment are the key element required to as certain operational feasibility.
As far as the project is concerned, it means all the operational requirements of the organization and so it is perfectly operational one.

TECHNICAL FEASIBILITY

During technical feasibility, the analyst evaluates the technical merits if the system concept, at the same time collects additional information about performance, reliability, maintainability and predictability.Technical analysis begins with an assessment of the technical viability of the proposed system. The tools available for technical analysis are derived from mathematical modeling and optimization techniques, probability and statistics, queuing theory and control theory. Modeling is an effective mechanism for technical analysis of computer-based system.This system can hold and manipulate data to perform all the required functionsand so it is technically feasible.

III. RESULTS AND DISCUSSION

PROPOSED WORK:

The proposed system is the combination of smart parking and the Slot allocation with the Android application. The proposed system architecture gives the schematic of the design required to develop the system. Here we see two sub-architectures, one for the car and one for the parking area. Parking system commanded by the mobile phone with android application.

The functions are as follows:

1. Initially the slot selection is made from the mobile phone
2. Transforming request for a parking slot from the mobile using Android application
3. The PACU gets the request slot number from the mobile
4. Checks for the parking slot for availability. If it is free to go to the next stage. If the slot is not free goes to the initial state.
5. If the parking slot is free, the requested slot reserves in the parking area
6. After reserving the parking slot in the parking area, it checks for a condition if it is available.
7. If the parking slot is not free then it will go to the initial stage.

It will be displayed on the display unit that consists of seven segments in real time. The seven segment display shows the number of currently available parking lots in the parking area. In additions to that, it has a parking guidance system that can show and guide users towards a parking space. The system used image processing of recognizing number plates for operation of parking and billing system. Overall, the systems run with pre-programmed controller to make minimum human involvement in parking system and ensure access control in restricted places. A miniature model of an automated car parking system that can regulate and manage number of cars that can be parked in a given space at any given time based on the availability of parking slots.

Every time an unknown node receives a beacon packet from the mobile anchor node, the unknown node's location is bounded in the communication range of the mobile anchor node. After receiving several beacon packets from the mobile anchor node, the unknown node approximates the overlapping area by a rectangular bounding box. DOL guarantees that the actual position of the node has been always within the bounding box and considerably simplifies the computation of the bounding box.

The Static path planning scheme works well when the unknown nodes are assumed to be uniformly deployed. However, in the cases where such assumption is not valid, the path planning scheme might not be the best solution. Thus, static path planning schemes will result in long path length, long localization time and low utilization rate of the beacon messages. The mobile beacon moving according to a regular triangle with the length of its communication range first broadcasts three beacon messages. The unknown nodes that do not know their own positions then request the mobile anchor node to deliver more beacon packets.

The mobile beacon determines the movement trajectory with all requests from remaining unknown nodes with the objective of minimizing the total length of the mobile anchor node. At each step, the mobile beacon chooses the nearest target among candidate points and receives additional request messages from the new request node. The visibility binary tree is built starting from all possible paths between the robot position and the target and optimizing the structure by reducing redundant edges.No matter whether indoor or outdoor scenes of real environments, sensor nodes may be deployed randomly or in irregular monitoring areas. Thus, movement trajectories should be designed dynamically or partially according to the observable environments or distribution density of sensor nodes. The proposed method serves as a promising candidate to achieve accurate vehicle localization particularly in parking lots, the range measurements from the parked vehicles, the solution will identify the gap between the location of the vehicles in the parking lot.

The information about the identified coordinates are exchanged to the parking required vehicle using the GSM system.

Advantages:

1. Improved accuracy
2. Low latency while processing the location information
3. High speed information retrieval.

The system has following modules,

1. Setting up the RSU server.
2. Identify the location of the user device.
3. Creation of vehicle parking Structure.
4. Identification of available parking lot information.

The proposed system utilizes the Non-redundant random identifier provision algorithm by taking the user Id and time at which device is established the connection with the rsu server.The unique identifier provision algorithm which takes the user Id as input and uniformly allocates the identifier from 0. To identify the location of the user device using the GPS. After establishing the connection with RSU server, each mobile communicates with the location server using internet.Once the GPS locations are identified, then the device forward the location information to RSU server.

The GPS satellites transmit the exact time the signals are sent. The GPS can tell how far it is from each satellite. The GPS receiver also knows the exact position in the sky of the satellites, at the moment they sent their signals.

Creation of vehicle parking structure information by validating location information. The system is designed by defining the vehicle placement information and the road structure. The system considers the size of vehicle location and parking area size for defining the parking lot information.

A zone construction algorithm is used to divide the complete area into a number of individual parking lots. Parking lot division based on the size of the vehicle and number of the vehicle splitting algorithm is proposed to create the parking lot.

Structure of the parking lot with central location information about the individual parking. Identification of available parking lot information with the minimum distance. The system is to be designed to identify the parking lot information from the list of vehicles location parked in the parking area.

A shortest path Dijkstra algorithm is used to identify the available parking lot information.The distance and angle of arrival algorithm are utilized to provide the available parking lot information Based on the location of vehicle and parking available in the parking lot.Available parking lot Id and direction to route the vehicle to reach the parking kit with the distance to be travelled.

IV.CONCLUSION

Identification of parking available in metropolitan areas during the peak hours is most complex process for the driving people. This problem is raised because of the unavailability about the available space in the particular area. It requires a certain level of human interference or interaction to initiate the communication between the devices or between the system. The solution is proposed to solve the problem of identifying the parking lot with the assistance of parked vehicles in the parking area. To achieve the localization, a GPS module is installed on the device to actively send ranging requests to some fixed modules at known positions. The system is designed as completely automated and its require a certain level of human interference or interaction to initiate the communication between the devices or between the system. The localization and adaptive parking structure formation with parking reservation is applied to detect the parking area.

V. FUTURE WORK

The system can further be enhanced by providing various options. In manual systems it is nearly impossible to collect the right amount from the user according to the amount of time for which he parked his vehicle. Thus by providing automation, the system can be further enhanced by providing option for billing where the collection of fee will be totally based on the time for which the user parks his vehicle.

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