

Title of the Paper

Utilisation of Location Based Services for the benefit of Visually Handicapped People

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Utilisation of Location Based Services for the benefit of Visually Handicapped People

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Abstract

Location based services (LBS) through handy mobile devices has been getting increased attention for fulfilling developmental need. This LBS technology will not only benefit the nation economically, but will definitely help socially less privileged people like blind people. Out of 180 Million World's Visually Handicapped People, 25% of them live in India and 30,000 new blind are added every year. Hence a serious search for their normal livelihood is inevitable. With this point of view, this article finds LBS Technology as a ray of hope for visually handicapped people, as it gives a big hold for them – yes 'their position'. This paper explores different possibilities of utilizing this technology with little innovative effort, for the social benefit.

Introduction:

Great visionary of Indian space programme, Dr. Vikram Sarabhai, once said that India will be second to none in the advanced technology, not for pride but for the benefit of the masses. In this regard, advancements in the geospatial technology must help country's grass root for not only economical development but also for the social development. Geospatial applications have drawn major attention from different corners for the last 2 decades, which has been fully understood and exploited through various national projects like Wasteland mapping, Rajiv Gandhi drinking water mission, Integrated mission for sustainable development and Biodiversity assessment, to say a few. Though there are technological gap between scientific community and administrative community it will be soon eliminated within coming 10 years. There are ways by which this big knowledge gap can be eliminated by a 'capsule' approach, means 'give what they need' through a customized kiosks. Timely example for this approach is a mobile phone, which applies a complex background signal processing but to the user it is just hidden and this small kiosk is becoming an economical boom in this country and it will be a boon to some of the socially less privileged people like Visually Handicapped Person (ViHP) soon. Wedding of these two powerful technologies (Geospatial & Mobile) can bring out enormous springs down i.e., applications.

One of the emerging application of this geospatial & mobile integrated gamut is Location Based Services (LBS). "Position" is the key word in this LBS, which is acquired through a Global Position System (GPS) based technology, which in itself is another gamut of satellite based technological innovation. Position can be accumulated through a handheld GPS for making a complete spatial information and can be analysed through Geographical Information System (GIS). But in LBS we will be using an existing spatial database in the background and location of the user will be passed on that database and will be analysed as per the user query like where is the nearest bank/hotel etc., information to a mobile user. Though the LBS will take a lead role for common man, what will it provide to a blind person, if it remains of text-based or graphic based information?. Let us forget about LBS, can a blind person make a call to a particular

person from the inbuilt phone book of mobile, if there are more than 1 phone entry?. A blind person need in addition a voice based service and it should be automatic, instantaneous, whenever and wherever he/she wants. It is very sad to note here that only 200 blind people have daily access to computers, despite the availability of “Bharati Braille” software developed at Indian Institute of Technology, Chennai (Hindu, 2000). Amidst this fast changing technology, blind people have been kept stand still, without much change in their lives. Out of 180 Million World’s Visually Handicapped People, 25% of them live in India and 30,000 new blind are added every year (Brundtland, 2000). Hence a serious search for their normal livelihood is inevitable.

Basically a blind person is not aware of his position, which can easily be identified through a hand held Global Positioning System (GPS) within the accuracy level of 20m. This positional information has to be told through a text-to-voice converter. But having 20m error on one hand is “something” rather than “nothing” for a blind person, but it is a problem for technology man, as how to minimise this error so that we can pinpoint the position on the map. Once the position is confirmed accurately we can play around within the software like finding nearest road or junction or hotel or bank and many more.

LBS Technology is a ray of hope for visually handicapped people, as it gives a big hold for them – yes ‘their position’. This paper explores different possibilities of utilizing this technology with little innovative effort, for the social benefit. The key points to be analysed in order to provide a feasible system for the blind people are a) money b) accuracy and c) customized software. Keeping these points in view the paper tries to analyse and provide a possible approaches using Geo-Information and Communication technologies (GI&CT).

Approaches:

It is thought that there are many ways we can serve the ViHP. We have tried to give the solution in a very logical manner starting from simple approach to a complex approach.

Way 1: Simplest way is in each of the Pedestrian Red-light crossing provide a small box type machine having a button. If the button is pressed, it will just speak out the current position locality details and also directional details with respect to that box facing side. This approach is a very economical one and also provides a 100% accuracy, but this is a localized one, we can use with expected success in Metros and if a city is developed in a very planned and systematic manner. Since Indian urban areas are a very typical one this approach is questionable still and also this will help only when ViHP reaches upto the Red-light crossing. How will he come to that Box point?. So this approach is not an efficient one.

Way 2: Another way is split the city into different radio frequency zones like FM radio. Make a device like radio device which can detect these frequencies and each of these frequencies are resonated with a respective button on the device. So by pressing that button the device will check whether the frequency exists in that area or not? If exists then a pre-recorded voice will tell in which zone the ViHP is located. Though this approach is economical, it is not accurate. In order to make it accurate we have to look for a way to find the varying levels of intensity of broadcasting frequency and based on that variations the big zone can be again sub-zonated and respectively names can be found and shall be pre-recorded onto the device. This needs a look from a broadcast engineer and also this has to be city specific and hence needs lot of preparatory background work for implementation.

Way 3: Another answer to this question of helping a ViHP is provide a GPS to them and it should have a text to voice converter. Then the question comes here, how shall the position information from GPS which is in numeric form can be converted into a location name?. Let us assume that we develop an elementary software which will tell approximate locality name from latitude-longitude information. Next question is Accuracy. Though there will be 20meter error in a single handheld mode, let us feel that 'something is better than nothing for ViHP'. Third problem is money. This is going to be a crucial. Because cost of a GPS is very high compared to any luxury house hold item. Due to economical reason this approach cannot be used for sure.

Way 4: If cost is not a problem the Way 3 can be made more sophisticated. Make a device which has a map of that metro and GPS in built. The GPS will provide a location and a background query will pickup predefined voice database which will tell in words what is the location and how far are the nearest benchmark locality and how to reach that place by footpath. When there are 4 nearest possible places then ViHP will be asked to press the number corresponds to that place name and accordingly the Network Analyst will describe in words how to reach that place. Still Accuracy problem exists in this approach.

Way 5: Another approach is using Local Positioning System (LPS, not LBS). GPS works with space based triangulation, but LPS will work based on ground based triangulations. For this we have to setup a ground stations in metros, just like Mobile network stations. These LPS stations will emit signals regarding their position. A Device can be made which will find its position using triangulation and will tell in word where a ViHP is located and in which direction he is moving. The approach will be more accurate, except high-rise buildings interruptions on signal. Establishing such network is very much economically feasible in comparison to satellite building-launching-&-operational cost, as this approach will not only provide service to ViHP and also to any common man like for emergency services, tracking their fleets.

Way 6: The existing Mobile phone can be used in this approach. Here using the mobile network area, the user position has to be identified and using Location Management utilities along with background GIS interoperable server many information can be passed on the ears of ViHP. It is a mandate of Federal Communications Commission (FCC), USA that, all wireless carriers in the United States must provide a certain degree of accuracy in pinpointing the location of mobile users who dial 9-1-1, which is a location based emergency service application that pinpoints your location and relays it the appropriate authorities. This mandate can be used with a special permission for a ViHP that he/she is licensed to get his positional information to some degree of accuracy, which will not be displayed in numbers but will be processed in the background and only locality details will be told in words. In this way the existing mobile can be used for LBS.

Again the cost of the equipment and operational cost are two major factor to be subsidized by the Government for ViHP.

It takes around 7 to 8 months to convert normal book to Braille text book (Lison Joseph, 2003) and also only 20% of the demand is fulfilled by dedicated Government Braille printing press. If this is a case for a simple book, then it would certainly will be a little time consuming process for implementing a full fledged LBS. But once it is established only thing which has to be taken care of is the temporal changes in the spatial database elements.

Conclusion:

It is found that the developmental need is becoming so high in the developing countries. So at this juncture, it is very important for the developing countries to look for such hurdles and applicability of such technologies from the common man point of view, otherwise unplanned developments would make void in some social development later. Leaving aside the cost and accuracy issue, still lot of work is to be done for preparing high resolution geospatial database and customized GIS software in making automated location management utilities with an intelligent Semantically interoperable text to voice converter. Since dependency on mobile phones is becoming more visible and soon LBS will become all-time activity for a common man, hence putting/creating a little extra infrastructural and spatial information base would provide an extended economical benefit in the long run and also help a social cause.

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