Integration of Indoor and Outdoor Voice Based Navigation Detection using Light based Communication (Lifi) & IoT

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Abstract— **Global Positioning System [GPS] has always established a tracking application, which is similar to the implementation of actual smartphones. Even though, the existing system holds this feature but on the other hand the door navigation has its own complication because of the utilization of portable devices used in different events. This includes location based application and other features which are becoming a research priority. Whereas in the proposed system there is integration done between the indoor and outdoor navigation by tracking through Wi-Fi technology. Here, for establishing the indoor navigation Wi-Fi is utilized and when the person is out of range of the Wi-Fi network then GPS comes into the range for sharing the location. The modification done in this project provides additional features such as voice based input, which will be useful for the blind for their navigation and this improves the efficiency of the project.**

Keywords— RFID, GPS, LIFI, VLC, RSS, Wi-Fi

I. INTRODUCTION

Indoor positioning system has made it easier for people to locate places and objects in easy manner and this technique has been undertaken for research for improvement and efficiency and the techniques used under them have various solution for obstacles been faced, some types of solutions would be WLAN, RFID, UWB and other Bluetooth based system. Every system user this procedure have their own performance analysis for the credibility of exactness that system gives to the end user. Performance can be varied such as complexity robustness of a system, accuracy of a result like location and precision and even expenses can be taken into matter of fact, where each will have their set of limitations and advantages but every aspect of this system matters. GPS typically utilize repeaters to amplify and transmit the actual signals to the user in indoor this calculation are done using mathematical algorithms.

The Wi-Fi which is used in indoor determines the position based on the received signal strength. All repeaters will transmit signals simultaneously. And also utilizing invisible light source for the transmission of data from the transmitter to the receiver.

In the development part of the project the global positioning system repeaters are based on the indoor method positioning. In this the reporters utilized does not have to be synchronized and series switching repeaters are not used in this technique. The algorithm proposed allows to receive the identical repeater without actually determining the full length measurement of the repeaters. This will eliminate the impact on the dynamic positioning performance where high switching can be avoided. As in the outdoor the repeaters are not required to be connected to an antenna of any actual lengths or measurement, in outdoor the location is wide for the repeaters to receive signals form the satellite. Then the signals which are received will be repeated constantly to the indoor system with few delays but there is less deployment and installment labor required for the process.

II. LITERATURE SURVEY

The indoor/outdoor domain in an early, detailed and productive way is determined by the action that runs on the mobile phone. Based on many locations the IO sensor is functioned. [1].

Android phones is formulated to safe Guard (i.e to alert people) when in danger. Car Safe uses two types of equipment that is computer conception and machine learning algorithms. The approaches are made with dual - camera car safe application. [4].

Over the past years the smart phones have become increasingly common for many applications. These designs are carried out on the principles of Android-based smartphones as middleware. Examination results show that the layout principles reduce the usage of the power-intensive GPS (Global Positioning System) by up to 98% and improve battery life by up to 75% [8].

The approach resulted in localization distances of approximately 2m--6m with precisions between 80--100% implying that it is sufficient to walk short distances across hallways to be located by the smartphone [10].

The setting is an indoor space, such as an office building or a mall, with Wi-Fi coverage but where we do not assume knowledge of the physical layout, including the placement of the APs. Users carrying Wi-Fi-enabled devices such as smartphones traverse this space in normal course [12].

An accurate indoor localization system for commodity mobile devices, with no specialized infrastructure or fingerprinting. Ubicarse enables handheld devices to emulate large antenna arrays using a new formulation of Synthetic Aperture Radar (SAR). Past work on SAR requires measuring mechanically controlled device movement with millimeter precision, far beyond what commercial accelerometers can provide [14].

III. PROPOSED SYSTEM

Integrated both Indoor & Outdoor location based on WiFi connectivity. If the particular WiFi is related to then tracking as Indoor and the if user is out of the WiFi then GPS is used for outermost tracking. The changing part of the project is to be made up of Voice-based input for visually impaired people. The same routine can be used for both normal & Visually impaired people for a very useful navigation/ exploring.

The lead of the proposed system would be unplanned voice alert which is used for dispatching the hurdles that is faced during the navigation while in use, these directions are effective for the visually impaired for transiting through indoor as well as outdoor. In process, any such indoor method can be used to settle the user's location.

Fig 1: Architecture Diagram

3.1 LIFI

LiFi was first introduced on March as digital communication. LiFi can be stated as visible light communication system transmitting wireless communications at tremendous rates. LiFi communication rates are about 224 GB/sec, also recognized as the world's fastest Wi-Fi. On the other hand Wi-Fi communication affects data transfer on radio waves, LiFi seizes the following extreme step in wireless advancement and embeds and transfers data in visible light beams, thereby entitling LiFi to take entire advantage of the broadly light spectrum bandwidth potential which is given within the light range.

3.2 ALGORITHM

1. Encoded polyline algorithm
2. Triangulation

1. Encoded Polyline Algorithm

This encoded polyline algorithm is mainly used for storing a series of points in a string and it's a type of lossy compression algorithm .Then the points are sort out using their significant value. When there is a fixed point we are directed to our wish for using polyline encoded interactive utility. The method is mainly utilized for the conversion of 1 and 0 into segment of similar codes accordingly to the ASCII characters which is then used as a common base of 64 scheme. This will ensure that the characters are

displayed sequentially. The received value is then summed with base 63 before converting them into ASCII values. This also checks for character which are an additional feature of this algorithm, this is done by checking the value by the least significant bit of every byte group; and if the ser bit is 1 then it is considered as not fully formed and extra information must be added. Every value are encoded in base of 64 as their signed integer values as latitudes and longitude comes under signed values. Then the formatted result within the polyline will be represented as a dual points which symbolize latitude and longitude. The maximum longitude of positive or negative 180 degrees of a precision for five decimal places this outcome is required for a 32 bit signed binary integer value.

The steps are:
• First take the signed value:
-179.9832104
• Now take decimal value and multiply by 5 and then sum the outcome:
-17998321
• Next convert decimal values into binary values. Calculate the negative values using two's compliment by just converting 1 and 0 to obtain the result:
00000001 00010010 10100001 11110001
11111110 11101101 01011110 00001110
11111110 11101101 01011110 00001111
• Now left shift the binary values into two complement:
101 11011010 10111100 00011110
• Next check if the actual value are negative or not and if so then encoding is done:
00000010 00100101 01000011 11100001
• Split the binary values into five bit chunks:
00001 00010 01010 10000 11111 00001
• Next align the above it into a reverse manner:
00001 11111five-bit1010 00010 00001
• Every value with multiple of 20 if other chunks then:
100001 111111 110000 101010 100010 000001
• Now convert every value to decimal:
33 63 48 42 34 1
• Plus 63 to every value to the result:
96 126 111 105 97 64
• Lastly interchange all the values to their ASCII values:
`~oia@

Example
Points: (38.5, -120.2), (40.7, -120.95), (43.252, -126.453)

Latitude	Longitude	Latitude in E5	Longitude in E5	Change in latitude	Change in longitude	Encoded latitude	Encoded Longitude
38.5	-120.2	3850000	-12020000	+3850000	-12020000	_p~iF	~ps|U
40.7	-120.95	4070000	-12095000	+220000	-750000	_ulL	nnqC

43.25	-126.453	4325200	-12645300	+255200	-550300	_mqN	vxq`@

Table 1: encoding points

Encoded polyline: _p~iF~ps|U_ulLnnqC_mqNvxq`@

2. Traingulation

Triangulation requires to measure the angles and whereas the trilateration requires measuring the distance, global positioning system utilize information received from satellites to find a particular degree on the Earth in method named trilateration, which assesses angles, illustrated in this illustration. GPS satellite provides two information which are their own location.
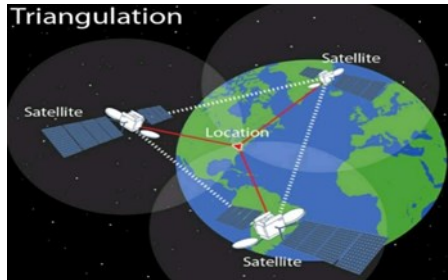

Fig 2 : Triangulation

And their current clock time which is used by carry the information in the electromagnetic waves through space to the receiver.

IV RESULT AND DISCUSSION

Analysis of the system gives us the efficient amount energy which been expended by different localization techniques and how these methods have reflected on the operating system which is under a modification, there is an improvised process been done on the indoor and outdoor system which will facilitate the circumstances which happens around it and by the end user utilizing the technique. Regardless of the smartphone to be found in indoor or outdoor the fused provider application is modified to switch in the global positioning system which is a subject to chance. And the outcomes are integrated specifically to endorse the less use of energy and in the precision found as the end result.
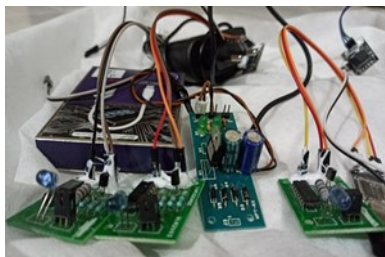

Fig 3: Hardware setup

Fig 4: software setup

V CONCLUSION

The future work can include various other features like lifi based payment, down hole construction for improving safety, smart car light and even in aviation but every aspect as their own limitation due to the LED broadband which is still in progress for its improvement that can be used in different technology and as such in this navigation an invisible lifi technology is used for transmission of data where this work is done is in deployment level but can also be enhanced for future work to help people for better navigation and locating other surrounding obstacles in a quick manner.

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