

**INTEGRATION OF INDOOR AND OUTDOOR VOICE BASED
NAVIGATION DETECTION USING LIGHT BASED
COMMUNICATION (LIFI) & IOT**

Submitted in partial fulfillment of the requirements for the award of
Bachelor of Technology degree in Information Technology

by

Deepika Manimaran (37120020)
Christina Steffi. F (37120017)



**DEPARTMENT OF INFORMATION TECHNOLOGY
SCHOOL OF COMPUTING**

SATHYABAMA
INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)
Accredited with Grade "A" by NAAC

JEPPIAAR NAGAR, RAJIV GANDHI SALAI, CHENNAI - 600 119

MARCH - 2021



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Jeppiaar Nagar, Rajiv Gandhi Salai, Chennai – 600 119

www.sathyabama.ac.in



DEPARTMENT OF INFORMATION TECHNOLOGY

BONAFIDE CERTIFICATE

This is to certify that this Project Report is the bonafide work of **Deepika Manimaran** (37120020), **Christina Steffi .F** (37120017) who carried out the project entitled **"Integration of Indoor and Outdoor Voice Based Navigation Detection using Light Based Communication (Lifi) & IoT "** under our supervision from November 2020 to April 2021.

InternalGuide

V. Maria Anu., M.E., Ph. D.,

Head of the Department

Dr. R. SUBHASHINI M.E., Ph.D.,

Submitted for Viva voce Examination held on

Internal Examiner

External Examiner

DECLARATION

I **Deepika Manimaran (37120020)** and **Christina Steffi .F (37120017)** hereby declare that the Project Report entitled_“**Integration of Indoor and Outdoor Voice Based Navigation Detection using Light Based Communication (Lifi) & IoT** “ done by me under the guidance of **V. Maria Anu., M.E., Ph. D.**, is submitted in partial fulfillment of the requirements for the award of Bachelor of Technology degree in Information Technology.

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SIGNATURE OF THECANDIDATE

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ABSTRACT

In the Existing system, GPS (Global Positioning System) based indoor positioning techniques generally utilize repeaters to amplify and retransmit the original GPS signals to indoor receivers. In the Proposed System, a GPS repeater based indoor positioning approach is proposed. Unlike most repeater-based indoor positioning techniques in current literature, repeaters are not required to connect to an outdoor antenna with fixed length cables. Neither do repeaters need to be synchronized. Each repeater retransmits the GPS signals continuously to the indoor receivers without sequential switching.. Modification part is our implementation, real time GPS will not fetch the exact longitude and latitude values , we implement LiFi based communication for the effective navigation system within a campus. GPS is used for outdoor navigation system as it is used currently. WiFi is used to detect the user's present and support accordingly.

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LIST OF ABBREVIATION

RFID - Radio Frequency Identifier

LIFI-Light Fidelity

WIFI-Wireless Fidelity

LAN-Local Area Network

CHAPTER 1

1.INTRODUCTION

1.1.Introduction

Location-based applications on modern smart phones have received widespread usage in today's society - to the point where it can even be said that many have become reliant on these types of applications. Location information is used to geotag posts on social media websites, to deliver the local weather and news, to help users navigate to a desired location, and to provide information on nearby restaurants and stores. However, users often have to balance the convenience and functionality of these location-based applications with a smartphone's battery life. Modern smartphones typically offer two main forms of determining a user's location: 1) the GPS and 2) a network based method that uses features like Wi-Fi and the cellular radio. The tradeoff between these two comes down to accuracy vs. energy. Applications that require fine-grained location information opt to use the power-hungry GPS, while applications with more coarse requirements may use the network-based provider, which is less accurate, but has greater energy savings. The user is often given the ability to toggle location services on or off and, with Android phones, can also selectively enable or disable the previously mentioned two methods to finetune their phone's accuracy/energy tradeoff. However, in most cases, the average user will not pay much attention to these options due to forgetfulness, not knowing such options are available, or a lack of knowledge on the energy costs. On the other hand, developers of location-based applications can reduce energy consumption by smartly choosing between using the GPS or the network provider depending on application requirements or other context. However, developers cannot always predict when to dynamically switch between methods. In other cases, locations returned by the network based method will not be accurate enough for proper functionality of some applications (ex. navigational applications) - in this case, the GPS will always be invoked regardless of environment or context. As a result, this leads to a waste of

energy in situations where the GPS is unavailable or inaccurate, such as in indoor environments or “urban canyons.” It must also be considered that a user’s actions will affect all installed location-based applications, while a developer’s actions only occur on a per-app basis. Thus, a mechanism that can make decisions regarding location services based on context and also affect all installed location-based applications will result in significant energy savings. We provide an analysis of the two localization methods available to modern smartphones and conjecture that the addition of an indoor localization method as well as the ability to detect indoor or outdoor context can improve battery life and increase location accuracy. To test this, we implement an indoor/outdoor detection service and a simple indoor localization method into the location services framework of the Android operating system. In our design, we implement an indoor/outdoor detection system modified from another author’s previous work and implement Wi-Fi RSS ranging as the prototype indoor localization method. In practice, any such indoor localization method can be used to infer the user’s location and future work can focus on this aspect to further increase location accuracy. Our contributions are as follows: Provide an energy consumption analysis between Android’s existing localization methods (GPS and networkbased) and our proposed solution. Implement a previous indoor/outdoor detection system as a full system service in the Android operating system. Create a new location provider in the operating system into which an indoor localization method can be implemented to infer the user’s location in a quick and energy efficient manner.

1.1.1 Android

Android is an open source and Linux-based Operating System for mobile devices such as smart phones and tablet computers. Android was developed by the Open Handset Alliance, led by Google, and other companies. Android offers a unified approach to application development for mobile devices which means developers need only develop for Android, and their applications should be able to run on different devices powered by Android. The first beta version of the Android Software Development Kit (SDK) was released by Google in 2007 where as the first commercial version, Android 1.0, was released in September 2008. On June 27, 2012, at the Google I/O conference, Google announced the next Android version, 4.1 Jelly

Bean. Jelly Bean is an incremental update, with the primary aim of improving the user interface, both in terms of functionality and performance. The source code for Android is available under free and open source software licenses. Google publishes most of the code under the Apache License version 2.0 and the rest, Linux kernel changes, under the GNU General Public

1.2.History of Android

The history and versions of android are interesting to know. The code names of android

ranges,as Aestro, Blender, Cupcake, Donut, Eclair, Froyo,Gingerbread, Honeycomb, Cream Sandwich, Jelly Bean and KitKat. Let's understand the android history pointy: Initially, Andy Rubin founded Android Incorporation in Palo Alto, California, United States in October, 2003.In 17th August 2005, Google acquired android Incorporation. Since then, it is in the subsidiary of Google Incorporation.

The key employees of Android Incorporation are Andy Rubin, Rich Miner, Chris White and Nick Sears. Originally intended for camera but shifted to smart phones later because of low market for camera .

1.3.Features of Android

Android is a powerful operating system competing with Apple 4GS and supports great features. Few of them are listed below:

Beautiful UI

Android OS basic screen provides a beautiful and intuitive user interface.

Connectivity

GSM/EDGE, IDEN, CDMA, EV-DO, UMTS, Bluetooth, Wi-Fi, LTE, NFC and WiMAX.

Storage

SQLite, a lightweight relational database, is used for data storage purposes.

Media support

H.263, H.264, MPEG-4 SP, AMR, AMR-WB, AAC, HE-AAC, AAC 5.1, MP3, MIDI, Ogg

Vorbis, WAV, JPEG, PNG, GIF, and BMP

Messaging

SMS and MMS

Web browser

Based on the open-source WebKit layout engine, coupled with Chrome's V8 JavaScript Engine supporting HTML5 and CSS3.

Multi-touch

Android has native support for multi-touch which was initially made available in handsets, Such as the HTC Hero.

Multi-tasking

User can jump from one task to another and same time various application can run Simultaneously.

Resizable widgets

Widgets are resizable, so users can expand them to show more content or shrink them to save space

Multi-Language

Supports single direction and bi-directional text.

GCM

Google Cloud Messaging (GCM) is a service that lets developers send short message data to their users on Android devices, without needing a proprietary sync solution.

Wi-Fi Direct

A technology that lets apps discover and pair directly, over a high-bandwidth peer-to-peer connection.

Android Beam

A popular NFC-based technology that lets users instantly share, just by touching two NFC enabled phones together.

1.4.Android Applications

Android applications are usually developed in the Java language using the Android Software Development Kit. Once developed, Android applications can be packaged easily and sold out either through a store such as Google Play or the Amazon Appstore. Android powers hundreds of millions of mobile devices in more than 190 countries around the world. It's the largest installed base of any mobile platform and growing fast. Every day more than 1 million new Android devices are activated worldwide.

CHAPTER 2

2.LITERATURE SURVEY

2.1.Taint Droid

An Information-Flow Tracking System for Realtime Privacy Monitoring on Smartphones

William Enck The Pennsylvania State University, Peter Gilbert Duke University, Byung-Gon Chun Intel Labs.

Taint Droid provides real time analysis by leveraging Android's virtualized execution environment. Taint Droid incurs only 14% performance overhead on a CPU-bound micro-benchmark and imposes negligible overhead on interactive third-party applications. Using Taint Droid to monitor the behavior of 30 popular third-party Android applications, we found 68 instances of potential misuse of users' private information across 20 applications. Monitoring sensitive data with Taint Droid provides informed use of third-party applications for phone users and valuable input for smartphone security service firms seeking to identify misbehaving applications.

2.2. Magicol

Indoor Localization Using Pervasive Magnetic Field and Opportunistic WiFi Sensing

Yuanchao Shu, Student Member, IEEE, Cheng Bo, Student Member, IEEE, Guobin Shen, Senior Member.

Magicol, an indoor localization and tracking system that embraces the local disturbances of the geomagnetic field. We tackle the low discernibility of the magnetic field by vectorizing consecutive magnetic signals on a per-step basis, and use vectors to shape the particle distribution in the estimation process. Magicol can also incorporate WiFi signals to achieve much improved positioning accuracy for indoor environments.

2.3. SensTrack

Energy-Efficient Location Tracking With Smartphone Sensors

Lei Zhang, Student Member, IEEE, Jiangchuan Liu, Senior Member, IEEE, Hongbo Jiang, Member.

SensTrack, a locationtracking service that leverages the sensor hints on the smartphoneto reduce the usage of GPS. SensTrack selectively executes aGPS sampling using the information from the acceleration andorientation sensors and switches to the alternate location sensing method based on WiFi when users move indoors. A machinelearning technique, Gaussian process regression, is then employedto reconstruct the trajectory from the recorded location samples.

2.4. Ubicarse

Accurate Indoor Localization With Zero Start-up Cost

Swarun Kumar, Stephanie Gil, Dina Katabi ,Daniela Rus Massachusetts Institute of Technology

Ubicarse, 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. In contrast, Ubicarse's core contribution is the ability to perform SAR on handheld devices twisted by their users along unknown paths.

2.5. RTDroid

Real-Time Android with RTDroid

Yin Yan, Shaun Cosgrove, Varun Anand, Amit Kulkarni, Sree Harsha Konduri, Steven Y. Ko, Lukasz Ziarek Department of Computer Science and Engineering University at Buffalo.

The implications and challenges of adapting Android constructs and core system services for real time and present a solution for each. Our system is unique in that it redesigns Android's internal components, replaces Android's Java VM (Dalvik) with a real-time VM, and leverages off-the-shelf real time OSes. We demonstrate the feasibility and predictability of our solution by evaluating it on three different platforms—an x86 PC, a LEON3 embedded board, and a Nexus S smartphone. The evaluation results show that our design can successfully provide predictability to Android applications, even under heavy load.

CHAPTER 3

3.SCOPE AND OBJECTIVE

3.1.Scope

LI-FI requires Line of Sight. If the apparatus is set up outdoors, it would need to deal with changing weather conditions. If the apparatus is set up indoors, one would not be able to shift the receiver. The problem of how the receiver will transmit back to the transmitter still persists. Light waves can easily be blocked and cannot penetrate thick walls like the radio waves can. We become dependent on the light source for internet access. If the light source malfunctions, we lose access to the internet.

3.2.Objective

To implement LiFi based communication and automatic voice alert for the effective navigation system within a campus. To use GPS for outdoor navigation system and real time voice alert.

CHAPTER 4

4.METHODOLOGY

4.1.Existing System

In the Existing system, GPS (Global Positioning System) based indoor positioning techniques generally utilize repeaters to amplify and retransmit the original GPS signals to indoor receivers. Less effective and There is no wifi and also Difficult indoor navigation for blind people.

4.2. Proposed System

In the proposed system we are integrating both Indoor & Outdoor location-based tracking basis on monitoring the WiFi connectivity. If WiFi is connected then tracking will happen as Indoor and user is out of the WiFi then GPS is used for external tracking.

The modification part of the project is to include Voice-based input for blind people. The same application can be used for both normal & Blind people for effective navigation. Automatic alert and voice commands used for visually impaired users.

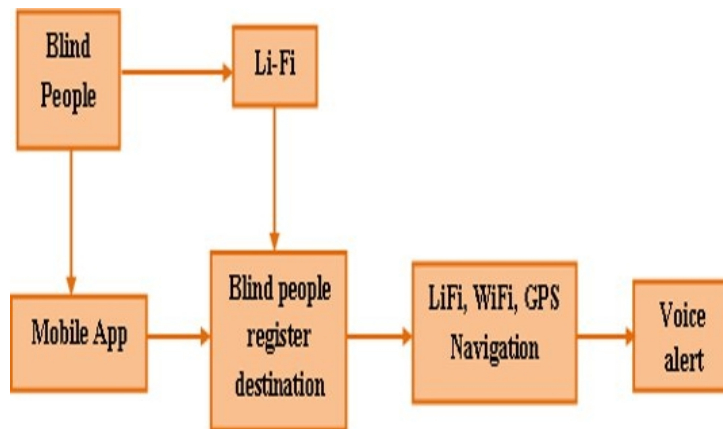


Fig 4.1: Architecture diagram

4.3.Data flow Diagram

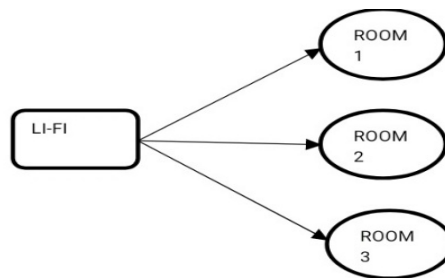


Level 0:

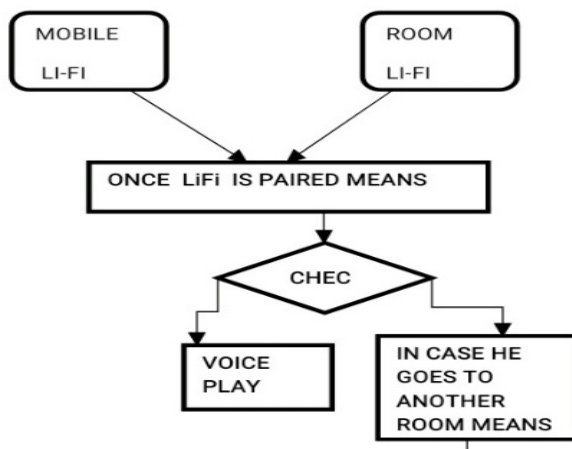
Level 1:



Level 2:



Level 3:



4.4.Lifi

Light emitting diodes (LEDs) can be switched on and off faster than the human eye can detect since the operating speed of LEDs is less than 1 μ s, thereby causing the light source to appear to be continuously on. This invisible on-off activity enables data transmission using binary codes. Switching on an LED is binary '1', switching it off is binary '0'. It is possible to encode data in light by varying the rate at which LEDs flicker on and off to give different strings of 1s and 0s. Modulation is so rapid that humans cannot notice it. A light sensitive device (photo detector) then receives the signal and converts it back into original data. This method of using rapid pulses of light to transmit information wirelessly is technically referred to as Visible Light Communication (VLC). The term Li-Fi has been inspired due to its potential to compete with conventional Wi-Fi. The VLC uses visible light between 400 THz (780 nm) and 800 THz (375 nm) as the optical carrier for data transmission and illumination. Data rates of greater than 100 Mbps can be achieved by using high-speed LEDs with adequate multiplexing. Parallel data transmission using arrays of LEDs where each LED transmits a separate stream of data can be used to increase the VLC data rate. Though the lights have to be kept on to transmit data, they can be dimmed to the point that they are not visible to humans but still be capable of transmitting data.

Parameter	LI-FI	WI-FI
Speed	High	High
Spectrum	10,000 times broader than that of Wi-Fi	Narrow spectrum
Data density	High	Low
Security	High security due to non-penetration of light through walls	Less secure due to transparency
Reliability	Medium	Medium
Bandwidth	High due to broad spectrum	Low
Transmit/receive power	High	Medium
Ecological Impact	Low	Medium
Device-to-device connectivity	High	High
Obstacle interference	High	Low
Bill of materials	High	Medium
Market maturity	Low	High
Latency	In the order of microseconds	In the order of milliseconds

4.4.1.Comparison between Lifi and Wifi

4.5.Algorithm

4.5.1 Encoded Polyline Algorithm

Polyline encoding is a lossy compression algorithm that allows you to store a series of coordinates as a single string. Point coordinates are encoded using signed values. If you only have a few static points, you may also wish to use the interactive polyline encoding utility.

The encoding process converts a binary value into a series of character codes for ASCII characters using the familiar base64 encoding scheme: to ensure proper display of these characters, encoded values are summed with 63 (the ASCII character '?') before converting them into ASCII. The algorithm also checks for additional character codes for a given point by checking the least significant bit of each byte group; if this bit is set to 1, the point is not yet fully formed and additional data must follow.

The steps for encoding such a signed value are specified below.

1.Take the initial signed value:

-179.9832104

2.Take the decimal value and multiply it by 1e5, rounding the result:

-17998321

3.Convert the decimal value to binary. Note that a negative value must be calculated using its two's complement by inverting the binary value and adding one to the result:

00000001 00010010 10100001 11110001

11111110 11101101 01011110 00001110

11111110 11101101 01011110 00001111

4.Left-shift the binary value one bit:

11111101 11011010 10111100 00011110

5.If the original decimal value is negative, invert this encoding:

00000010 00100101 01000011 11100001

6.Break the binary value out into 5-bit chunks (starting from the right hand side):

00001 00010 01010 10000 11111 00001

7.Place the 5-bit chunks into reverse order:

00001 11111 10000 01010 00010 00001

8.OR each value with 0x20 if another bit chunk follows:

100001 111111 110000 101010 100010 000001

9.Convert each value to decimal:

33 63 48 42 34 1

10.Add 63 to each value:

96 126 111 105 97 64

11.Convert each value to its ASCII equivalent:

`~oia@

The table below shows some examples of encoded points, showing the encodings as a series of offsets from previous points.

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	-75000	_ulL	nnqC
43.252	-126.453	4325200	-12645300	+255200	-550300	_mqN	vxq`@

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

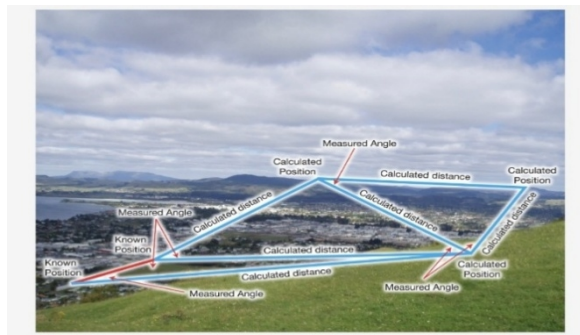
Example

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

Table 4.1: encoded data

4.5.2 Triangulation

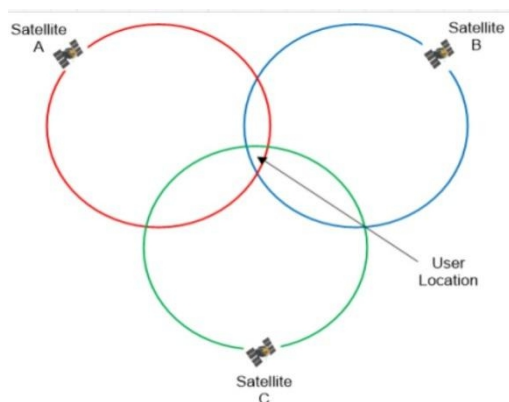
Triangulation is a surveying method that measures the angles in a triangle formed by three survey control points. Using trigonometry and the measured length of just one side, the other distances in the triangle are calculated. The shape of the triangles is important as there is a lot of inaccuracy in a long skinny triangle, but one with base angles of about 45 degrees is ideal. Each of the calculated distances is then used as one side in another triangle to calculate the distances to another point, which in turn can start another triangle. This is done as often as necessary to form a chain of triangles connecting the origin point to the Survey Control in the place needed. The angles and distances are then used with the initial known position, and complex formulae, to calculate the position (Latitude and Longitude) of all other points in the



triangulation network.

Fig 4.2: triangulation network

Fig 4.3: Satellite trilateration



4.6. Usecase Diagram

A use case describes a sequence of action that provides something of measurable value to an action and is drawn as a horizontal ellipse.

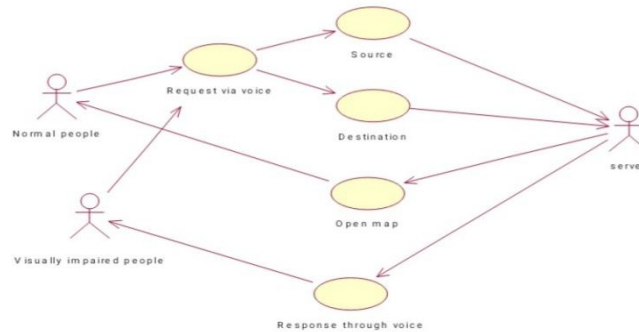


Fig 4.4 use case diagram

4.7. Sequence Diagram

Sequence diagrams are the most popular UML artifact for dynamic modeling, which focuses on identifying the behavior within your system.

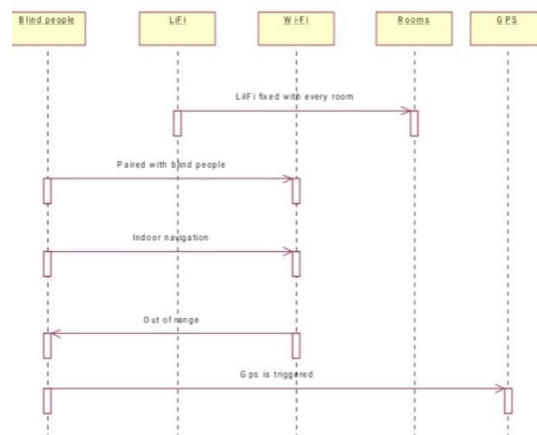
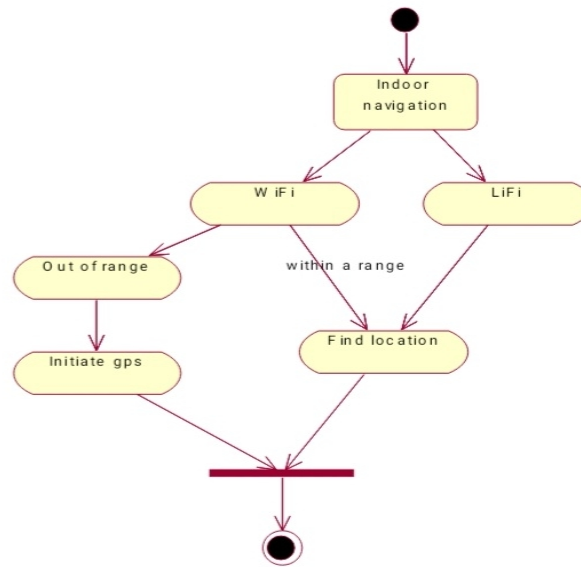


Fig 4.5:sequence diagram

4.8.Activity Diagram

The activity diagrams can be used to describe the business and operational step-by-step workflows of components in a system. Activity diagram consist of Initial node,



activity final node and activities in between.

Fig 4.6: activity diagram

4.9 System Requirements

Hardware Environment

Hard disk	: 120 GB
Monitor	: 15' color with vgi card support
Ram	: Minimum 256 MB
Processor	: Pentium iv and above (or) equivalent
Processor speed	: Minimum 500 MHZ

Software Environment

Platform : Windows Xp/7/8

Front End : Java-JDK1.7,Android-sdk and Eclipse

Back End : MYSQL

Embedded kit

4.10 Modules

4.10.1.Andriod User

Mobile Client is an Android application which created and installed in the User's Android Mobile Phone. So that we can perform the activities. The Application First Page Consist of the User registration Process. We'll create the User Login Page by Button and Text Field Class in the Android. While creating the Android Application, we have to design the page by dragging the tools like Button, Text field, and Radio Button. Once we designed the page we have to write the codes for each. Once we create the full mobile application, it will be generated as Android Platform Kit (APK) file. This APK file will be installed in the User's Mobile Phone Application.

4.10.2.Wifi Monitoring

Wi-Fi is the name of a popular wireless networking technology that uses radio waves to provide wireless high-speed Internet and network connections. A common misconception is that the term Wi-Fi is short for "wireless fidelity," however this is not the case. In this Wi-Fi is used for indoor navigation.

4.10.3.Lifi Hardware construction

Li-Fi is a bidirectional, high speed and fully networked wireless communication technology similar to Wi-Fi is a subset of optical wireless communications (OWC) and can be a complement to RF communication (Wi-Fi or Cellular network), or a replacement in contexts of data broadcasting. It is wireless and uses visible light communication or infra-red and near ultraviolet (instead of radio frequency waves)

spectrum, part of Optical wireless communications technology, which carries much more information, and has been proposed as a solution to the RF-bandwidth limitations. A complete solution includes an industry led standardization process.

4.10.4.Indoor Navigation

In this module, we can design and implementation of indoor navigation for blind people. LiFi is connected to kit. LiFi is a wireless optical networking technology that uses light-emitting diodes (LEDs) for data transmission. LiFi is designed to use LED light bulbs similar to those currently in use in many energy-conscious homes and offices.

4.10.5.GPS based Outdoor Navigation

In this module, we are implementing the gps based outdoor navigation. In indoor navigation we are using Wi-Fi and LiFi technology. These two methodologies used to indoor navigation purpose only. In case the user not in the Wi-Fi range and LiFi means, take the GPS value find the user.

CHAPTER 5

5.RESULT AND DISCUSSIONS

5.1.Login page

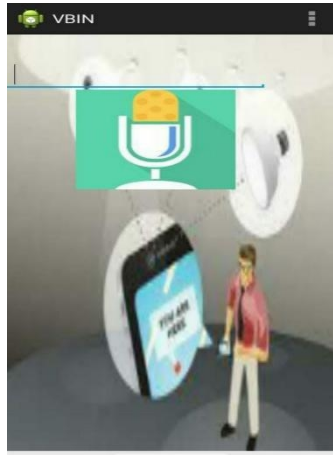


Fig 5.1:login page



5.2.Application page

Fig 5.2: application page

5.3. Hardware setup

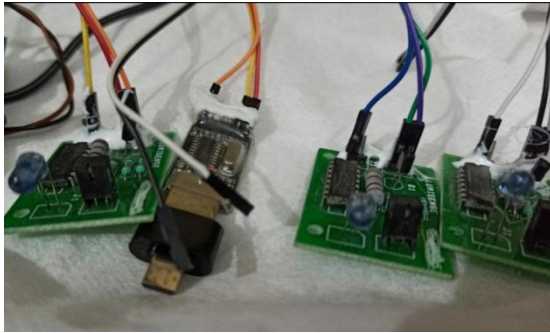


Fig 5.3: lifi Transmitters



Fig 5.4: lifi receiver

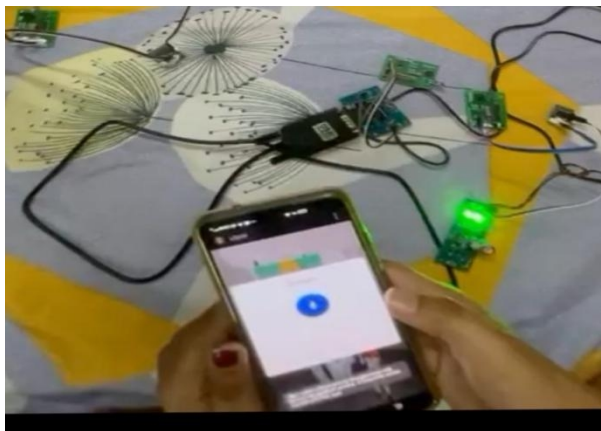


Fig 5.5: full setup

CHAPTER 6

6.CONCLUSION AND FUTURE WORK

6.1.Conclusion

In this work, we presented an analysis of the energy consumed by Android's localization methods and proposed a modification to the Android operating system to consider indoor/outdoor context and make smarter decisions on which localization method to use on behalf of the user or application developer. In particular, we modify the Fused Location Provider

API to switch between the GPS and an indoor localization method depending whether or not the phone is detected to be indoors. Our results have shown that the combined indoor/ outdoor detection and an indoor localization method will drain less energy than the GPS and can also be more accurate in indoor environments.

Reference

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Appendices

Sample Code

MAIN ACTIVITY:

```
package com.example.allen.androidroute;

import android.os.Bundle;

import android.app.Activity;

import android.view.Menu;

import android.app.Activity;

import android.content.Context;

import android.hardware.usb.UsbDevice;

import android.hardware.usb.UsbManager;

import android.os.AsyncTask;

import android.os.Bundle;

import android.os.Handler;

import android.os.Message;

import android.os.SystemClock;

import android.util.Log;

import android.view.LayoutInflater;

import android.view.View;

import android.view.ViewGroup;

import android.widget.AdapterView;

import android.widget.AdapterView;

import android.widget.ArrayAdapter;

import android.widget.ListView;
```

```

import android.widget.ProgressBar;

import android.widget.TextView;

import android.widget.TwoLineListItem;


import hoho.android.usbserial.driver.UsbSerialDriver;

import hoho.android.usbserial.driver.UsbSerialPort;

import hoho.android.usbserial.driver.UsbSerialProber;

import hoho.android.usbserial.util.HexDump;

import java.util.ArrayList;

import java.util.List;

public class MainActivity extends Activity {

    private final String TAG = MainActivity.class.getSimpleName();

    private UsbManager mUsbManager;

    private ListView mListView;

    private TextView mProgressBarTitle;

    private ProgressBar mProgressBar;

    private static final int MESSAGE_REFRESH = 101;

    private static final long REFRESH_TIMEOUT_MILLIS = 5000;

    private final Handler mHandler = new Handler() {

        @Override

        public void handleMessage(Message msg) {

            switch (msg.what) {

                case MESSAGE_REFRESH:

                    refreshDeviceList();

```

```

        mHandler.sendMessageDelayed(MESSAGE_REFRESH,
REFRESH_TIMEOUT_MILLIS);

        break;

    default:

        super.handleMessage(msg);

        break;

    }

}

};

private List<UsbSerialPort> mEntries = new ArrayList<UsbSerialPort>();

private ArrayAdapter<UsbSerialPort> mAdapter;

@Override

public void onCreate(Bundle savedInstanceState) {

    super.onCreate(savedInstanceState);

    setContentView(R.layout.main);

    mUsbManager = (UsbManager) getSystemService(Context.USB_SERVICE);

    mListView = (ListView) findViewById(R.id.deviceList);

    mProgressBar = (ProgressBar) findViewById(R.id.progressBar);

    mProgressBarTitle = (TextView) findViewById(R.id.progressBarTitle);

    mAdapter = new ArrayAdapter<UsbSerialPort>(this,

        android.R.layout.simple_expandable_list_item_2, mEntries) {

        @Override

        public View getView(int position, View convertView, ViewGroup parent) {

            final TwoLineListItem row;

            if (convertView == null){

```

```

        final LayoutInflater inflater =

            (LayoutInflater) getSystemService(Context.LAYOUT_INFLATER_SERVICE);

        row = (TwoLineListItem) inflater.inflate(android.R.layout.simple_list_item_2, null);

    } else {

        row = (TwoLineListItem) convertView;

    }

    final UsbSerialPort port = mEntries.get(position);

    final UsbSerialDriver driver = port.getDriver();

    final UsbDevice device = driver.getDevice();

    final String title = String.format("Vendor %s Product %s",

        HexDump.toHexString((short) device.getVendorId()),

        HexDump.toHexString((short) device.getProductId()));

    row.getText1().setText(title);

    final String subtitle = driver.getClass().getSimpleName();

    row.getText2().setText(subtitle);

    return row;

}    };

mListView.setAdapter(mAdapter);

mListView.setOnItemClickListener(new ListView.OnItemClickListener() {

    @Override

    public void onItemClick(AdapterView<?> parent, View view, int position, long id) {

        Log.d(TAG, "Pressed item " + position);

        if (position >= mEntries.size()) {

```

```

        Log.w(TAG, "Illegal position.");

        return;

    }

    final UsbSerialPort port = mEntries.get(position);

    showConsoleActivity(port);

}

});

long i = sqlliteController.insertRoomdetails(reamindar1, reamindar2);

if(i>0){

    Toast.makeText(getApplicationContext(),"Valuesadded
successfully",Toast.LENGTH_LONG).show();

        }else{ Toast.makeText(getApplicationContext(), "Values not added
successfully",Toast.LENGTH_LONG).show();    }

    }else{

        Toast.makeText(getApplicationContext(), "Please fill all the fields",
Toast.LENGTH_LONG).show();

            }}    });

    btn_delete.setOnClickListener(new View.OnClickListener() {

@Override

public void onClick(View v) {

        // TODO Auto-generated method stub

        boolean flag = sqlliteController.deleteRoomdetails();

        if(flag){

            Toast.makeText(getApplicationContext(), "Values
deleted", Toast.LENGTH_LONG).show();

```

```

    }else{

        Toast.makeText(getApplicationContext(), "Values not
deleted", Toast.LENGTH_LONG).show();

    }

}

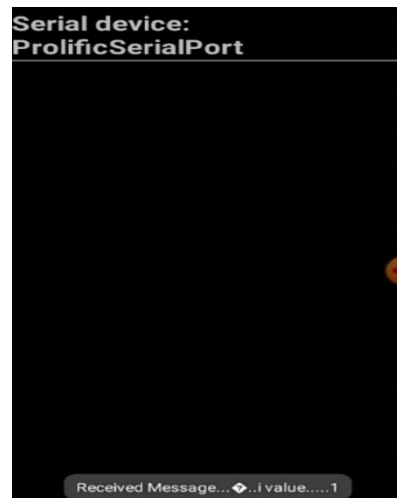
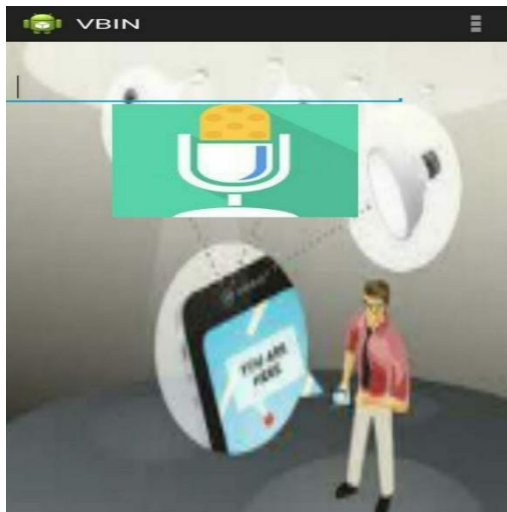
});

}

}

```

Screenshots





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Letter of Acceptance

To

Deepika Manimaran, Maria Anu, Christina Steffi.F,
Dept of IT, Sathyabama Institute of Science and Technology India.

Greetings!!

On behalf of the Surya Engineering College Erode, we take great pleasure in inviting you to attend the “5th International Conference on Computing Methodologies and Communication (ICCMC 2021)” which is going to be held during 08-10, April 2021 at Erode, India.

We are glad to inform you that your submitted article entitled “**Intergartion of Indoor and Outdoor Voice Based Navigation Detection using Light based Communication (Lifi) & IoT**”[Paper id:ICCMC185] has been accepted for publication at ICCMC 2021. We welcome you to join us and share your research and views. This conference will offer you an unforgettable experience in exploring new opportunities.

We look forward to seeing you at Erode, India.

With Thanks,

Yours' Sincerely

Dr. E. Baraneetharan
Associate Professor & Head,
Dept. of EEE,
Surya Engineering College,
Erode, India.

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

Deepika Manimaran
Dept of IT
Sathyabama Institute of
Science and Technology
India
madhumitha1499@gmail.com

Maria Anu
Dept of IT
Sathyabama institute of
science and technology
India
maria.it@sathyabama.ac.in

Christina Steffi.F
Dept of IT
Sathyabama Institute of
Science and Technology
India
christinasteffi03091999@gmail.com

Abstract— The Global Positioning System has always established a tracking which is similar to the actual smartphones been used. And the existing system holds this feature but on the other hand the door navigation has it's own complication because of the various usage 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 tacking through technology such as Wi-Fi. Here for 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 locating. The modification done in this project is by providing additional features such as voice based input which will be useful for the blind for their navigation and this feature can also be used by normal people, 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 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 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 outmost 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 valuee. 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)

Lati tude	Long itude	Lati tude in E5	Long itude in E5	Chan ge in latitu de	Chan ge in long itud e	Enc ode d latit ude	Enco ded Long itude
38.5	- 120. 2	385 000 0	- 1202 0000	+385 0000	- 1202 0000	_p~i F	~ps U
40.7	- 120. 95	407 000 0	- 1209 5000	+220 000	- 7500 0	_ul L	nnqC
43.2 5	- 126. 453	432 520 0	- 1264 5300	+255 200	- 5503 00	_mq N	vxq` @

Table 1: encoding points

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

2.Triangulation

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.

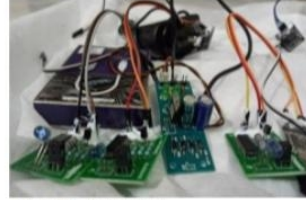


Fig 3: Hardware setup



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 it's 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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