Wireless Indoor navigation on Android OS using Wi-Fi

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Abstract- *In recent times, the definition of internet of things has evolved to great extent and it means different things to different people. However the basic idea of Internet of Things remains the same which is use of information and communication Technologies(ICT's) as well as Internet to provide efficient services to the mankind for their optimum benefits. While implementation of IoT itself is complex due to large of devices various link layer technologies and services that are involved in such systems. In this paper, we specifically implement an urban Internet of Things system which primarily gives an emphasis on smart educational institute which aims at exploiting advanced communication technologies to support for administration of the institute and for the new visitor who find it difficult to find their way around the institute. This paper thereby provides a comprehensive survey of various technologies such as Android, Java, protocols and architecture for using Internet of Things in Smart Institute. Furthermore,this system will provide an overlook of the institute via the administration office,playground and canteens. The user of the system will also get a static image map to roam around the institute. Lastly the system will provide technical solutions and best practice guidelines for finding the way around the institute and also help a new visitor in reaching his desired location.*

Keywords*- FSPL(Free Space Path Loss),Indoor Mapping,MEMS(Micro Electromechanical Systems), Signal Strength, WLAN Localisation.*

I. INTRODUCTION

The Internet Of Things (IoT) Is A System Of Interrelated Computing Devices, Mechanical And Digital Machines, Objects, Animals Or People That Are Provided With Unique Identifiers And The Ability To Transfer Data Over A Network Without Requiring Human-To-Human Or Human-To-Computer Interaction. A Thing, In the Internet Of Things, Can Be A Person With A Heart Monitor Implant, A Farmanimal with a biochip transponder, an automobile that has built-in sensors to alert the driver when tire pressure is low -- or any other natural or man-made object that can be assigned an IP address and provided with the ability to transfer data over a network. IoT has evolved from the convergence of wireless technologies, micro-electromechanical systems (MEMS), micro services and the Internet. The convergence

has helped tear down the silo walls between operational technologies (OT) and information technology (IT), allowing Animal with A Biochip Transponder, An Automobile

That Has Built-In Sensors to Alert the Driver When Tire Pressure Is Low -- Or Any Other Natural or Man-Made Object That Can Be Assigned An IP Address And Provided With The Ability To Transfer Data Over A Network. IoTHas Evolved From The Convergence Of Wireless Technologies, Micro-Electromechanical Systems (Mems), Micro Services And The Internet.

* Internet connects all people, so it is called "the Internet of People"

* IoT connects all things, so it is called "the Internet of Things"

Figure 1: Internet Of Things

The internet of things is the internetworking of physical devices, vehicles, buildings and other items—embedded with electronics, software, sensors, actuators, and network connectivity that enable these objects to collect and exchange data. A smart institute is an educational institute which, along with the traditional methods makes use of the iot paradigm for providing better interactive services to the students and visitors[2].

There are numerous colleges which have a very large campus area that makes it difficult for a new visitor to take a round around the college and find his/her desired destination. Therefore, in this system the user will be provided with an android application which will guide the user through the campus to his desired destination. The map will be not an actual map but it will be collection of images which show the path from one place to another .all the images will be stored on the database. The internet of things (IoT) shall be able to incorporate transparently and seamlessly a large number of

different and heterogeneous end systems, while providing open access to selected subsets of data for the development of a plethora of digital services. Building a general architecture for the IoT is hence a very complex task, mainly because of the extremely large variety of devices, link layer technologies, and services that may be involved in such a system .India has the fastest growing telecom network in the world with many users moving towards smart phones and majority by students. Android is a reliable software development kit issued by Google in order to provide developers with a comprehensive set of tools for building android applications. If used properly, the sdk (software development kit) and jdk (java development kit) is able to deliver state-of-the-art software for android devices in other words, the sdk includes only the basic utilities for android app development.[1]

The information which we get from our mobile in a cost effective way & student can get information easily &quickly. So, it is time saving through this service one can access the complete information about the college campus such as department, canteen, parking, class room, library, etc. This information will provide to the user depending upon his/her current location.

II. SMART INSTITUTE ARCHITECTURE

Smart institute is an android based web application framework which makes it possible to easily reach at the desired Location by minimizing the time of the user. The main objective of this project is to add mobility and automation to the process of managing and efficient information searching of college/institute campus. Maximizing the coverage of all the information needs about college campus like student section, Department, Parking, Library, etc. Using this we can handle all the information about whole college campus without any hassle. [3]

Figure 2 provides a snapshot of the Smart Institute interface, which determines the user module, mapping module, image module, and recommendation module.

A. User Profiles:The Smart Institute framework maintains records of college, canteen, library, hostel etc. for each geographical region. The user can choose the required venue or the image of required venue where user wants to go. User has to scan the QR code before entering the institute.

B. Mapping Module: The mapping module consists of showing the desired venue in the Google map along with user current location to the user with the help of FSPL by detecting signal strength. The mapping module also computes venue closeness based on geographical distance between the current user and popular venues.

C. Recommendation Module: It depicts the online recommendation module that runs a service to receive recommendation queries from users.

A user's request consists of:
(a) Current context (such as, GPS location of user,time and region)
(b)Bounded region surrounding the user from where the top.

D. Image Module:The image of all venues of college for example classroom, library, canteen, parking etc. are stored in the My SQL
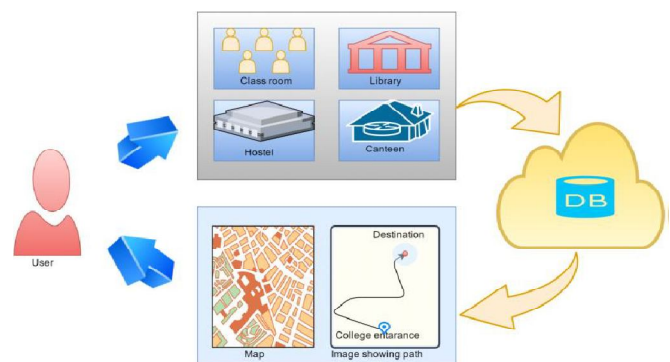

Figure 2: System Architecture

Database. Whenever user makes the query for getting the required venue image the user will be given with pre stored image of that venue.

III MOTIVATION

- Roaming around a new college becomes a difficult task for a new visitor when the campus is too large to explore.
- This becomes tiresome when one is in a hurry or going for some important task.
- The application will help a new visitor with a static image map which will guide the user through the campus

IV. INDENTATIONS AND EQUATIONS

- Free Space Path Loss: FSPL algorithm is used to determine the connectivity strength between two entities. FSPL is proportional to the square of distance between the transmitter and the receiver i.e. signal strength, and also proportional to the square of the frequency of the radio signal.In the "Smart Institute" application FSPL algorithm is to be used to determine the nearer location from the current location of the user. This will help in

fetching the right map in the form of proper consequent images[4].

The equation for FSPL is

$$FSPL = (4\pi d)^2$$
$$= (4\pi df)^2$$

Where
• φ is the signal wavelength in meters.
• f is the frequency in hertz
• d is the distance from transmitter in meters
• c is the speed of light in a vacuum 2.99792458 * 108meters per second

Trilateration: Trilateration algorithm is used to implement the GPS functionality in smart phones. Suppose, the user wishes to know the location of the institute on the map. Then the directions will be provided to the user in the form of Google map using the trilateration algorithm.[4]

V. CONCLUSION

In this paper, the solutions currently available for the implementation of Smart Institute will be analyzed. The location based campus navigation system is very much needed in a dynamic environment where many things are not under the human control. This system caters to the need of various stakeholders involved in the process and really makes it easy for new user and students. For this we develop a system in which user can enter simple query or request. Depends on his/her location and request, system will generate the response. In that, user can get the information about the location in that user or student is interested.

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