College Campus Routing using Bluetooth Beacon

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ABSTRACT

Traditionally, Security or Receptionists guides the visitor's and the students for their queries which leads to issues that is, if there is unavailability of receptionist or security in the campus the visitor's feels difficult to reach their required destination, but on research, proposed idea does task like routing the user from the initial location to the required destination with the help of smart phone or tablet by installing BLE Terminal app connected to the Bluetooth Low-Energy (BLE) beacon. Specifically, we apply the idea of global map matching, used in the field of GPS, to route estimation based on BLE beacons. Thus, the global optimum route in beacon network can be estimated from the radio field intensities of the BLE beacon directly. We associate a beacon network with path network to estimate the route and stay in track of users.

Keyword : - *Bluetooth Beacon, BLE Terminal App, Security, Smart Phone or Tablet, Visitors.*

1. INTRODUCTION

Bluetooth Low Energy is a wireless personal area network technology used for transmitting data over short distances. Nowadays, modern smart phone users spend most of their time indoors. Unfortunately, indoor spaces sometimes block cell signals and can make it difficult to locate devices using GPS. Also GPS can't track the exact location of the device at a minute level.

We installed BLE beacon transmitters in the classrooms, corridors and campus of AMC Engineering College, and confirmed the effectiveness of the proposed method by experiments.

So Beacons provide a solution to this problem by using Bluetooth Low Energy (BLE) to allow sensors to detect – within inches – how close a smartphone is. Beacons are small enough to attach to a countertop or wall, rely on battery-friendly, low-energy Bluetooth connections to transmit prompts or messages directly to a tablet or smartphone. Likewise, it may also create a new market for retailers who could use technology to better target consumers, which can also be implemented in Schools and College which benefits the visitor's and students during examinations. In order to implement those we are into a solution of Embedded system using Bluetooth technology with controllers which performs specific tasks. It is designed for low energy consumption and cost, while maintaining a communication range similar to that of its predecessor, Bluetooth. These transmitters can be powered by batteries or a fixed power source such as a USB adapter. They're also inexpensive, accuracy, simple to deploy and are supported by most mobile operating systems.

2. PROPOSED METHODOLOGY

In this proposed system we are using the embedded system that is Bluetooth technology as it is relatively new compared to other technologies and there is huge potential of its growth and practical application.
Bluetooth low energy (BLE) beacons have been used to track the locations of individual blocks or rooms as per the

users requirement. Hence beacons provide a solution to this problem by allowing the other Bluetooth device to detect with inches. Beacons are small enough to attach to a countertop or wall, rely on battery-friendly, low-energy Bluetooth connections to transmit prompts or messages directly to a tablet or smartphone It's a big step ahead that could open the door for groundbreaking services, which could enhance people's lives.

Likewise, it may also create a new market for retailers who could use the technology to better target consumers. Bluetooth beacons are transmitters that use Bluetooth Low Energy 4.0(BLE) to broadcast signals that can be heard by compatible or smart devices. These transmitters can be powered by batteries or a fixed power source such as a USB adapter.

When a smart device is in a beacon's proximity, the beacon will automatically recognize it and will be able to interact with that device. Bluetooth Low Energy is a wireless personal area network technology used for transmitting data over short distances . It is designed for low energy consumption and cost, while maintaining a communication range similar to that of its predecessor, Bluetooth. They're also inexpensive, simple to deploy and are supported by most mobile operating systems .

We are here using the HM-10 Bluetooth Modules are the go-to Bluetooth modules for any Arduino project! It's easy to hook up and code in the Arduino IDE. In most projects, we usually connect to HM10 to an Arduino and use it to wirelessly communicate with another smart device like a mobile phone. Interfacing of Bluetooth module HM-10 with 89C51 Microcontroller Keil Program in C.

In this we are connecting 89C51 with BT module and connect the BT with your smart phone using an application named "Bluetooth Serial" which you can get on Google play store. Then you can operate the LEDs connected at port P2 by sending different hex values based on the given program.

3. ARCHITECTURE DESIGN

Consider A as user and A visits to the security for purpose of enquiry. Security will initially guides the user to reach the required destination without addressing him/her manually, but with the Smart College Routing System and also regarding the Installation of required Android App. The user A gets logged into the BLE Terminal by providing their name near the security. After establishing the connection with the Bluetooth device using the Smart or Android phone. The app which was installed earlier by the user for easily navigating the user's required destination. The user's Bluetooth will get connected to the nearer Bluetooth, thus creating a path and display the particular destination in his/her personal
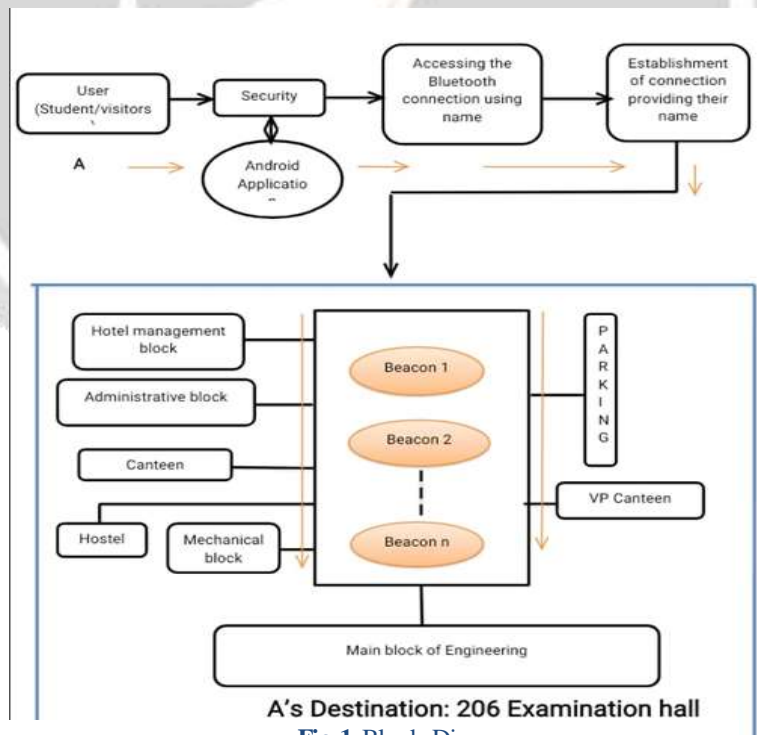

Fig.1 Block Diagram

device, also by redirecting if the user is getting in wrong path. The Bluetooth that automatically connects to the next Bluetooth beacon by creating a path to guide to the user for reaching destination. The Bluetooth beacon that are placed in a nearby location can be charged by a normal AC power supply of low voltage, in case of power cuts, the temporary battery is used.

4. IMPLEMENTATION

Embedded systems have received significant attention during the last decade mainly because of their numerous applications. They can be found in robotics, smart buildings, fabrication equipments as well as medical, automation, industrial, commercial, military applications. Most of the modern embedded systems are based on microcontrollers

Here, we design and implement an embedded system based on the ATmega89C51 microcontroller and use it for constructing location routing system. By interfacing a Bluetooth module into the proposed embedded system, it can provide a control system that uses Bluetooth as a standard technology for connecting (send/receive data to/from) remote devices. The control circuit of the proposed system is designed in a way such that a user can interface any kind of desirable peripheral. Furthermore, the mobile device is provided with a Bluetooth connection to create a path between the initial beacon and destination beacon. Using different programming languages, we program the working of the system as a Routing Bluetooth beacon. The proposed system can be reprogrammed easily to support a variety of applications.
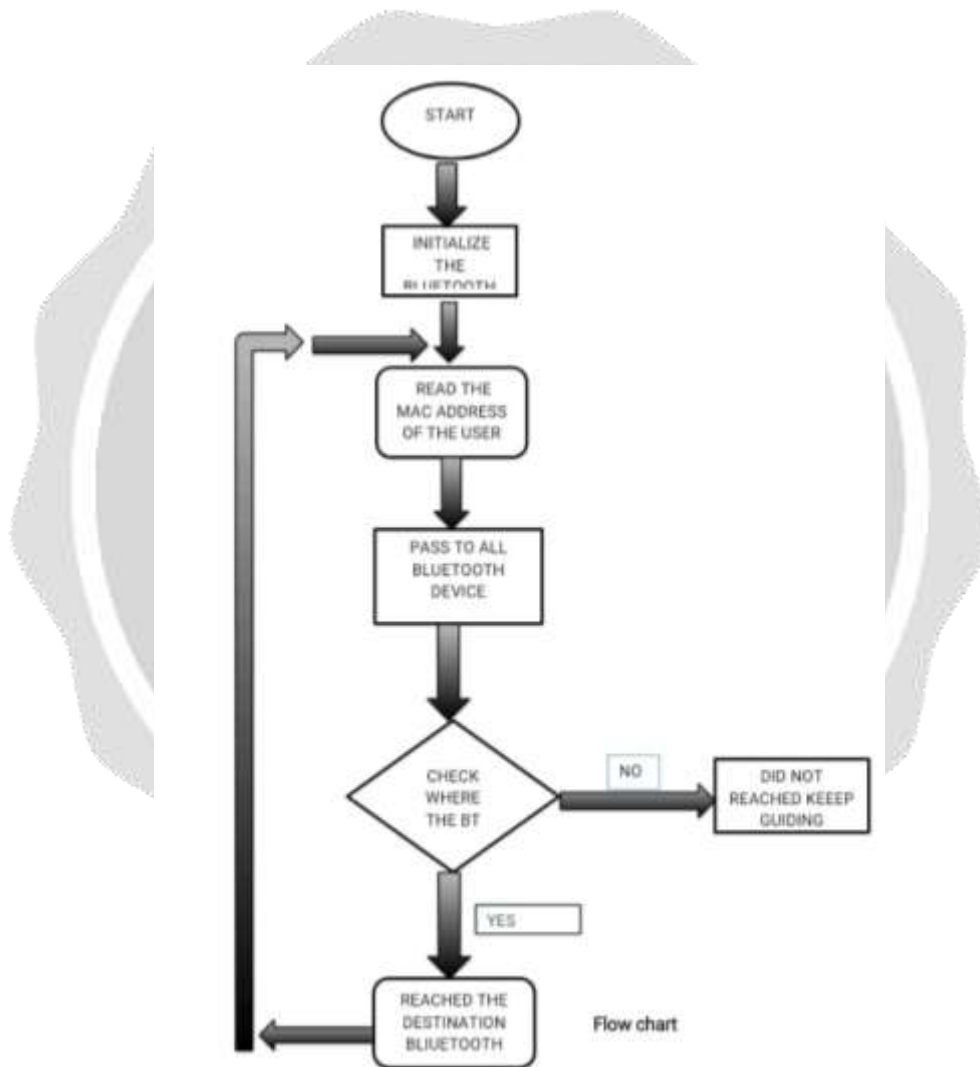

Fig.2 Flow Chart

5. USE CASE DIAGRAM

The purpose of use case diagrams are used to gather the requirements of a system including internal and external

influences. These requirements are mostly design requirements. Hence, when a system is analyzed to gather its functionalities, use cases are prepared and actors are identified.

When the initial task is complete, use case diagrams are modelled to present the outside view.

In brief, the purposes of use case diagrams can be said tobe as follows –

- Used to gather the requirements of a system.

- Used to get an outside view of a system.

- Identify the external and internal factors influencing thesystem.
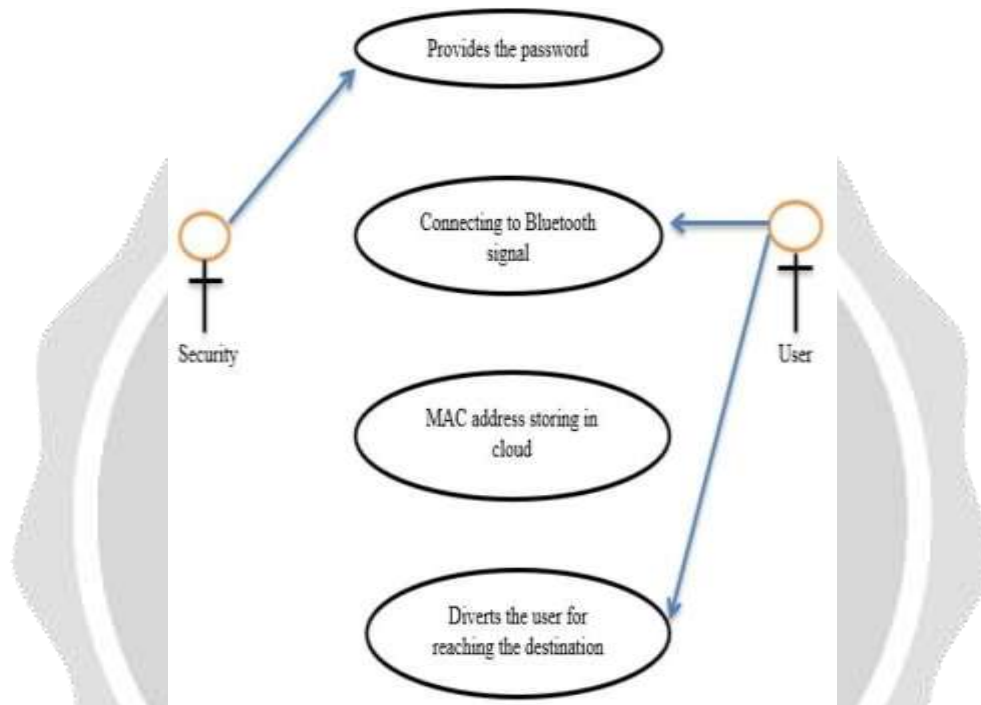
- Show the interaction among the requirements are actors.

Fig.3 Use Case Diagram

6. LITERATURE SURVEY

A literature survey or a literature review in a project report shows the various analyses and research made in the field ofinterest and the results already published, taking into accountthe various parameters of the project and the extent of the project.
A literature survey includes the following
• Existing theories about the topic which are accepted universally.
• Books written on the topic, both generic and specific.
  • Research done in the field usually in the order of oldest tolatest.
• Challenges being faced and on-going work, if available. Literature survey describes about the existing work on thegiven project. It deals with the problem associated with theexisting systemand also gives user a clear knowledge on howto deal with the existing problems and how to providesolution to the existing problems different thing.[1]

On Improving Indoor Navigation Accuracy Using Bluetooth Beacons
Author: Rattapon Kaewpinjai, Thatchai Chuaubon, Anya Apavatjrut
Year: 2020
The proposed idea is a navigation assistive event management platform. This platform presents a novel approach for organizing an exhibition by allowing both organizers and visitors to interact together in a real-time manner. The platform also provides location-based services. The location of the visitors is calculated using multi- lateration technique with the help of available. WiFi signals in the building. Additionally, in order to improve localization

accuracy, several Bluetooth beacons were introduced. It has been shown from the experiments that Bluetooth beacon deployment can significantly improve localization precision. Several empirical path loss models for both WiFi and Bluetooth signals defined under a real-world environment were proposed and compared in this paper.

This system aims at tracking exhibition visitors in a real time manner. Indoor tracking assists visitors in navigating. It is also beneficial for the organizers' perspectives for further.[2]

BLE Beacons for Internet of Things Applications: Survey, Challenges and Opportunities.
Authors: Kang Eun Jeon, James She, Perm Soonsawad, and Pai Chet Ng
Year: 2018
The information consolidates the state-of-the-art BLE beacon, from its application and deployment cases, hardware requirements, and casing design to its software and protocol design, and it delivers a timely review of the related research challenges. In particular, the BLE beacon's cutting-edge applications, the interoperability between packet profiles, the reliability of its signal detection and distance estimation methods, the sustainability of its low energy, and its deployment constraints are discussed to identify research opportunities and directions.

The main contributions of this paper are summarized as follows:
•an overview of the BLE protocol and beacons, their applications, and related hardware and software issues;
•a survey of the state-of-the-art research on BLE beacons;
•a review of limitations of BLE beacons and suggestions of future research directions, challenges and opportunities.[3]

7. CONCLUSION

Bluetooth beacon technology is an advancing technology. Beacons provide a most accurate location with less expensive and flexibility.in this paper, we defined a college campus routing system which guides us to reach our destination using a smart phone or tablet.

8. FUTURE SCOPE

The beacon technology will be a drift in next few more years in the future. The beacon technology enables sensors, controllers which opens up with millions of possibilities for the developers and designers to make an inventive experience a service.
Further this can be implemented in shopping malls,transport, in airports and railways, bus stations etc.
Initial manual connecting and disconnecting of Bluetooth devices after reaching the required destination can be avoided by developing app.

9. REFERENCES

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