Transforming Physical Browsing in Library using IoT

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Abstract — The Internet of Things characterized as interconnection of exceptionally identifiable inserted processing gadgets inside the current framework. Sooner rather than later the world will be overlaid with correspondence of installed gadgets making a "Savvy World". The world is splashed in the web and now the Internet of Things is additionally picking up a considerable measure of consideration. However, the utilization of the web innovation in library administration is at its earliest stages. In spite of the fact that standardized tag or BLE-BEACONS based library administration framework has raised effectively in the current past, it has its own constraints. The proposed framework depends on the BLE-BEACONS innovation where BLE-BEACONS are inserted on the books shelf and the client advanced mobile phone can connect to it through its Bluetooth device for simple, productive and efficient physical browsing in library. This framework utilizes client's own advanced mobile phone to see the whole book data available on multiple BLE-BEACONS device in its range. One of the significant objectives of this IoT based "Brilliant Library System" is rearranging the client's undertaking of hunting down the books and issuing books.

Keywords– *Internet of Things (IOT) BLE-BEACONS;* Arduino-uno kit; BLE-HC05 module; Android Application

I. INTRODUCTION

The IoT has transformed from being an experiment concept, and is now completely transforming how industries operate. The IoT a network of connected things, like relationships between things and things, people and things, and people and people. We consider the problem of tracking physical browsing by user in Library. homologous online browsing, where users pick to go to web pages, reside on a subset of pages of interest to them, and click on links of interest while ignoring others, we can draw parallels in the physical setting, where a user might walk purposefully to a section of interest, reside there for a while, gaze at specific items, and reach out for the ones that they wish to examine more closely. As our contribution, we design techniques to explore and track each of these elements of physical browsing using a combination of a Smartphone app which eases the Students ' physical Browsing experience and BLE-beacons for indoor positioning. We believe that access to physical browsing information of Library can not only provide crucial insights into Library needs and interests but also reveal how much the Library is effective.

II. RELATED WORK

RFID is the wireless system that uses radio waves to transmit information from a tag attached to a thing, for the automatic identification. RFID technology for library management.

III. METHODOLOGY

A BLE Beacon device is used for identification of books on each Shelf. We are using BLE HC-05 module for the BLE beacon device .It transmits the data to the android app. The app shows the details of the book on the display of the mobile phone of the user. The app will have features like issue the book, return the book and search the book.

IV. PROPOSED SYSTEM

A] BLE-BEACON
BLE beacon is the Hardware Transmitter that broadcast their identifier to nearby portable electronic devices. It allows smart phones, tabs and other devices to perform actions when in close range of beacon.
 Components to build a BLE-BEACON

Arduino Uno Controller IC:-
Arduino/Genuine Uno is a microcontroller board. We can connect it to pc with usb cable or AC/DC adapter.
 BLE HC-05:–
HC-05 module is an easy to use Bluetooth SPP (Serial Port Protocol) module, designed for transparent wireless serial connection setup. The HC-05 module is the most popular Bluetooth module in the DIY community for wireless communication. It is cheap and you can find tons of tutorials

and resources on using it. With the signal coverage of 9 meters (30ft), the JBtek HC-05 module can build a connection to other modules in two ways: as a master or as a slave. Cables are used to connect the BLE-Beacon device with the BLE-HC-05 module.

B] ANDROID APPLICATION

The Android application should be installed in the user's smart phone. As soon as the user enters the library and assuming that he has the application started: - the application will check if the Bluetooth device is ON if yes then it will proceed further otherwise application will prompt to Turn ON the Bluetooth device. The application will then check the BLE beacon devices in range and request them for connection. After connection its receives the data present on the BLE beacon device and display it to user.

Function of Android application:-
- Connect and receive data on the BLE-beacon device.
- Displaying the received data in Tabular form.
- Searching option according to Title, Author or Publication.
- Sorting panel to sort the books according to Title, Author or Publication.

Types of users:-
- Normal user – normal user will only have access rights to the BLE- beacon device.
- Admin –Admin can access as well as can write to the BLE beacon device.
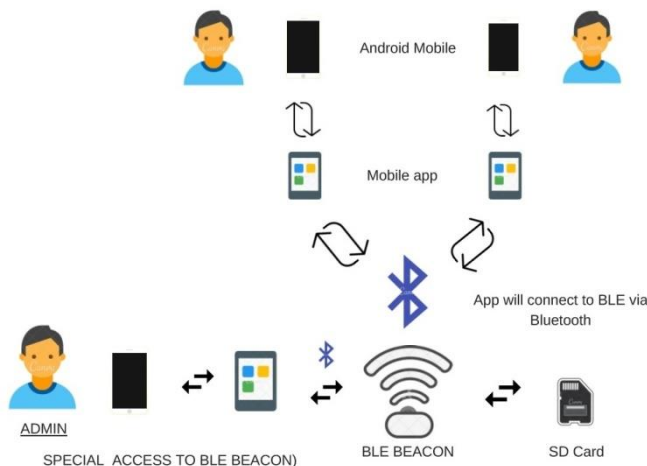
System Architecture:-

Fig 1 : System Architecture

V.   SYSTEM INTRODUCTION

The BLE beacon device will be placed on each shelf in the library. Each BLE beacon device will have the information such as number of books, book titles, authors, publication, and price. The user will have an android application to interact with the BLE- beacon device.

Whenever the smart phone is in range of the BLE beacon device, the android application sends the connect request . BLE beacon device using its localizer, identifier analyze the data and location and sends it to the android application.
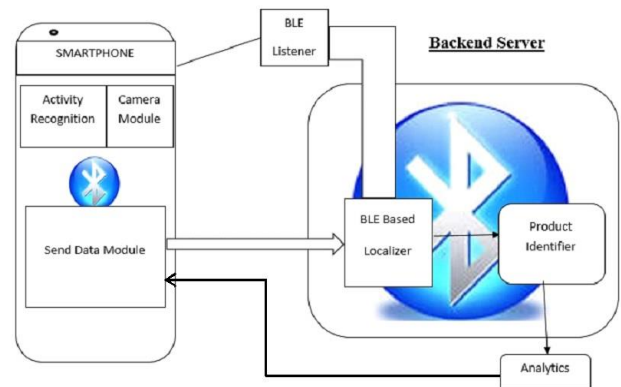

Fig 2 : System Interaction.

VI.   SYSTEM IMPLEMENTATION AND DEVELOPMENT

In the Implementation of Transforming Physical Browsing in Library using IoT , Three major stages Consist:

1. Creating the BLE Beacon device.
2. Designing the Android App.
3. Integrating the BLE Beacon Device and Android app.

1. Creating the BLE Beacon device
   The BLE Beacon device will be placed on each shelf of the Books in the Library. The Device Contains BLE HC 05 Module.

2. Designing an interactive tool that also visualizes necessary data.

 Android Studio is used for developing the Application. The App contains two Modules: User Module and Admin Module.
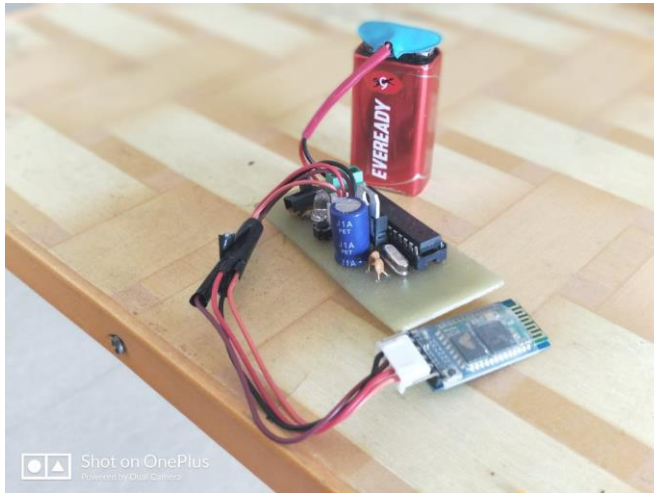   1.   User Module.
   2.   Admin Module.

3. Integrating the System.

The User needs to connect with the BLE Beacon device through Bluetooth in order to get the books information.

ig 3: Overview of BLE Beacon

Device

VII.   RESULTS

A.   Study Area and Dataset

The user gets all the information on the android app. The **Android App** shows Book details and its location in the rack. He can issue /return the book using the app.
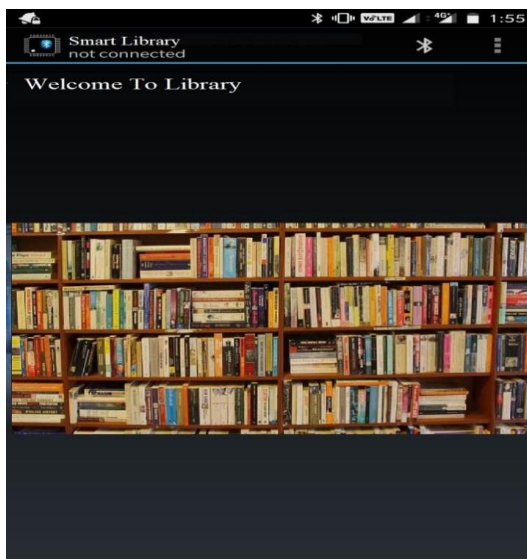

Fig 4: Overview Android Application.

The fig: 4 shows the overview of Android Application used for displaying the book details.
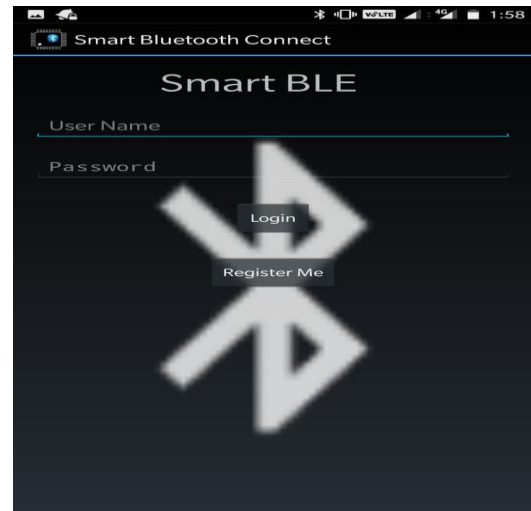
B.   Output

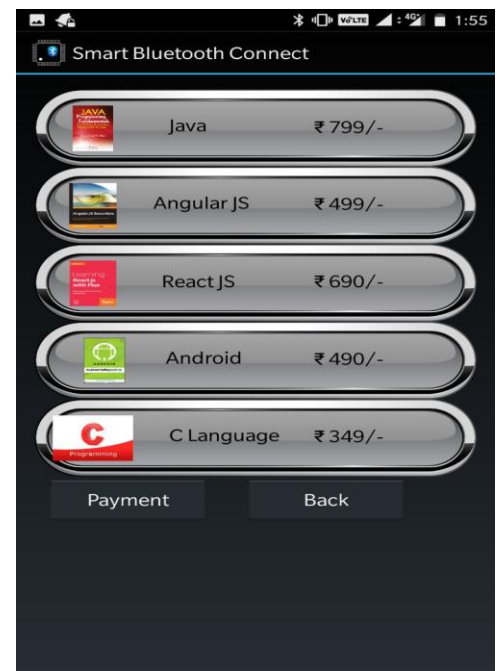**Fig 5 :** Login page of Android Application.

Fig 6: Overview of Dashboard for User

VIII.   CONCLUSION

We have presented our work on physical browsing of user, using standard Android application and an array of BLE beacons deployed in a library. The user uses the android app which connects to the BLE beacons deployed at library while

browsing and facilitates the user with all the book details in the range of the Bluetooth device on screen. This helps the user in ease of Browsing, better decision-making with all the Books information on screen, time-saving and easy physical browsing through app. As a case study, this is of interest to researchers and practitioners as it represents a commonly discussed use-case for indoor positioning , yet relatively little work has used live data from such environments using a BLE platform.

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