

Smart Employee Tracking System Using Beacon Technology

1.INTRODUCTION:

a) Overview:

Beacons are small radio transmitters that send out Bluetooth signals. They are available in different sizes, colors and shapes, making them **suitable for a wide range of applications** and allowing easily into any environment.

An Beacon technology consist of one or more Beacon devices that transmit their own identification number to the local area. It helps smart phones determine their approximate location. And also it can find is relative location to an Beacon in a workplace or store beacon is a new technology which is a indoor localization tracking system with using the Bluetooth technology. Basically it is based on BLE (Bluetooth Low Energy). beacons are standalone devices that constantly send out a UUID (Universally Unique Identifier) using Bluetooth 4.0 Low Energy

- **Employees are provided with a device that contains a beacon broadcaster with their unique ID.**
- **The scanner at each room of the workplace scans for the available beacon broadcasters and gets the Employee Id from it.**
- **The location of each employee with their ID and time is updated to the cloud and stored in the database.**

There will be a provision for Admin to track the location of every employee at a particular zone in the Web app

b) Purpose:

While GPS is a globally used as location technology it has some disadvantages and also GPS signal inside the buildings or a basements is much more difficult to identify the location but the beacon device can be used at anywhere like indoor localization with any distance. Beacon functions as an indoor tracking system, which allows businesses to advertise their new products with

An Beacon module is an improvised technology which can be used for tracking purpose and also it can be used to find the location for the blind peoples. This device is fully based on the Bluetooth Low Energy (BLE). Bluetooth low energy consisting two main parts are

1 .Advertising

2. Connecting

Advertising and connecting process are done by the BLE through the Beacon device. And also BLE is the main source to find the approximate localization of required object.

2.LITERATURE SURVEY

a)Existing problem:

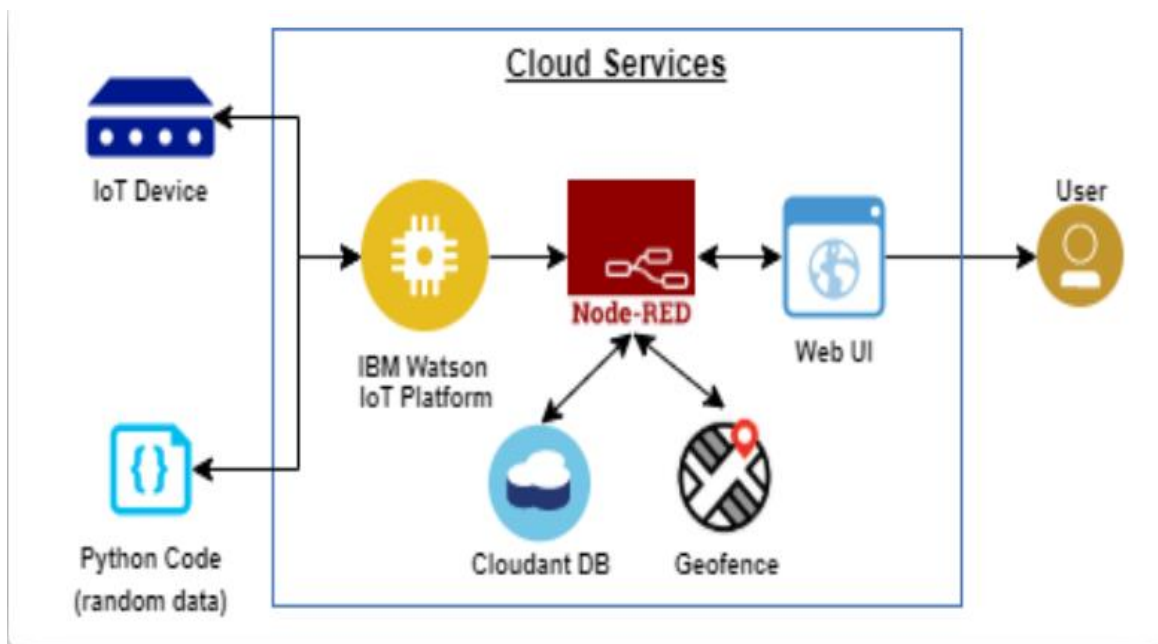
People have different personalities and work ethics .So in order to manage their work efficiently and fairly, there has to be a system in place to allocate tasks to different workers. Currently a manual system will provide most of the requirements for this project. Although noble the manager has little it control over his business. In a manual system data is stored in a cabinet. Files are thus often misplaced or lost. And at times is difficult to find relevant files. Records for stocks are also not always filed correctly and thus information is not centralised and not easily accessible.

b)Proposed Solution:

Introduction In this world of growing technologies everything has been computerized. With large number of work opportunities the Human workforce has increased. Thus there is a need of a system which can handle the data of such a large number of Employees. This project simplifies the task of maintaining records because of its user friendly nature. The objective of this project is to provide a comprehensive approach towards the management of employee information.

3.THEORITICAL ANALYSIS

a)Block Diagram:



b)Hardware/Software Designing:

Software Designing:

- Python code for location of employee
- Designing of nodes for web application in nodered service
- Designing blocks in mit app inventor for android application
- Storing the data in cloudant service

4)EXPERIMENTAL INVESTIGATION:

First of all our project it is **smart employee tracking system**. we need to track the location of employee using beacon technology ,each employee is given with beacons which generate identification number. By the beacon scanners in the particular location it scans the beacon through identification number and tells the location of employee .This data (employeeid,area,time)should send or display to web application and mobile app .so to generate random values like sensor data(we have a python code and this is connected to ibmiot platform with the installed libraries ,and we have to display this in UI interface(web application) . we have nodered service ,sensor data is given to ibmiot node in node red and by connecting this to cloudant node we can get this data or store this data in cloudantdb and from this ibmiot node connecting to fuction node we can display the sensor data in UI interface(web application)and to get the data in moblie app we use the help of mit app inventor we designed the interface for mobile app and designed the blocks and with this we can get sensor data to mobile app.

Python code:

```
import time
import sys
import ibmiotf.application
import ibmiotf.device
import random
import json

#Provide your IBM Watson Device Credentials
organization = "pentio"
deviceType = "iotdevices"
deviceId = "1008"
authMethod = "token"
authToken = "6304532723"

# Initialize the device client.
E=0
A=0
T=0

try:
    deviceOptions = {"org": organization, "type": deviceType, "id": deviceId, "auth-method":
    authMethod, "auth-token": authToken}
    deviceCli = ibmiotf.device.Client(deviceOptions)
    #.....

except Exception as e:
    print("Caught exception connecting device: %s" % str(e))
    sys.exit()

# Connect and send a datapoint "hello" with value "world" into the cloud as an event of type
"greeting" 10 times
deviceCli.connect()

while True:
```

```

E=1811
A='canteen'
T='2pm'
#Send Temperature & Humidity to IBM Watson
data = {"d":{"employeeid" : E, 'area': A , 'time': T}}
#print data
def myOnPublishCallback():
    print ("Published employeeid = %s %" % E, "area = %s %" % A, "time = %s %" % T,
"to IBM Watson")

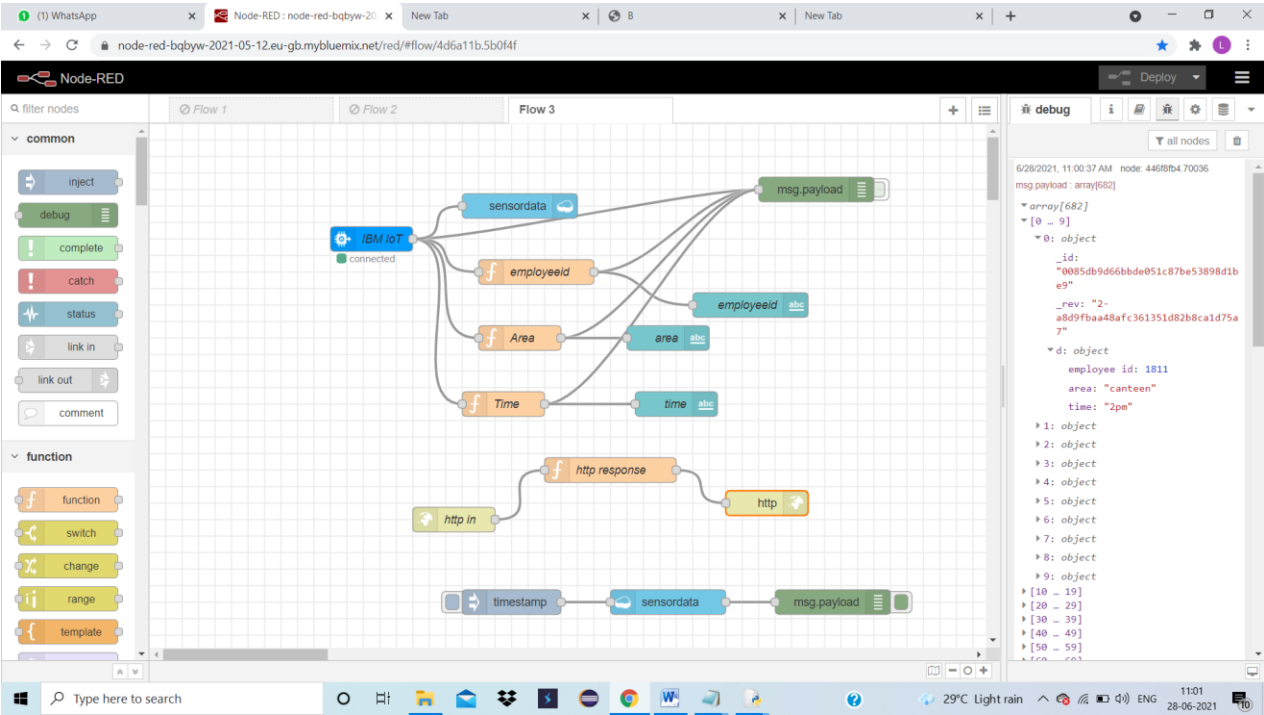
    success = deviceCli.publishEvent("Data", "json", data, qos=0,
on_publish=myOnPublishCallback)
    if not success:
        print("Not connected to IoT")
        time.sleep(1)

# Disconnect the device and application from the cloud
deviceCli.disconnect()

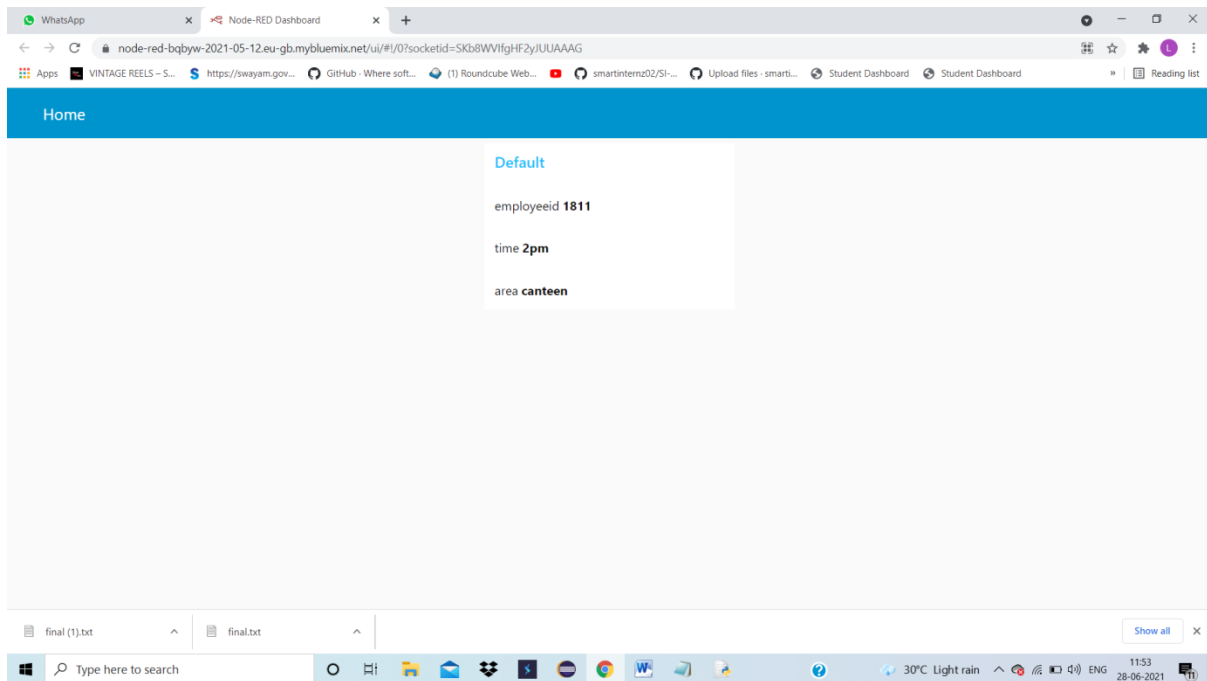
```

output for the python code:

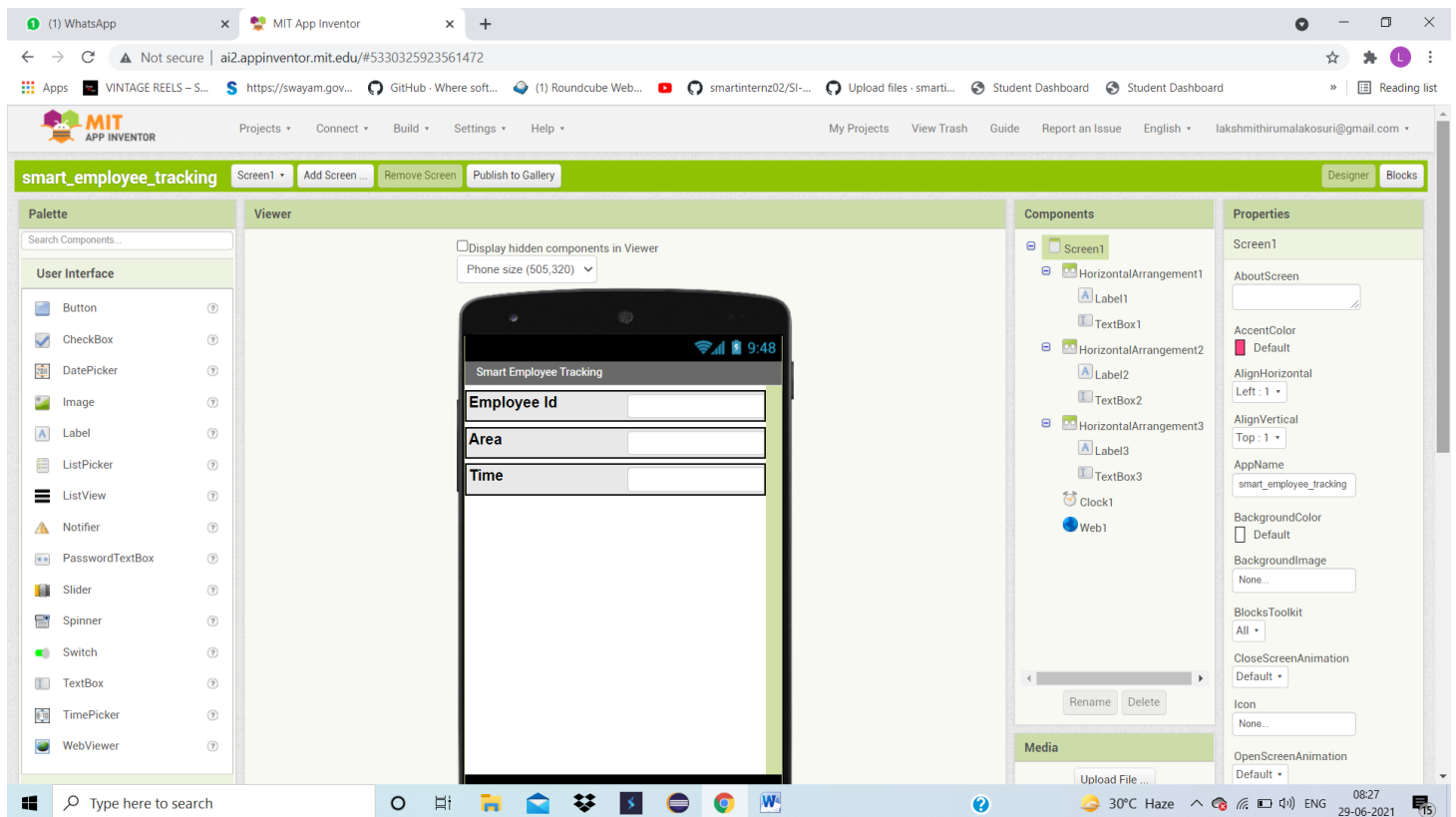
Retrieving data from cloudantdb



Visualizing sensor data in User Interface:

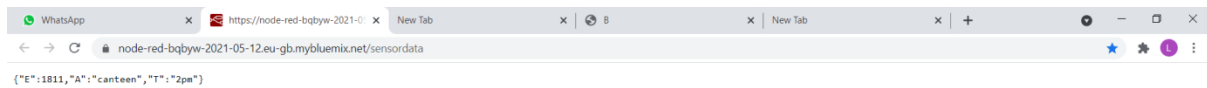


Designing app interface for the displaying the sensor data:

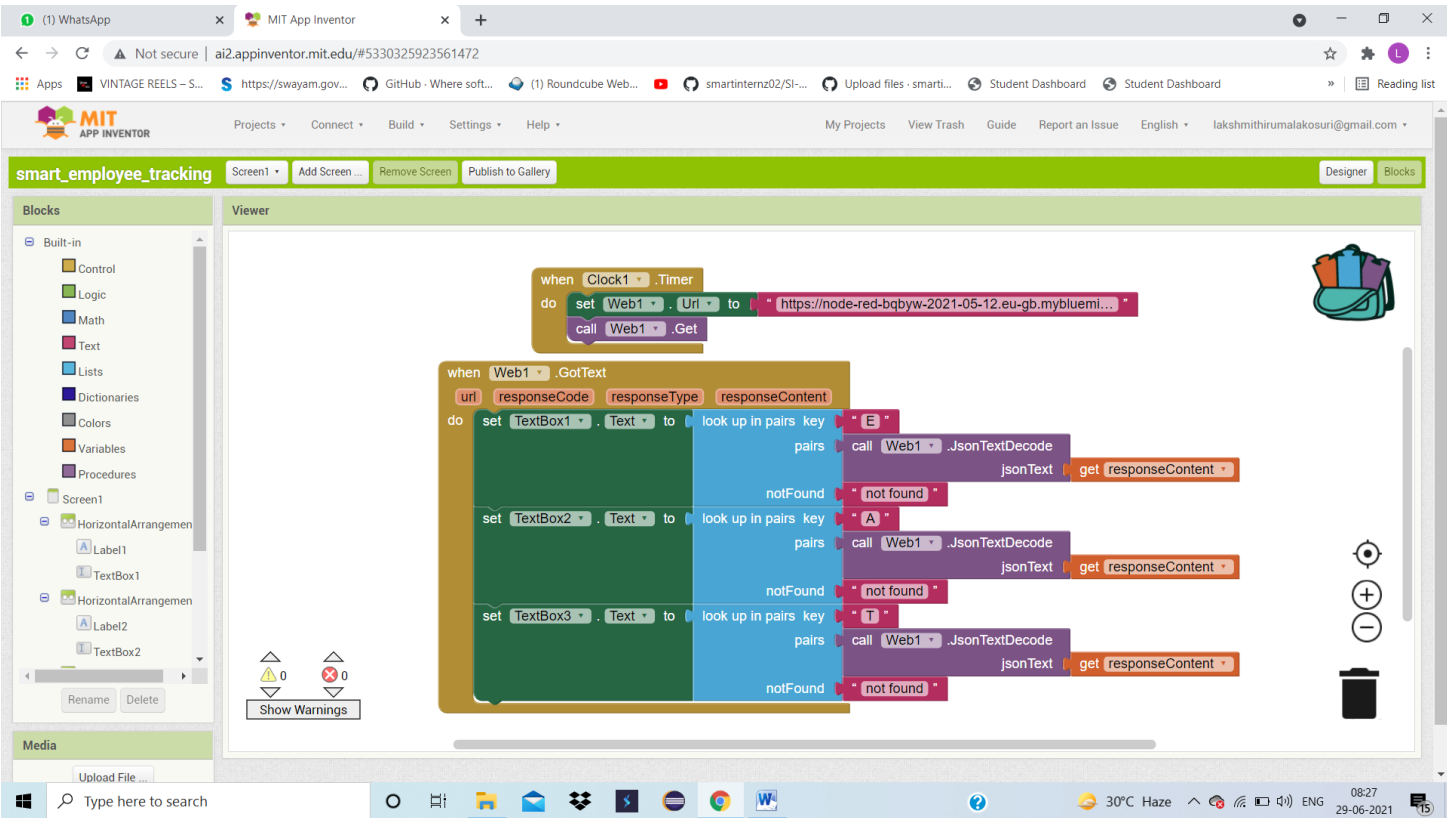


The url for getting the sensor data:

<https://node-red-bqbyw-2021-05-12.eu-gb.mybluemix.net/sensordata>



Designing blocks in mit app inventor



Before hitting the url:

8:31 AM

Smart Employee Tracking

Employee Id Hint for TextBox1

Area Hint for TextBox2

Time Hint for TextBox3

After hitting the url:

8:31 AM

Smart Employee Tracking

Employee Id 1811

Area canteen

Time 2pm

The screenshot displays the Cloudant dashboard for a database named 'sensordata'. The interface is divided into a sidebar on the left and a main content area. The sidebar contains navigation links: 'All Documents', 'Query', 'Permissions', 'Changes', and 'Design Documents'. The main content area shows a table of documents. The table has three columns: 'id', 'key', and 'value'. The 'id' column contains document IDs, the 'key' column contains keys, and the 'value' column contains JSON objects. The table shows 20 documents, each with a unique ID and a value containing a timestamp and a sensor ID. The browser's address bar shows the URL 'https://cloudant.com/dashboard.html#database/sensordata/_all_docs'.

id	key	value
0085db9d66bbde051c87be53898d1be9	0085db9d66bbde051c87be53898d1be9	{"rev": "1-6cb36ea9f7124703c848b8d67c96..."}
0085db9d66bbde051c87be53898d4099	0085db9d66bbde051c87be53898d4099	{"rev": "1-6cb36ea9f7124703c848b8d67c96..."}
0085db9d66bbde051c87be53898d5fd4	0085db9d66bbde051c87be53898d5fd4	{"rev": "1-6cb36ea9f7124703c848b8d67c96..."}
0085db9d66bbde051c87be53898d7a5b	0085db9d66bbde051c87be53898d7a5b	{"rev": "1-6cb36ea9f7124703c848b8d67c96..."}
0085db9d66bbde051c87be53898d8c8d	0085db9d66bbde051c87be53898d8c8d	{"rev": "1-6cb36ea9f7124703c848b8d67c96..."}
0085db9d66bbde051c87be538995ff11	0085db9d66bbde051c87be538995ff11	{"rev": "1-6cb36ea9f7124703c848b8d67c96..."}
0085db9d66bbde051c87be5389968661	0085db9d66bbde051c87be5389968661	{"rev": "1-6cb36ea9f7124703c848b8d67c96..."}
0085db9d66bbde051c87be53899686d	0085db9d66bbde051c87be53899686d	{"rev": "1-6cb36ea9f7124703c848b8d67c96..."}
0085db9d66bbde051c87be5389987dd5	0085db9d66bbde051c87be5389987dd5	{"rev": "1-6cb36ea9f7124703c848b8d67c96..."}
0085db9d66bbde051c87be538998bdc9	0085db9d66bbde051c87be538998bdc9	{"rev": "1-6cb36ea9f7124703c848b8d67c96..."}
0085db9d66bbde051c87be538998eddd	0085db9d66bbde051c87be538998eddd	{"rev": "1-6cb36ea9f7124703c848b8d67c96..."}
0085db9d66bbde051c87be538999bda4	0085db9d66bbde051c87be538999bda4	{"rev": "1-6cb36ea9f7124703c848b8d67c96..."}
0085db9d66bbde051c87be53899f7d55	0085db9d66bbde051c87be53899f7d55	{"rev": "1-436c69daf0a8cd9f2b7bd1eca0620..."}

Data storage in cloudant:

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f1e212b8-f19f-44a4-81f7-98c8d4a624d3-bluemix.cloudant.com/dashboard.html#database/sensordata/0085db9d66bbde051c87be53898d1be9

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sensordata > 0085db9d66bbde051c87be53898d1be9

{ } JSON 📖 🔔

Save Changes

Cancel

Upload Attachment

Clone Document

Delete

1 {

2 "_id": "0085db9d66bbde051c87be53898d1be9",

3 "_rev": "1-6cb36ea9f7124703c848b8d67c96746e",

4 "d": {

5 "employee id": 1811,

6 "area": "canteen",

7 "time": "2pm"

8 }

9 }

Log Out

Type here to search

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🌡 29°C Light rain

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ENG

14:40

26-06-2021

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Flow Chart:



Result:

The sensor data is received by the ibmplatform and the data is splited and visualized in ui interface(web application) and the app is designed to get the sensor values when we hit the url.

Advantages:

- Beacons have great price / value factor compared with other technologies.
- They are easy to use and implement.
- Beacons have multiple applications (engagement, navigation, analysis, etc.)
- Enable to understand customers better by collecting customer behaviour data.
- Enables to retarget customers after they walk away.
- They work in multiple verticals (retail, education, culture, airports, events, offices, hotels etc.)
- What are the advantages of Beacon as a platform?
- **Beacons** are one of the best ways to establish connection with your customers in a physical world. They trigger and deliver proximity campaigns to a person's phone based on his/hers location. **Beacons** also enable to collect important data on customer behaviour and increase their engagement. **Beacons** are simple devices.
- The **beacons** will allow retailers to identify a specific device approaching their store and the devices can even trigger a discount code to appear on the consumer's device, turning a browser into a buyer. **Beacon technology** has the potential to revolutionize the way we navigate and save us a lot more time.

#	Beacons
Battery	Low consumption

#	Beacons
Range	up to 70 meters (230 feet)
Accuracy	up to a meter
Cost	Low
Best For	Indoor Campaigns, Loyalty, Customer Analytics, Indoor Location

Disadvantages:

People need to install an app to be able to experience proximity marketing with beacons. When beacons are not implemented correctly people can get easily annoyed by receiving too many push notifications and may even stop using the app. Most beacons are battery-powered, which may be a maintenance issue. You can get USB beacons instead but they need to have a power supply

Applications:

Proximity Marketing

Proximity marketing in retail is the first field of beacon technology use. Retail commerce lives and breathes on, giving the customer a reason to buy something. Since the customer is already in the store, beacons can drop a nudge right on the phone and simply suggest something worthwhile. That makes them very convenient tools for delivering a personalized customer experience with minimal resources involved.

Payment

Payments are the next logical step of implementing beacons into the customer experience. The most common two ways of implementing beacon-based technology to the payment experience are by adding it to the payment terminal and enabling payments via smartphone (currently in use by terminals compatible with Apple Pay and Google Pay services).

Event Management

Event management is the other big field where Beacon location technology may come in handy and make a huge difference. Managing events on any scale is a considerable challenge.

You need to:

- Know what is going on all the time
- Inform everybody about everything as soon as possible
- Navigate people through the event and remind them of scheduled events and changes to the program.

Content Delivery

The perfect way of implementing content delivery to the customer experience is with various hangout platforms like cafes, coffee shops and restaurants, and the likes. Airport or railway waiting rooms are also suitable spaces for this kind of activity.

For example, major newspapers like the New York Times and Wall Street Journal have provided certain popular hangout spots in Manhattan and JFK airport with beacon-based content delivery. Beacons sent the latest news and the most popular articles to promote the newspaper's applications.

Conclusion:

With the improved version of iBeacon technology we can use for multipurpose. Beacons are used for indoor location mapping, targeted advertisements, automatic mobile payments etc. An iBeacon device can easily paired with the mobile phone, so we can track the location of the employee or marketing representatives approximately. Even though the device can be used for entry and exit for various places like workplace, industries, etc,. Due to this technology we can avoid more management oriented problems occur in the workplace

Future Scope:

The future of beacon technology is quite bright in the offices and organizations where these can help in increasing the productivity and reducing costs. Beacons can make the office environments much smarter by enabling auto trigger, automatic initiation, and completion of the tasks without the human intervention

Bibliography:

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<https://ja-si.com/employee-tracking-bluetooth-card-beacons/>

<https://theappsolutions.com/blog/reviews/geolocation-beacons-explained/>

<https://ijarcce.com/upload/2016/december-16/IJARCCE%2027.pdf>

Appendix:

Source code:

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    def myOnPublishCallback():
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    success = deviceCli.publishEvent("Data", "json", data, qos=0,
on_publish=myOnPublishCallback)
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UI output screenshot:

