

# Monitoring Social Distancing and Detecting COVID Patients at Public Places Using a Beacon-Based Application

Monis Anis<sup>1</sup>, Priyesh Kumar Pandey<sup>2</sup>, Dr. Atul Kumar<sup>3</sup>

<sup>1,2</sup>B.Tech, Dept. of CSE, Shri Ramswaroop Memorial College of Engineering & Management (AKTU), Lucknow, India

<sup>3</sup>Professor, Hod, Dept. of CSE, Shri Ramswaroop Memorial College of Engineering & Management (AKTU), Lucknow, India

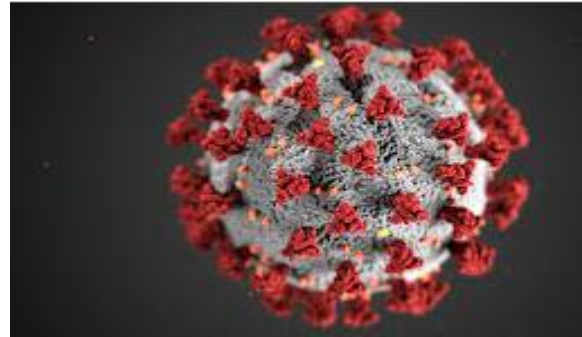
**Abstract**— With the popularity of mobile devices, location services have been deep into everyone's life, and the positioning of data collection is an important goal of data analysis. However, the current applications mainly focus on outdoor device such as WIFI positioning technology was discussed the most often and also got a lot of well research results. This paper mainly discusses the application of Beacon technology in the information service of the library, and understands the user for the acceptance of new technology. Beacon technology is a combination of user and space environment of intelligent technology, beacon is a low-power Bluetooth sensor technology, the library can use this equipment to understand the use of library physical space and collections. The library can be combined with a smart mobile device via Beacon technology, allows users to receive the latest library information, users can also search on the smart mobile devices on various collections. Users can also direct the user to the bookshelf where the destination book is located, depending on the search needs entered by the user. This study discusses the user's intention to use Beacon in combination with the technology acceptance model and the innovation diffusion theory.

**Index Terms:** Beacon, Bluetooth low energy, location data, indoor positioning, diffusion of innovation theory.

## 1. INTRODUCTION

Since we are aware of the fact that from the beginning of 2020 or rather by the end of 2019 our world is experiencing the deadly disease named SARS-CoV-2 which happens to be highly infectious. In challenging times like these the only and the most effective preventive measures seem to be maintaining social distancing at public places, the ad-hoc solution

adopted by many countries was to monitor it manually and making people aware of its importance but this is not the long term solution for a problem which is being present in this world for almost two years now. Therefore we as the technocrats are duly responsible for developing a better way of monitoring social distancing at public places.



Now there could be many ways of monitoring social distancing by using technology as a tool. But since I am from India which happens to be a developing country and an emerging economy where per capita income is around 2100 dollars which stands at 145th place in the world. Therefore keeping all this in mind the idea of social distancing has to be such that it is economically accepted by all. The solution which is affordable for even micro or small business owners can only prevail in an economy like India.



Now, the challenge ahead for me was that even today

the majority of the Indian population has not exposed themselves to smart devices, therefore any technological advancement for monitoring social distancing from traditional ways must have to be such that it is accessible to even those who have kept themselves secluded from this era of technology.

According to the data collected by Statista (a data collection agency) reveals that internet penetration rate in India is only 45% which means that even today 55% of Indian are deprived of using the internet and another data collected by Statista shows that the total number of smartphones in India is 760 million in the population of 1.3 billion.

Therefore, by now, I was pretty sure that my technological solution must not have to depend on the internet or smartphones, so while searching for the alternative of internet and smart devices I watched a five-year-old video on I-beacons a few days ago an idea struck my mind of developing a beacon-based technology for monitoring social distancing.

Now why I chose beacons as the base for developing the technology was simple because it is a cheaper alternative to the internet as it uses Bluetooth for connectivity, and Bluetooth connectivity is offered by even cheapest mobile phone in the market today (Keypad phones) which is more or less owned by almost everyone in India.

Therefore, this appeared to be the most feasible solution among all.

Now, the second challenge for us was to detect COVID patients at public places. This was necessary in order to stop the further spread of the infection. Here in India people are usually not very law abiding or preventive.



Many incidents were reported of COVID patients violating preventive norms set by the government and World Health Organisation, in many cases people

with positive RT-PCR test reports were found roaming around at public places.

Hence it was necessary to find and stop these people from further spreading the infection, but unfortunately, this wasn't possible to be executed manually.

Therefore I designed this technology to detect these patients and stop the further spread.

## 2. LITERATURE REVIEW

During this tough time of SARS-COV-2 when the world economy is at its nadir because of nationwide lockdown imposed by many countries to fight this deadly disease. As maintaining social distancing seems to be the most effective way to control the spread of disease, many countries have adopted the way of maintaining it manually.

Here our focus is on developing a technology to effectively monitor social distancing at public places by using beacons.

This beacon-based technology is cost-effective as we mainly focus on Indian markets and on their affordability and ability to adapt to new technology.

Communicable Diseases Surveillance

System in Iran: Strengths and Weaknesses 30 Years Following its Implementation

Journal of Infection and Public Health

A Study on User Behavior Analysis of Integrate Beacon Technology into Library Information Services

Molecular Beacon Assay Development for Severe Acute

Respiratory Syndrome Coronavirus 2 Detection

In-store location-based marketing with beacons: from inflated expectations to smart use in retailing

Monitoring, surveillance, and investigation of health threats

Communicable disease surveillance and response Systems

Public Health Surveillance Systems: Recent Advances

in Their Use and Evaluation

## 3. ALGORITHMS

For monitoring Social Distancing

Step 1: START.

Step 2 :As soon as the device will come in a range of the beacon will transmit the signal with a unique id.

Step 3: The device will receive the request to accept the signal.

Step 4: Once it clicks Ok then the connection will establish.

Step 5: Now administrator will recognize this device uniquely.

Step 6: Suppose there are N devices in the premises as soon as the distance between any two devices will be less than two meters it will start giving alert notifications on your device.

Step 7: On further ignorance of the notification, the alarm in the premises will alert them.

Step 8: For smartphone users, there will be additional features.

Step 9: Auto-saved Map outline of the premises will be accessible by the users after getting connected to the Beacon.

Step 10: For Parking vehicles.

Step 11: A beacon transmitter at a parking spot will transmit the signal.

Step 12: The receiver in the car will accept this signal.

Step 13: After the connection is established it will guide you to the particular spot.

Step14: END.

#### 4. FOR DETECTING COVID PATIENTS

Step 1:START

Step 2: As soon as the device will come in range of the beacon will transmit the signal with a unique id.

Step 3: The device will receive the request to accept the signal.

Step 4: Once it clicks Ok then the connection will establish.

Step 6: After this process beacons will access the user data from AROGYA SETU APP and if the user's RT-PCR test report is updated as positive on the app it will mark the user by a red flag and issue a warning on his device.

Step 7: On further ignorance of the notification, the alarm in the premises will alert them.

Step 8: Once the negative report is updated on AROGYA SETU APP it will remove the red flag and update with a green flag.

Step 9: END.

#### 5. IMPLEMENTATION

Now the challenge ahead for me was how to design it.

So after reading a lot about beacon technology I was perplexed as to which beacon to use, how to design a user-friendly application, the cost-effectiveness of the project, and much more.

After doing my research I concluded that I will be using BLE (Bluetooth low energy) beacons and a 'react' based which is compatible with both IOS-based and android-based devices.

Now how this technology will work?

Firstly we will be installing a beacon at public places like malls, supermarkets, educational institutions, and offices where people usually carry their mobile phones with them.

Secondly, we will be developing a React-based application that you can install on your Bluetooth-enabled devices as soon as your device will come in the range of the beacon, it will ask for your permission, once you will give the permission it will access your location.



After accessing your location it will give you an alert notification as soon you will come in proximity (around 6 feet) with another person carrying Bluetooth enabled device which is also connected to this beacon.

If further violation of social distancing will take place then the administrator of this application will alert you with a voice signal via speakers install at that place.

The best part about this technology is that you don't need to carry particularly a smartphone as I have mentioned earlier in the introductory part that these beacons can also be connected to the basics keypad phone.

In this case, also beacon will ask for your permission to access your location and once you will be violating social distancing norms.

Even your smart wearables like Bluetooth-enabled watches can also access this technology. Like in case of school kids who aren't allowed to carry a mobile phone with them can be monitored using a smart band which isn't much expensive and quite affordable.

## 6. COVID PATIENT DETECTOR

Beacons will access the user data from AROGYA SETU APP and if the user's RT-PCR test report is updated as positive on the app it will mark the user by a red flag and issue a warning on his device. On further ignorance of the notification, the alarm in the premises will alert them. Once the negative report is updated on AROGYA SETU APP it will remove the red flag and update it with a green flag.

## 7. CONCLUSION

Hence, this was our idea of solving the problem of maintaining adequate social distancing at public places. Though I believe that there can be even better solutions than mine for solving the current issue but my concern was more of an economical solution that is affordable by even small business owners. I would conclude here by urging our government and industrialist that this is the time we should start thinking about adopting smart ways over the traditional ones. This will save a lot of manpower and will give the best solutions.

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