

IoT for Resource Constraint using Physical Web for Emergent Users

Khushboo Mantri¹Pratiksha Kharde²

^{1,2}Don Bosco Institute of Technology, Mumbai, India

Abstract— In this paper, we have discussed Physical Web and use of the physical web in daily life. The physical web is an emerging technology. The basic idea of the physical web is to traverse and control physical objects in the world surrounding mobile devices with the help of web technologies. The Physical Web, like many new mobile and ubiquitous technologies, seeks to enable a range of seamless and procure experiences. Its goal is to extend the web to physical objects, making them and their services easily discoverable by nearby mobile devices, we explore the potential and hurdle of one such new platform the Physical Web in resource-constrained contexts in Dharavi, Mumbai, India. The Physical Web is an open source Bluetooth - based beacon system, which aims to provide quick and seamless interaction with physical objects over a web platform. This emerging technology (Physical web and Beacon) provide local small enterprise traders in the regions with the facility to quickly and easily create and distribute a simple online presence via a local broadcasting medium.

Key words: Internet of Things; Emergent Users; Physical Web; Eddy Stone; Beacons

I. INTRODUCTION

With the development of IoT technology, Bluetooth Low Energy Beacon devices have become important media of beneficial insight. Although current applications of these devices do not make objects "smarter and wiser" as most people imagine, with the help of the sensing characteristics, IoT can have more diversified utilization. The Beacon is, in fact, Bluetooth precision positioning technology. Its use is mostly focused on customer push applications of the retail industry, which can bring business opportunities. The reason Beacon is regarded as an important development is that its micro-positioning function is more precise than GPS. In the past, GPS could only give an obscure idea of the user's location, but with Beacon, the positioning range is precisely narrowed down to 2-100 meters, and able to identify any mobile phone that enters the signal transmission range. Compared to other wireless communication technologies, although Wi-Fi can also achieve positioning, its accuracy is lower than that of Beacon. Moreover, the only android system supports Wi-Fi positioning technology. Near Field Communication that has risen to fame in the recent years can only transmit short-range messages. Hence, it cannot achieve positioning. Despite Near Field Communications high rating in the field of mobile payment, Beacon also has payment applications and is considered Near Field Communication opponent. The Physical Web, like many new mobile and ubiquitous technologies, seeks to enable a range of seamless and enticing experiences[8]. Its goal is to extend the web to physical objects, making them and their services easily discoverable by nearby mobile devices. For instance, at a Physical Web-enabled parking meter or vending machine, users can walk up and pay using their mobile phone instead of depositing cash. Similarly, at a bus stop, users can quickly use their own device to see when the next bus is coming

without the need for a specific app. The Physical Web is the natural extension of the Internet into our everyday interactions with the world around us. It won't be long before you can walk up to just about anything and get more information about it with a quick tap on your smartphone[7].

II. BACKGROUND WORK

A key motivator is to include the groups, who often have lower literacy, infrequent access to data connections, low exposure to technology, and other constraints, in the process of shaping and appropriating devices and services. This is in contrast to what typically happens in such regions, where technologies from traditional markets (e.g., in the USA and Europe) "trickle down" after several years [8]. In this case study, we explore the potential and barriers of one such new platform the Physical, Web in resource-constrained contexts in Dharavi, Mumbai.

According to initial findings in Dharavi, we found that people in Dharavi use smartphones in their daily life for their entertainment purpose. As Dharavi is a slum area and there are a lot of uneducated people staying there, there are some people who are educated but they have only completed their SSC or HSC. Being less educated they still are updated with technology. According to literature survey, we found that people use different applications in their smartphones such as Google voice search to search anything on the internet as voice search makes easy to search anything on the internet to uneducated people. They use Whatsapp and imo for their entertainment purpose and for video calling. The use torrent to download movies from the internet. They also use Youtube and Facebook to watch videos and new. From the Fig 1.1, we can observe all the initial findings and observations found in Dharavi. From our initial findings and observations, we come to know about the number of people use a smartphone in Dharavi and how well they can cope up with the technology. As the people in Dharavi use smartphones for their entertainment purpose, they are willing to use smartphones for their business purpose. They want to use smartphones through which they can increase their profits and business. As most of the people in Dharavi have smartphones so they don't need to spend money or invest money to increase their business and profits.

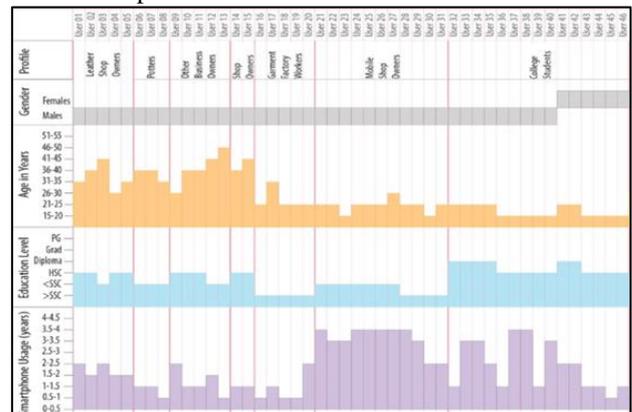


Fig. 1.1: Initial Findings & Observation in Dharavi

III. PROPOSED SYSTEM

A. Application for Shopkeepers

We gave each store owner a Physical Web beacon and access to a simple web app. Selecting any of these will take the user to the simple website of that shopkeeper to upload a single image at a time taken on their phones which will automatically appear at the URL on their beacon. The working application of shopkeeper can be understood from Fig 1.2 The shopkeeper Module[4]. The image uploaded is entire of the shopkeepers choice, for example, this can be the photograph of any of the product available in their shop. Our aim is to see whether this simple yet flexible approach will uplift creative solutions for shopkeepers with a range of technical experience and expertise. Shopkeepers are able to change the image and an optional title through the app on their beacon at any time. Once updated, passersby with Physical Web-enabled devices can then see this image and title when they select that beacon from the notification list.

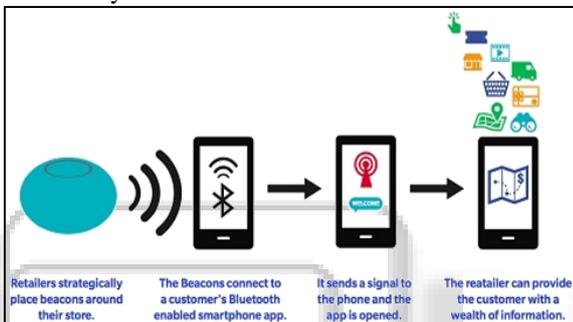


Fig. 1.2: Shopkeeper Module (Uploading Pictures)

B. Notification at Customer Side

Walking down a busy shopping street, the person is keen to find a trader who sells the best product, for example, a leather bag. The market is a bustling area full of people, making it difficult for the person to see what products each shop has on offer. So, the person takes out his/her phone and checks for Physical Web beacons nearby. From here they can see a list of nearby shops, and quickly notices a shop named for example "Dharavi leather bag center". By clicking on the link the customer will be taken to the shopkeeper's web page, which displays his business card. On this card are photos of his products and his phone number and other necessary details are present. If the person is interested in the product, they can visit the shop. Fig 1.3 shows how the customer will use his or her smartphone to find amazing deals and discounts on the products in nearby store[5].

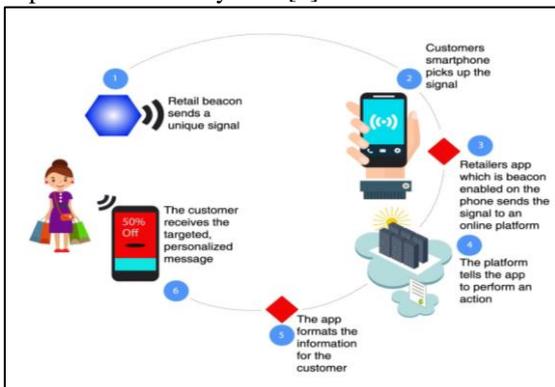


Fig. 1.3: Customer Module (Notification At Customer Side)

IV. IMPLEMENTATION

Bluetooth beacons are small hardware transmitters, it is a class of Bluetooth low energy (BLE) devices that broadcast their identifier to nearby portable electronic devices, which supports physical web. As part of indoor positioning systems, beacons use proximity technology to detect human presence through their smartphone, tablets, PDAs, etc. After detecting electronic device it delivers informational data, contextual data, and creates personalized experiences. When a person walks through an area where a beacon is set up, a beacon sends a URL to their mobile phones. A beacon fixed on to a shop wall or event location or any public place, can communicate easily with a corresponding smartphone app and figure out where the person is located currently, with great accuracy. The retailers or event organizations can then come up with a much targeted or personalized communication based on the proximity of the customer[6]. There is an app solution come forth: this app will help the shopkeepers to upload images of the product or the contextual data on the website. The URL of this website will be provided to customers through beacon, beacon shows the URL in the form of a notification, can be viewed on your mobile phones. In the beacon industry, to configure a beacon a mobile app is required such mobile app is regarded to as an iBeacon app, an Eddystone app, or an indoor navigation app. Put simply, it's a mobile application that supports beacon technology and is installed on a mobile operating system supporting one of the beacon standards. Apple smartphones with iOS 7 and higher support the iBeacon standard, smartphones on Android 4 and up use the Eddystone standard. Hence the Eddystone and iBeacon app; "indoor navigation app" is just a more general term. Users receive informational data, contextual data from beacons via Bluetooth Low Energy (BLE) — a power-efficient Bluetooth technology developed for the Internet of Things applications and devices. Moreover, an app doesn't even have to be running to be awakened by the beacon signal. To receive informational data, contextual data in the form of notification, three things should be on customers mobile phone, Bluetooth, mobile data or any form of internet connection and physical web.

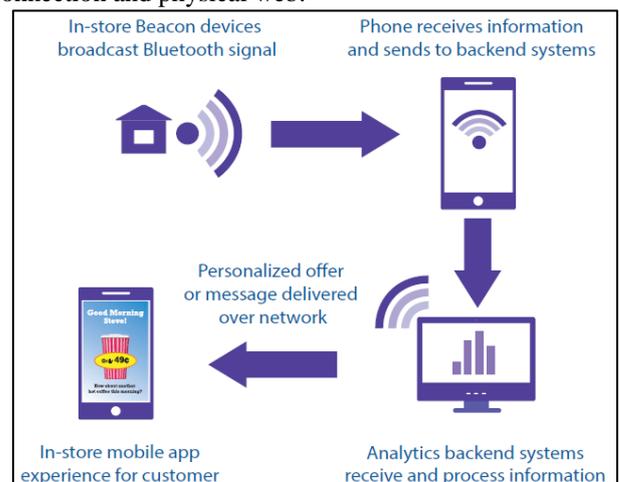


Fig. 1.4: Working of Beacon

V. TECHNOLOGY USED

Html, CSS, Php, JavaScript, Mysql, SQL Server, PhoneGap, Cordova.

VI. CONCLUSION

Until recently, resource-constrained and emergent users have been overlooked as creators and shapers of new and innovative technology. This leaves a large proportion of the world to make-do with technology that is essentially designed for a completely different user group. The Physical Web is an example of such a technology that emergent users would not typically get a chance to shape and define themselves. We strongly believe that working with emergent users to help stimulate ideas and improve technology is helpful not only to create their own visions of the future but also to provide a different perspective on more mainstream mobile services used in the rest of the world. So take physical web to another level, we worked with emergent users of Dharavi, Mumbai, India and the use of beacons i.e physical web also improved the profits of the emergent users which are the shopkeepers of Dharavi, Mumbai, India

REFERENCES

- [1] Devanuj and Anirudha Joshi. 2013. Technology adoption by 'Emergent' Users: The User-usage Model. In Proceedings of the 11th Asia Pacific Conference on Computer Human Interaction
- [2] Matt Jones, Simon Robinson, Jennifer Pearson, Manjiri Joshi, Dani Raju, Charity Chao Mbogo, Sharon Wangari, Anirudha Joshi, Edward Cutrell, and Richard Harper. 2017. Beyond "yesterday's tomorrow": future-focused mobile interaction design by and for emergent users. *Personal and Ubiquitous Computing* 21,1 (2017), 157–171. DOI:<http://dx.doi.org/10.1007/s00779-016-0982-0>
- [3] Everett M Rogers. 2003. *Diffusion of Innovations*. Free Press, New York.
- [4] Lucy A Suchman. 2002. Practice-Based Design of Information Systems: Notes from the hyperdeveloped World. *The Information Society* 18, 2 (2002), 139–144. DOI:<http://dx.doi.org/10.1080/01972240290075066>
- [4] sagipl, 'beacon-technology', 2017. [Online]. Available: <https://blog.sagipl.com/beacon-technology/>
- [6] PALO ALTO, 'WHAT ARE BEACONS AND HOW DO THEY WORK', 2017. [Online]. Available: <https://www.intellectsoft.net/blog/what-are-beacons-and-how-do-they-work>
- [5] Happiest Minds, 'Beacons - Technology', 2018 [Online]. Available: <https://www.happiestminds.com/Insights/Beacons-technology/>
- [6] Vladimir Collak, 'beacons-and-retail', May 7, 2015. [Online]. Available: <https://www.ceremity.com/2015/05/07/beacons-and-retail/>
- [7] 111WebStudio, Thursday, 'What about Beacons and the Physical Web?' 17 March 2016 [Online]. Available : http://blog.111webstudio.com/blog_direct_link.cfm?blog_id=62773
- [8] Jennifer Pearson, Simon Robinson, Thomas Reitmaier, Matt Jones, Anirudha Joshi, Chinmay Parab, Frankline

Onchieku Mogoi, Scott Jenson, 'Exploring the use of the Physical Web with Resource-Constrained Communities', 2017. [Online]. Available :<https://dl.acm.org/citation.cfm?id=3053349>