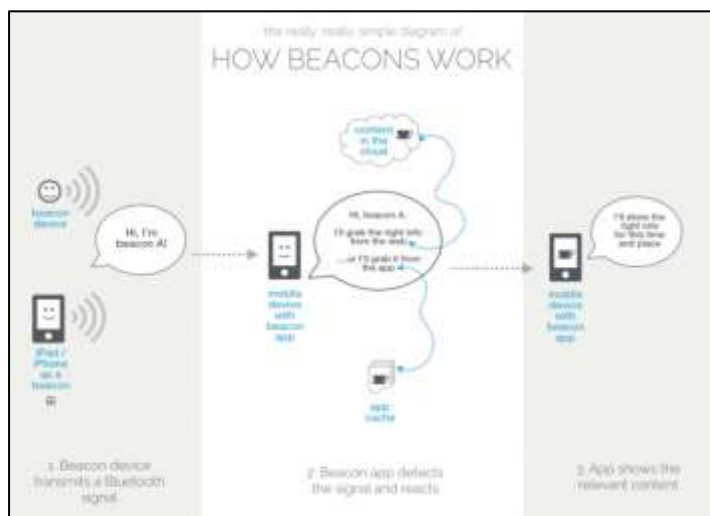


Accessibility and Internationalization Through Campus Beacons

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Co-Sponsoring Organizations: College of Liberal Arts and Sciences; UF Libraries

Purpose and Specific Objectives

Beacons are small devices that transmit data via Bluetooth Low Energy (BLE) to a corresponding smartphone app. As indicated in the diagram (source: <https://blog.locly.com/?p=1438>), any Bluetooth enabled device with the appropriate app can receive the beacon signal, when it gets in range. The app will then display, on the device, the information corresponding to that beacon location.



To date, beacon technology has been used primarily in retail (e.g., pushing tailored coupons or offers to customers according to where they are in a store) and in museums (e.g., self-guided tours of artwork or installations). Our proposal is to bring beacon technology to the higher education realm. Specifically, the purpose of this project is to internationalize and make accessible campus information, both for those who have receptive language impairments (auditory or visual) and/or for those who speak languages other than English, using these beacon devices. Through this technology, UF will be able to provide students, faculty, staff and visitors accessible information in a variety of formats, and in multiple languages.

In terms of language translation, some will point out that, to some extent, the Google Translate app already does something similar. With that app, the user sets the language pairing and direction (e.g., English -> Spanish), aims the camera at any printed text, and sees a translated result. This translation is carried out through text recognition and automatic translation through Google. However, as with all computer-translated text, Google's product is not always accurate linguistically, and can run the risk of being culturally inappropriate or insensitive. This is especially true in the less commonly taught languages and the less English-like languages, given the nature of the algorithms used by the Google program.

In other words, while translations in to Spanish or French might be mostly accurate and convey the general idea, translations into Arabic or Chinese are frequently riddled with errors and often mismatch cultural references. For example, the images below reveal what might happen when computers take the translation out of context.



Not quite accurate ...



"Let's love bushes" = "Keep off"?



"No loitering" = "No vagabonds allowed"?

Thus, the human element of translation, especially if we want to focus on the end user who will be reading/seeing/hearing/interpreting the language produced, is absolutely essential in the process. Additionally, the

use of beacons allows us to push information to users when/where needed, rather than depending on them to have to initiate the process.

The various components of the project development are outlined here.

A. Beacon Access

While smartphones and other smart devices are used to pick up the signal from a beacon, there are 2 primary types of beacon protocols – iBeacon and Eddystone. The iBeacon protocol broadcasts a unique ID using Bluetooth that is detected by a connected app that triggers an action. This type of access requires the creation of an app containing instructions on how to interact with the beacons and a number of software development kits are available for this purpose (<https://github.com/Estimote/iOS-SDK>). The Eddystone protocol, in contrast, broadcasts a short URL that can be read by a Physical Web browser, such as Chrome or Phy.net (both apps are free in the iOS and Android app stores). The Estimote beacons can be used in either manner and, for this pilot, we plan on exploring both types of protocols.

Eddystone: We will start the pilot by setting up the beacons using the Eddystone protocol because the campus content can be easily created in web form. Library IT will assist in creating a standardized template that the language students can edit to add their translations. Visitors will be encouraged to install the app browser PHY.net (<https://bkon.com/products/physical-web-browsers/>) that will sense the beacon’s URL signal when in range (anticipated within 20-30 feet).

Dedicated App: We plan to host a “hack-a-thon” in mid-October at the MADE@UF lab in Marston Science Library in which students will create an app to accompany the beacons. The budget includes 20 beacons that will be used by the student developers to test their apps. In order to incentivize participation of the best and brightest developers, we will offer three prizes (see budget for potential prizes) to the top contributors. We will enlist the help of faculty/staff from Marston Science Library, UFIT/AT, and the Computer Science Department to judge the competition.



Future app development: UF has 2 official mobile apps that potentially could be modified to add support for beacons. The main UF App is an optimal choice because of its large number of downloads (The Google Play Store reports 10,000-50,000 downloads). There is also an official UF Campus Tour app that already includes information about locations across campus that could be augmented with beacons. We have spoken with Brandon Vega (UFIT), and while there are no current plans to add beacon capability, there may be the opportunity to investigate incorporating this technology in the upcoming update of the UF App. This will create a streamlined experience for users, without having to download additional specialized apps.

B. Beacon Locations

For an initial pilot proof-of-concept project, we placement with the campus tour route. Our idea is the Florida Cicerones offer by installing a beacon campus tour. Signs will include the standardized that additional content is available. With input from the Dean of Students Office (Mickey Howard, New Student and Family Programs) and the Florida Cicerones (Jill Pettibone), we will have access to the tour route and the script used in the tours. This information will allows us to provide multilingual and multi-format versions of the same information on our website and app. In this way, anyone with impairments or different language backgrounds could simultaneously (or even independently) participate in the same campus information sessions that the traditional guides offer.



have chosen to align the beacon to supplement the current tours that device at every stop on the standard beacon icon to indicate to visitors



The first beacon will be deployed inside the Marston Science Library near the 2nd floor 3D printers. This is already a stop on the campus tour and will serve as an easily secured location to test and refine the beacon parameters.

We are fully aware that the physical deployment of the beacons themselves will need to be approved by Physical Plant and Business Affairs, and that the app and corresponding information will need to be consistent with signage and messaging used elsewhere in the University. Both Gregg Clarke (Director of Operations, PPD) and Nicole Yucht (Assistant Vice President for University Communications) have agreed to facilitate this process.

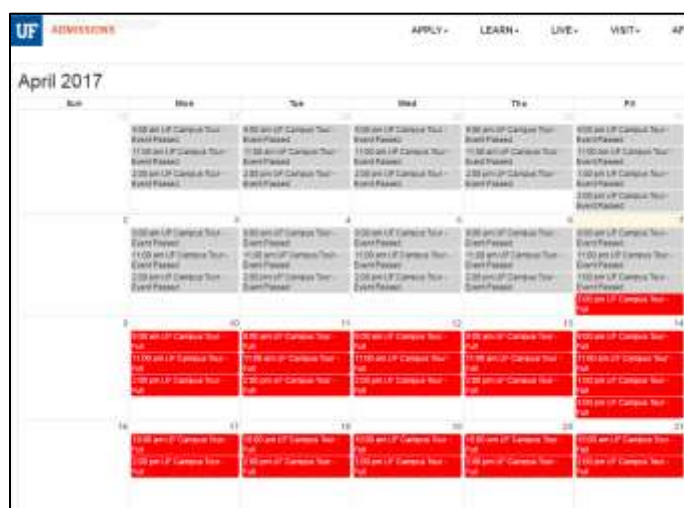
C. Content Development

Various campus units will contribute to making the tour guide information available in the desired audio, visual and multilingual formats. We will collaborate with the Dial Center for Oral Communication to provide audio recordings, with the Department of Speech, Language and Hearing (PHHP) and/or the Signing Gators to provide sign language translations. The Department of Spanish and Portuguese Studies and Department of Languages Literatures and Cultures (both in CLAS) have expressed a commitment to providing written and oral translations of the information. Through these collaborations, and with the guidance of appropriate faculty in each unit, the audio, visual and multilingual texts will be produced by graduate and undergraduate students in the relevant departments by way of experiential learning opportunities.

Impact/Benefit

This project will create an accessible, multilingual campus. It has the potential to impact virtually all members of the campus community, as well as visitors, and will offer an enhanced campus experience. It also offers a unique opportunity for students in relevant disciplines to participate in experiential learning and to contribute to the campus. By aligning our pilot project with the campus tour we maximize the ability to reach a broad audience and gauge the potential success of future beacon deployment elsewhere around campus.

The Florida Cicerone's offer two or three tours every weekday, each with a capacity of 160 people, according to the sign-up pages (<http://www.admissions.ufl.edu/visit/tour>). These tours almost always fill up, especially in key fall and spring months (prior to college applications, and upon notice of admission). The screenshot below, for example,



comes from the sign-up page for campus tours. The gray shading marks tours that have already passed, but additional information on that site shows that they averaged around 100 visitors in each tour. The red shading shows the tours for the remainder of the semester, all of which are already full to capacity. Based on the four weeks shown in this screenshot, we can estimate that well over 6,000 visitors, guests, and parents were reached via the tour during this time period. Extrapolating out to the course of a calendar year, and even considering that April is a very popular month for tours, we can estimate that this project has the potential to benefit hundreds of thousands of visitors to campus each year.

On top of the visiting/potential student population, current members of the UF community can also

benefit from increased accessibility of campus information. Many students, due to some kind of language processing impairment or disability, likely cannot easily or readily access all the information available on campus. The Disability Resource Center reports to us that they currently have 86 hearing-impaired and 49 visually-impaired students registered with them; however, we know that it is optional and not required to register with the DRC, and so this number likely does not represent the total of potentially affected students. Further, even those with milder processing impairments such as dyslexia would stand to benefit greatly but having information available in different formats (audio/visual/etc.).

An additional population of those that may benefit comes from campus community members who do not speak English as their first language. The UF International Center estimates that there are approximately 6,750 international students on campus, along with 2,240 international scholars. While specific numbers are not tracked, we also know that numerous international visitors come for conferences or tourism, and we also have a number of

faculty and staff on permanent 'green card' or other visas. Over 3,500 faculty and staff travel abroad each year, and a significant portion of our U.S.-born student population are also bi- or trilingual from home experience. Thus, the potential impact of this project is quite broad.

The benefits this project offers to students and other members of the UF community, as well as to any visitors to campus, are also significant:

- Availability of campus information in multiple formats and languages benefits the entire community with greater accessibility.
- Greater exposure to and availability of multiple languages can facilitate language learning and afford greater multilingual and multicultural awareness for faculty, students and staff, while enhancing our internationalization efforts.
- The project provides an opportunity for experiential learning and community engagement in multiple disciplines (language, oral communication, communication sciences).
- Students involved benefit from seeing the real-world applications of their field of study and coursework.
- Offer our information in multiple languages/formats ensures that campus remain welcoming to all.

Sustainability

An initial purchase of 50 beacons will allow for us to pilot test beacon presence on campus, with deployment along the campus tour route. An additional 20 beacons will be purchased to assist with the hack-a-thon that will be hosted to develop the appropriate app. The life of the beacon batteries is estimated to be up to 5 years, according to the company website, depending on how far and how frequently the signal is set to broadcast. A broadcast range of 25ft, with a frequency of every 5 seconds, will be sufficient for our purposes, and so we anticipate that the beacons will remain active for a number of years. During this time, no additional expenses are anticipated. The grant proposers assume responsibility, in conjunction with PPD, for ensuring the continued placement and maintenance of the physical beacons. (The beacons can send an alert message when they haven't been 'seen' or accessed within a particular period of time, so that we will know when we need to check on them.) We also assume responsibility for updating and maintaining the content delivered through the beacons.

Although initial deployment of the first round of beacons will occur immediately, the addition of information will likely be ongoing for a number of semesters as we incorporate different languages and different delivery formats. In this way, this original project has the potential of self-sustaining for quite a long time, as we involve new languages, new classes, and new collaborations. We will also explore the option of crowd-sourcing translations for languages that are not currently taught at UF.

During these initial years, we will evaluate the success of using beacons to deploy accessible and multilingual information to the community through user feedback, interviews and surveys. The cost of replacing these beacons and/or purchasing new beacons for additional locations will need to be addressed by the university administration, should they desire to continue the project. We commit to continuing the collaboration with the relevant departments/entities to ensure app development and delivery of material in the necessary languages and formats.

Timeline

MONTH(S)	ACTION
Summer 2017	-Preliminary plan for deployment locations and content devised
August 2017	-Funds awarded
August 2017	-Beacons purchased
September 2017 (ongoing)	-Classes and campus organizations work with PIs to develop content in appropriate formats and languages (part of course projects)
September 2017	- Initial testing of beacon implementation will start in Marston Science Library
October 2017	-App developed through hack-a-thon at MADE@UF
October 2017-December 2017	-Deployment of beacons elsewhere on campus -Pilot testing
December 2017-June 2018	-Assess project success (interviews, surveys, etc.)
Future semesters	-Classes and organizations continue to develop further content

Budget

ITEM	SOURCE OF ESTIMATE	QUANTITY	COST PER UNIT	TOTAL
Estimote Location Beacon	http://estimote.com , Tom Livoti (email)	70	\$28.00	\$5,600.00
Installation of beacons	Tom Livoti (email)	50	\$15.00	3000.00
Printing/cutting of vinyl beacon logo stickers	Target Copy estimate (phone)	50	\$1.34	\$67.00
App development	--	--	--	--
3D printing pen (app dev. incentive prize)	http://www.hammacher.com/Product/89808	1	\$100.00	\$100.00
Fire HD tablet (app dev. incentive prize)	https://www.amazon.com/Fire-Tablet-Alexa-Display-Black	1	\$99.00	\$99.00
Moleskine Smart Writing set (app dev. incentive prize)	https://store.moleskine.com/usa/en-us/Moleskine-Smart-Writing-Set/C250	1	\$199.00	\$199.00
			TOTAL	\$9,065.00