

LaCEP Program Internship report

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Company: OQTA.Inc

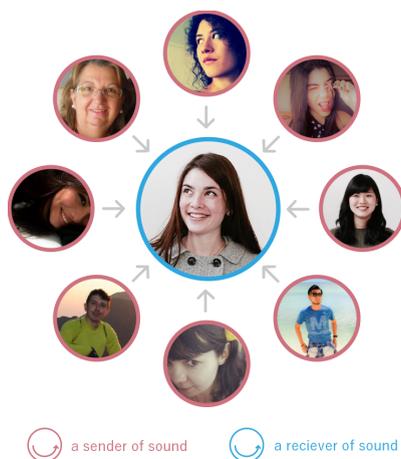
1. Introduction

My Internship at OQTA was arranged by Tokyo University of Foreign Studies staff, as a part of the LaCep program, an exchange program for Latin American students, whose objective is to create a network between our countries and Japan by giving Japanese lessons and an insight into Japanese culture and society.

The contact with the company was made by Shindo Sensei, who assigned a team of four students from the LaCep program to OQTA (Me and Juliana from Brazil, Laura and Manuela from Colombia). We went to the company on the December 26th to have a first contact with them and arrange the dates for the internship. The internship was planned to begin on the February 22nd and end on the March 7th. However I ended up asking them to stay one week more to get more experience.

OQTA is a small startup company located in Minato Ku, Tokyo which develops an IoT application. The product is a Cuckoo clock which can be activated by an IOS/Android App on the smartphone, making the bird chirp. The device owner chooses with the App eight people who can send the sound to him. These eight people then become able to activate the clock whenever they remember the clock owner.

The most special aspect of this is that the receiver of sounds does not know who from the eight people is sending the sound, so that he or she will remember all eight people in his/her OQTA circle at once. This means that the purpose of this product is to create closer connections between small communities of people by using non verbal communication, in a simpler and faster way than other social media, making, thus, the idea very convenient to people who are busy or live far away and don't have enough time to communicate.



As for the current state of the company, they have already applied for international patents and are preparing themselves to launch the product in the market. They are also working on establishing an office in the United States, as they believe it is a market of great potential.

2. Objectives

This internship was intended to be my first experience at working within a company and also with working with Japanese people. At the beginning I worked with the other TUFs students along with the Marketing/Sales team and after some days I joined the engineering development team as I have engineering academic background. Besides, I also had participation in conferences, where I helped the staff in the product booth.

3. Methodology/Task descriptions

3.1. With marketing sales team and other TUFs students

3.1.1 Feedback/Opinion regarding the product

My first task consisted of sharing the opinions regarding the product and answer many questions about the concept. Kudo san, from the marketing/sales team, explained some issues the company had while trying to explain the concept to Japanese people and we came up with some ideas to help and also to share our vision about the market of our countries.

3.1.2 Testing the product app

We received a prototype of the product to test it in our homes and we tested the app with our friends/family circle as well. We were asked to give our feedback and ideas about what could be improved.

3.1.3 Ideas for the making of video/pitch with the marketing team

One year before another group from TUFs' LaCEP program did an internship at OQTA and their task was to create a promotion video explaining OQTA concept. So the marketing/sales staff proposed us to work on another promotion video. After we shared our thoughts on the last work by TUFs students we came up with some ideas for a next video.



Frame from the OQTA prom video made by other TUFS students.

3.1.4 Ideas for the product name

Another task was thinking about the product name for the Cuckoo Clock product, while considering the effect it would have in other potential markets such as in Latin America and North America.

3.1.5 Participation in conferences

OQTA was attending the Japan Brand Festival at Shibuya Hikarie which took place from the 2nd to 4th of March. In the day of the OQTA's speech in the conference we were invited to participate. We helped the staff in the product booth and we observed closely their preparations for the speech. I still have the plan to support OQTA at the Japan Slush conference.

3.2 With engineering development team

3.2.1 Counter display for the meetup event.

My first task with the development team consisted of modifying the firmware of the product, implementing a counter for the number of times the App button is pressed to activate the Cuckoo clock. Then a HTML/Javascript display for the counter was also created to be shown in a livestream meetup event held at the company place with OQTA fans. The fans watching the livestream on the internet had a link where there was a button to activate the clock remotely so that OQTA put the display along with the Cuckoo clock in front of the camera. They want to count the number of times in each meetup event as a way to measure how the support of the company is growing in time.

Although the idea of the counter is very simple I had to learn a lot by myself to implement it as I did not have much experience with programming microcontroller boards. I had indeed some experience programming Arduino and Freescale dev kits at university but I never had to deal with an IoT application, which include the use of so many different libraries and protocols. Furthermore, creating the display was also hard because I have never worked with object oriented program languages before and I had to learn the basics about HTML/CSS/JScript to understand what I should do.

3.2.1.1 Understand the electric circuit as a whole

Before starting with my task, I had my first meeting with the development team and they explained me many details regarding the hardware and software. They are implementing the control of the clock using custom printed circuit boards with an ESP32 microcontroller, which can be programmed with using Arduino IDE functions. This microcontroller has integrated Bluetooth and WiFi modules, which makes it perfect for development of IoT applications. The board in the Clock hardware is then connected to the smartphone app by creating an WiFi client in the firmware, which scans the IP Address of OQTA for new bird sounds.

3.2.1.2 Review about arduino and Learn about the ESP32

I bought some electronic components to review some programs I did before on my own Arduino dev board, since I had been some time away from programming microcontroller boards and needed to remember some important syntaxes from the C programming language. I also borrowed one ESP32 dev board from OQTA to install its driver on my PC and things related to this microcontroller board were also studied. Although the ESP32 is not an Arduino board, it is possible to program it using the Arduino IDE, which is very good because of the wide support available in the Arduino community.

3.2.1.3 Understand the Firmware program

I was then invited to the github group of the firmware, where the latest versions of the software are shared. I spent about two days studying by myself how the code works to control the clock circuit and to establish network connection to finally be able to modify it. I had to learn some syntaxes related to the C++ language, which differs slightly from C programming language and also some concepts related to HTTP client/server protocol were studied to understand how the Web/Server client in the ESP32 is done as well as to understand how the information is passed from the app to the circuit board.

3.2.1.4 Update the Firmware

Having understood how the clock hardware is programmed, the next step was modifying the hardware program to create a counter variable to store the number of the clicks in the App button, which is incremented every time the function which activates the clock bird is called. After that, the library where the definitions to initialize the web API(Application Programming Interface) of the device are defined was modified to include an web index for the counter number. Also, a reset button for the counter variable was also included in the HTML code. At the end, some functions were included in the main code to initialize the device in API mode from startup.



Programming the PCB board with my computer

3.2.1.5 Create Web browser display

At the end I created a custom stylized web display for the meetup event which can be seen in the following picture. The program retrieves from the Clock microcontroller board IP its counter variable.



Counter display for the meetup event

To do so, I had to learn the basics of HTML/CSS/JavaScript, which I still had no experience before. With an HTML file the display object was declared, whose shape is described in a file of CSS extension. This CSS file also calls the background .png format image which I created by using one of the clock pictures available in the website. In the HTML code of the display, the jQuery library function was included to retrieve the count number from the clock hardware IP.

3.2.2 Manufacturing of the product

After my first task of the display counter was finished I started doing some general tasks for the manufacturing of the product.

3.2.2.1 Writing the firmware in the printed circuit boards

By the time I was there, OQTA was preparing to send many microcontroller printed circuit boards to the factory which makes the cuckoo clock. I input the firmware code in the boards using my computer USB. To do so, I used an writer program with the compiled code which runs in the command prompt, since this is a much faster option than using the Arduino IDE.

3.2.2.2 Configure the device SSID and UUID

After the firmware codes were written in the boards, the SSID, which is the name of the wireless network of each clock, and the UUID, which is an identifier number of each device, were written in the boards by inputting config files directly in the microcontroller board flash memory. This was done by using the SPIFFS(SPI Flash File System) tool available for Arduino IDE.

3.2.2.3 Circuit soldering

After the above tasks were finished, I did the soldering of new microcontroller printed circuit boards. I already knew how to do soldering in printed circuit boards but still had no experience with extremely small components, so I was taught by one of the engineers who supervised my work during the soldering process.

3.2.2.4 Identifying problems with malfunctioning boards

There were some boards which were not lighting up one of the LEDs from the Cuckoo Clock. So I identified the problems in those circuits by first studying the schematics and then measuring the correct voltages with a multimeter in a board which was working. When comparing the voltages with those from the malfunctioning boards the problems could be identified.

4. Conclusion

My time working with OQTA had been extremely productive and interesting. I believe this was a great experience not only to my career but also to develop important soft skills such as entrepreneurial vision and intercultural communication. Moreover, after my internship I feel much more confident with my professional abilities and I also feel prepared to have other work experiences in Japan.

I have not only learned how to work with Japanese people but also how to handle Japanese customers by attending the conferences with the company. In addition, the socialization process with the OQTA team was both very smooth and amusing. Even though my Japanese language abilities were far from perfect, they were always very patient and we could successfully communicate sometimes using English.

My time at OQTA is surely something which I will remember my whole life as my first working experience and I feel very glad to have been involved with the development of such product, whose idea I find so fascinating. I really wish OQTA much success and I also strongly support the initiative of giving experience to TUFS international students.