

# Online Social Network based on Internet of Things and Habit of Drinking Coffee in South of Brazil

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## Abstract

We describe an Internet of Things-IoT system composed by a thermos flask with embedded sensors and network interface as result of art and technoscience experimental research. The system can connect to the internet after activity recognition and send a message over an online social network (e.g. Twitter/ Facebook) when hot coffee is made. The idea is to create a connected device that can engage people to interact face-to-face bringing old habits of drink coffee as an excuse to socialize. Drink coffee with friends is a habit spread globally; in the south of Brazil, the tradition to cultivate and drink coffee is strong present especially in elderly people. The prototype is being improved before users' tests, opening new perspectives to the concept of "online social network based on IoT".

## Keywords

Internet of Things, online social network, thermos flask, coffee.

## Introduction

Elderly people (but not limited to) in Brazil usually invite friends to drink coffee in their houses as an excuse to socialize. Also, in some regions of the country, the coffee plantation and consumption defined the cultural and economic growth (Camolezi & Costa, 2009)

Historically, in Parana state, located in the south of the country, a climate event called "geada negra" (black frost) in 1975 made the producers lost a considerable amount of the coffee. This event forced the government to encourage another agricultural culture but a recent resumption of coffee production by public agencies (including tourism) have the intention to reinforce the tradition and bring new opportunities to farmers with new biotechnological strategies to control and defend the production (Rafaelli, 2004).

The multicultural history of cities like Maringá and the tradition of produce and consume coffee present in the imagination of the population pushed us to think about an IoT (Internet of Things) device to integrate the consuming and cultural habit to drink coffee as a social and historical event. As a combination of a physical object with the networks, the IoT promises new opportunities to art and sci-

ence, by embedding into it a computer and the communication power (Greengard, 2015). The IoT potential is applied to any sorts of daily objects and this experimental art and technoscience paper describes the creation of a prototype, a thermos flask with embedded sensors and network interface. The system can connect to the internet after activity recognition and the device can send a message over an online social network (e.g. Twitter/ Facebook) when hot coffee fills the object inviting friends to drink in their house. The idea is to create a connected device that can engage people to interact face-to-face bringing old habits of drink coffee as an excuse to socialize.

## Coffee green gold times

The restart of coffee tradition in the region, with another type of seed, a specialized one called "gourmet", brings the opportunity to reinforce the place that was the main producer of the most part of coffee consumed in Brazil ("A nova cafeicultura do Paraná," 2014). Many industries are now installed (such as "Companhia Cacique de café Solúvel" and "Iguaçu Café" among others and commerce associated) producing all sorts of coffee and tourist tours are also suggested to plantation fields. Educational institutions contribute with the cultural background preserving and sharing the tradition, UniCesumar, a private educational centre in Maringá, has a museum with a coffee barn—an old wooden house from 1949 transferred integrally to campus with scenography of old coffee times.

In terms of coffee consumption habits Trancoso, Cavalli & Proença (2010) indicate the strong presence of coffee in Brazil, putting the country as the second global coffee consumer (ABIC-Associação Brasileira de Indústria de Café, 2015), especially during breakfasts, taking account its stimulation potential, a perfect drink to start the day (Fredholm, Bättig, Holmén, Nehlig, & Zvartau, 1999).

The habit of drink coffee reserves also a cultural aspect and capacity to integrate and reunite people (Arruda et al., 2009). In public, private and familiar environments or during studies and work times it is common to create small break moments to interact with others. In Brazil, the ex-

pression “hora do cafezinho” (“time to a little coffee”) is common in private and public sector, when workers stop their activities to talk and drink coffee. With the aim to reinforce this social, communicational potential and cultural aspect of drinking coffee we designed an IoT system to stimulate interaction between users mediated by coffee shared times.

### Online Social Network based on IoT

The idea of IoT is to decentralize the computation-device power to small and connected devices. These ordinary objects when smartly connected with each other can add their computation capacity and synchronously work to “improve” our daily life. This tendency was announced before by Mark Weiser (1991) when he talked about ubiquitous computing and confirmed now with the invasion of smart devices “everyware” (Greenfield, 2006). The prevision is that in 2020, the IoT “which excludes PCs, tablets and smartphones, will grow to 26 billion units” (Rivera & Van der Muelen, 2013). Many factors contribute to this increasing number of connected objects including the size, price and computational power of electronic components, communication protocols and design principles (McEwen & Cassimally, 2014).

This trend seems irrevocable when we saw all sorts of connected objects connected that opening new affordances (Gibson, 1966) and contexts of interaction (Dourish, 2004). Artists, designers and engineers with many examples and working in collaboration are given just some highlights that how we can use and embodied our experiences with the enchanted objects. From our imagination, all sorts of objects can work together to support us (like cups and wardrobes in Disney’s “The Beast and Beauty”) but also for surveillance and control (van Kranenburg & Bassi, 2012). Now, we have integrated landscape of objects with sensors, microprocessors, middleware and software that work in the periphery of our attention (Weiser, 1996). Some examples are washing machines that can tweet when finished work (Milian, 2009), a plant that tweets when it needs water (Faludi, 2011), chairs that vibrates when you received an email (McEwen & Cassimally, 2014) and other healthcare applications (Hsu, Wang, Shen, Chiang, & Wen, 2017).

These enchanted objects blurry the taxonomical division of people (alive) and objects (inert). The tendency confirms that cyberspace has been clued to the physical objects opening new fronts of works called pervasive and sentient (Rheingold, 2003).

From many possibilities and scenarios, we are devoted to thinking about how IoT can integrate people. We know that IoT can help people in everyday activities, including people with disabilities (Domingo, 2012) and elderly population (Pal, Funilkul, Charoenkitkarn, & Kanthamanon, 2018) but how can we stimulate social interaction and improve cultural tradition being naturally attached to habits and the history of the place? This perspective of using connected devices to support interaction has been receiving

the name of “Social Internet of Thing” (Atzori, Iera, Morabito, & Nitti, 2012) but in this paper we prefer to call this as “online social network based on IoT” or OSNIoT (Lucena, Oberleitner, Barbosa, & Martins, 2017). Researchers have been challenged to create a smart architecture to integrate all sorts of objects, including in the context of social interaction (Kranz, Roalter, & Michahelles, 2010; Nitti, Atzori, & Cvijikj, 2014).

### Methods - Designing and test the “thermos flask”

The device is built using an LM35 (temperature small sensor) inserted into a commercial “thermos flask” (fig.1), a microprocessor and controller Arduino Uno R3, energy fonts of 5 volts e GND. A communication module “Ethernet Shield” is responsible to connect the system to the Internet (especially to Twitter). The sensor is responsible for sensing the temperature and when it hits the temperature = or > 80°C the system sends a single tweet. It is noticeable that coffee is made with hot and boiled water. As a first version, a LED was installed to give a feedback when communication was made.

After the single tweet message: “come to my home to drink a coffee with me” the system block another message over 8 hours (average time to another coffee make). The IoT device received the name of “coffeezin” that in Portuguese sounds like “little coffee”.

Fig. 1 –sensor LM35 sensor embedded inside the container of the



flask. (Right): prototype with Arduino UNO R3 and Ethernet Shield module attached using a nylon body band. Photos: authors.

Also, a social experiment was applied during two subsequent weeks. A user, living in a condominium with 352 apartments, majorly with undergrad students, posted on Facebook group page a brief explanation about the project and the number of unit that they can visit to drink the coffee as soon they see the online post.

The protocol adopted to make coffee were; 1) from 7:30 am until 9 am, and 2) 4:30 pm to 6 pm every day from 7 to 20 May 2017.

### Results and comments

After two weeks we counted two (2) unknown neighbours (1 after 30 minutes of the post – another after 44 minutes of the original post) and 1 frequently seen neighbour (after 36 minutes). One comment in the post showed that another neighbour went to the house but didn't find the user, when asked about the time she said that were around 11 am. Small interviews were applied to know about their habit to drink coffee and drink preferences (filtered or capsules). All of them live alone (not share the apartment) and they are a student.

We interact daily with many objects, in many places and context. The kitchen is, for example, a place in the house where manually operated devices/objects are constantly, and where new technologies are well accepted. This integration of technology in the kitchen is a natural movement, especially in the field of domotics and experimental works as cited by Spence & Piqueras-Fiszman (2013).

Optioning to create a thermos flask we take the environment into consideration. A kitchen is a place where we can understand and historicize different aspects of cultures (Bryson, 2011) and with symbolic dimension. Previous examples of IoT devices designed to the kitchen environment offers, majorly, facilities. There is coffee machine, refrigerator and microwaves activated at distance or by proximity. Meaningful and sometimes not so meaningful things are created to take our world as imaginative and creative forms of IoT. "Pantelligent" ("Pantelligent," n.d.), is a frying pan developed with the temperate sensor and Bluetooth communication module to guide/help a "chef" to cook better. It integrates a smartphone with a special app with some recipes. "HAPIfork" is a fork that counts the time that you spend during meals and how many times you take it to your mouth and the gap between chews ("hapifork," n.d.). "Pred Pad" is a balance scale to measure the weight of the food and show in real time some nutritional data displayed on smartphone ("Pred Pad," n.d.). Another idea tries to promote smart objects with online social networks, Whirlpool Co, for example; a cooker with an interactive touchscreen cooktop displays recipes, Facebook/Twitter updates, and news and climate condition. And at least, "Smart Fridge" can smartly see the products inside the Fridge, helping the user to identify when the food is getting old (Itzkovitch, 2013).

Other devices, when used in a drink relation were designed to bar environments, objects like a cup can be transformed in a "social sensor" (sensor of social activity) (Beigl, Gellersen, & Schmidt, 2001). And in a similar perspective, researchers created a beer mat to entertainment to use in bar and pubs. The object has a pressure, gravity, orientation and movement sensors to measure the weight of the cup and infer about social interaction and activity (Butz & Schmitz, 2005). By interacting with these devices, we can infer about group meetings and time spending on kitchen or bar.

We went in another direction, as an ordinary object that is not the centre of attention (thermos flask) we used to comprehend more about the activities and infer about social interaction.

## Conclusion and further developments

All data from the device can be used to identify a pattern of coffee consumption, time of production and even the replies and comments can signalize acceptance to social and in locus visit. Designing challenges can include: a) as augmented and ordinary thermos flask with sensors, the system cannot change the basic functionality of the device to keep the temperature. Our first intervention a small hole made on top of the object can accelerate the losing of temperature; b) designing solutions are needed also to create a robustness object to support interaction such as the cleaning and washing process of the thermos or even falling; c) create smart solutions to identify when user did a small quantity of coffee for individual consumption or when is opened to received friends and familiar, and d) smartly integrate the system to friends/family that are really going to visit, identifying potentially friends to visit the user based on: historical background interaction, frequency of interaction and location. At least, smart solutions of software, sleep mode or counting time can contribute to the autonomy and lifecycle of batteries.

For now, we are combining the thermos flask with an air freshener. Considering the smell of coffee as good marker/stimulus to wake up, a hacked automatic air freshener emits the coffee fragrance in the friend's house when the coffee is made and inserted in the thermos. All ideas take social and interactional background as inspirational material to design IoT system.

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