

## DESIGN AND TECHNOLOGY: NEW INTERFACES FOR URBAN FURNITURE

<sup>1</sup> VILAS, Danielle Lopes, PROAC, UFJF, Juiz de Fora - MG.  
vilasdanielle@gmail.com

<sup>2</sup> JESUS, Karine Dias de, UFJF, Juiz de Fora - MG.  
karinediasj@hotmail.com

<sup>3</sup> ROCHA, Josielle Cíntia de Souza, UFJF, Juiz de Fora - MG.  
josiellecintia@yahoo.com.br

<sup>4</sup> GOMES, Mayara Carvalho, PROAC, UFJF, Juiz de Fora - MG.  
mayara.gomes@arquitetura.ufjf.br

<sup>5</sup> CALIL, Anna, UFJF, Juiz de Fora - MG.  
anna.calil@estudante.ufjf.br

<sup>6</sup> COLCHETE FILHO, Antonio Ferreira, PROAC, UFJF, Juiz de Fora - MG.  
antonio.filho@ufjf.br

### INTRODUCTION

The world is constantly changing: new technologies, facilities and practices change relationships and forms of interaction. It is no different with urban furniture, or street furniture, as it happens with cell phones— their new technological functions provide new perspectives to their users through design.

Technology continuously evolves, and new proposals, solutions, and materials increasingly focus on industrial and informational processes, meaning everything is modified. Historically, the Industrial Revolution influenced transformations related to the use of technology and its consequences in urban life, which are, in turn, responsible for changing relationships involving the use of technology. These urban transformations directly impact the Design field, allowing the use of new materials, as is the case of new interfaces in urban furniture. John Heskett (2001) connected design and technology: "design as a human skill, must always be in a constant process of adaptation to respond to the needs of its time".

The development of information technologies has revolutionized how humans' lives are different. According to Castells (2005), the first information technology revolution was the starting point for analysing the complexity of the new economy, society, and culture. The current technological revolution, according to the author, originated and spread during the global development of capitalism, for which it was an essential tool. In this sense, a new society emerging from this process is capitalist and informational, although it presents historical variations according to the country, that is, "according to its history, culture, institutions and specific relationship with capitalism and information technology" (CASTELLS, 2005, p. 43).

Normally, in relation to public spaces, it should be noted that, among the elements experiencing it and allowing it to stand on its own, the sets are formed by various urban furniture. When observing a bus shelter, for instance, it is possible to identify the difference between the presence of this type of urban furniture in a metropolis and a small town.

### MATERIALS AND METHODS

This study focuses on the association between the insertion of technology and the design of urban furniture produced in the last twenty years. Through literature review and primary and secondary sources, we aimed to explore the use of contemporary design as a



way to support the construction and improvement of public spaces, as well as the contribution of urban furniture to this process. The potential creation of urban furniture using the interface between design and new technologies is highlighted through four experiences: holography, touch screen, clean energy, and internet of things. Such attempts were identified and addressed here through Figures 1 and 2.

## RESULTS AND DISCUSSION

There is a demand in the consumer market demands – through technological evolution – for the search for new and versatile products with new functions. The need to be connected to the virtual world has made technology present in almost all elements around us, especially with the New Information and Communication Technologies (NICT) that emerged from the Third Industrial Revolution, in the mid-1990s. Since the First Industrial Revolution (1760-840), many transformations have occurred, including in the field of architecture and urbanism. New perspectives guided the theoretical field, which was reflected in the city. Urban furniture presents itself as an element that went through these processes: its design became more appropriate to the possibility of using new materials, such as iron, aluminum, and glass.

Every urban furniture developed in the last decades was created using high technology. This association is closer to the NICT, through which many urban furniture with an intuitive interface are developed: they have the same operating principles as the last century's furniture but with different materials, colors, design, and ergonomics, among other aspects.

Concerning the current technological development of materials, the role of Smart Cities is noteworthy. According to the European Union (2010), Smart Cities are systems of people interacting and using energy, concepts and financial resources to catalyze development and economy, improving quality of life. The Publication Index by the Urban E Motion Business School (20) indicates the level of planning of a city: planning, social images, human capital, public dimensions, management, the environment, international union, mobility and transport, and economy. It is worth noting that technology is mentioned as one of the main and defining factors for cities' progress. However, some key factors must be observed when introducing high-tech technologies in large centers, as Miranda (2015, p. 323) refers:

For these new products equipped with sensors to circulate around the city and work coordinated in a network, the urban space must be equipped with information and communication technologies (ICTs). Municipal governments need to assume, then, the role of agents of this market insofar as they have the attribution of managing the urban space. This is the context in which high-tech urbanism in smart cities emerges.

Based on research from books, newspapers, and magazines, we organized a table with information on the association between urban furniture and technological advances. Since there are different classifications in the field, here, the urban furniture was considered based on the principles of ArchiExpo divisions. In light of this, a table was organized according to the following main groups: "support", "benches and seats", "information", "mobility", and "services".

Figure 1 – Types of urban furniture subdivided into categories based on ArchiFurno

URBAN FURNITURE				
SUPPORT	BENCHES AND SEATS	INFORMATION	MOBILITY	SERVICES
Wastebaskets	Benches	Information panel	Bus shelter	Newsstand
Waste collection	Seats	Signpost	Bike shelter	Chemical Toilet
Dispensers	Table	Totens	Bike rack	Smoking Cabin
Drinking Fountain		Other information equipment	Covering	Ashtray
Fountain				Multipurpose Shelter
Fountains Springs				
Sculptures				

Source: The authors.

After this organization, a second figure (Figure 2) was elaborated addressing technological elements created in the 21st century associated with these groups of urban furniture. They were defined according to criteria identified through research from academic studies, books, market catalogs, and portfolio of companies, resulting in four divisions: holography, touchscreen, clean energy, and internet of things. Thus, the figure below allows us to differentiate the technological advances in the design of urban furniture in relation to the four groups of technological interfaces discussed here.

Figure 2 – Technological design categories related to urban furniture.

URBAN FURNITURE WITH TECHNOLOGICAL DESIGN INTERFACE				
	HOLOGRAPHY	TOUCHSCREEN	CLEAN ENERGY	INTERNET OF THINGS
SUPPORT	Sculptures	Wastebaskets, waste collection, dispensers and drinking fountains	Wastebaskets, waste collection, dispensers, drinking fountains, fountains and sculpture	Wastebaskets, waste collection, dispensers, drinking fountains, sculpture
BENCHES AND SEATS	-	-	Benches and seats	Benches, seats and table
INFORMATION	Information panel	Information panels, signposts and totems	Information panel	Information panel and signpost
MOBILITY	-	Bus shelter, bike shelter, bike rack and covering	Bus shelter, bike shelter, bike rack and covering	Bus shelter, bike shelter, bike rack and covering
SERVICES	-	Newsstand	Newsstand, Chemical Toilet, smoking cabin and multipurpose shelter	Newsstand

Source: The authors.

Urban furniture classification may include new items at any time. Here, we highlight the four forms designated as the categories associated with technological design elements:

a) HOLOGRAPHY: as an electronic system, it is common to use holography to project something that, necessarily, still does not have a physical body. This technique creates three-



dimensional images based on laser technology. Due to the laser light modality, holography is not a suitable source for public space lighting, as it is adopted for temporary artistic purposes or entertainment activities (TALEBIAN, 2012, p. 11). This resource was used by the company Vizoo for the release of the movie “Lord of the Rings”, in Denmark in 2011. Moreover, in addition to attracting a greater number of pedestrians' eyes, it is less invasive than outdoor urban furniture, for example. (ZIULKOSKI, 2011).

Another example is the transmission of public art pieces to refer to one that has already been in the same place in the past, transforming the current space. This would be a possible alternative to portray the history of a particular region through technology. In this sense, urban furniture aiming to present information would achieve, through the holographic resource, a better spatial definition. Another possibility is to carry out image transmission even if the object is kilometers away, meaning physical barriers cannot prevent the use of a holographic piece.

b) TOUCHSCREEN: the touchscreen group refers to a system directly interacting with electronic systems. In other words, the system which is already commonly adopted: direct interaction with the user through a digital screen. Currently, technology panels on bus shelters are commonly made of glass, steel, and touchscreen boards – as is the case of the EyeStop shelter, developed by the SENSEable City Lab, a laboratory of the Massachusetts Institute of Technology (MIT), in the United States, that studies technology integration into life in large cities (Arora, 2014). The walls of the developed urban furniture are composed of a large information screen through which it is possible to search for information about the city and bus routes, access the Internet, send emails, and monitor the region's air quality. In addition, structural screens can also interact with smartphones.

A relevant point of this technological proposal encompasses the sustainability issue: photovoltaic panels capture sunlight and provide energy for the bus shelter itself. In other words, through a totally technological and intuitive interface, the user can acquire necessary information from urban furniture. This no longer has only its primary function, which is to shelter people waiting for a bus but becomes urban furniture with additional functionalities that meet other needs.

c) CLEAN ENERGY: due to environmental concerns and the existence of environmental responsibility deals, mass production has to follow the rules of one of the pillars of clean energy.

An example of this urban furniture is the digital water curtain developed by Lumiartecnia & Aqua Reign, in 2020. This structure was designed as an alternative to introducing water imagery within the urban landscape. It consists of a portal with a water curtain that can be controlled through an electronic system and emit sounds and colors of the most diverse types. The water used in this urban furniture is always filtered and chemically treated so it can be safely reused (Digital Water Curtain, 2020).

The UN (2018) estimates that, in 2050, approximately 68% of the world's population will be living in cities, highlighting the importance of debating the expansion of green areas in urban spaces. Thus, implementing such a typology of urban furniture makes it possible to contribute to ecological, social, and economic perspectives.

d) INTERNET OF THINGS: due to large-scale computerization, many urban furniture have programming associated with artificial intelligence, that is, the internet of things.



Technological generation allows products with these characteristics to be connected to a virtual platform. An example of technological street furniture is a cover developed by the Brazilian company Sunew, in 2018. In addition to the internet of things and solar energy, which makes this street furniture self-sufficient, it emits music and lighting; thus, it is ideal for extra artificial lighting. Furthermore, it absorbs UVA and UVB rays, and its shade produces better thermal comfort, also offering outlets to recharge gadgets.

Another example of the use of the internet of things in urban furniture is the presence of computerization in bus shelters. Associated with this, there are advertisements, something very common in this type of street furniture. In the 1960s, Jean-Claude Decaux innovated marketing campaigns by advertising in street furniture. In a similar way to what is found in peripheral areas and away from large urban centers, Decaux installed printed advertisements on panels reinforced with translucent glass. From then on, advertisements became increasingly related to street furniture, which made them to some extent follow the evolution of these items (ArchDaily Brasil, 2018).

In 2018, Decaux invited Zaha Hadid Architects to rethink their billboards. The solution presented by the architectural firm was to offer an authentic and contemporary communication channel in London. The billboard proposed by the office has sinuous shapes that could only be executed due to technological advances related to materials, such as the malleability of iron and steel, for example (ArchDaily Brasil, 2018). In addition, the use of visual media resources associated with the internet of things attracts the viewer's attention to the ad in an impactful way. The technology, in this case, is available to everyone who passes the space and does not need to intrinsically be selective.

## CONCLUSION

In the 21st century, urban furniture in large urbanized centers of developed countries are usually associated with technological elements, which makes it a promising factor for industries in this sector. With the advancement of technology over the last few decades, the way of thinking about public spaces had to be readjusted to the new human needs. Technological urban furniture came to optimize day-to-day actions and issues related to sustainability, accessibility, and mobility are closely intertwined with the technological environment. Therefore, it is crucial to design products with a clean source and the least possible polluting impact. In this way, what also makes, or does not, a technological urban furniture is its materials and components.

It is notable that, at different times in history, urban furniture has gone through different processes until reaching the current moment – in which they are seen as an example of applied high technology. According to Wan (2007), the design of considerable urban furniture compatible with time must maintain characteristics of the past, meeting current and future needs by integrating technology.

In this article, four main components were identified for defining urban furniture with a high-tech technological interface: holography, touch screen, clean energy, and internet of things. The first one is the least common. The second is already quite present in urban furniture. The third and fourth groups were the only ones mentioned that included all types of urban furniture classification, probably due to their popularity. We can conclude that most of the furniture identified are related to the internet of things group. The QR Code interface is commonly found in elements scattered around cities, especially in urban furniture, which leads to the understanding that the current design mainly focuses on the interaction





between furniture and smartphones. Considering that the current world is becoming digital, the smartphone or cell phone is a common, and widely used, element in the world's population. Therefore, accelerated production of furniture connected to this device is not unimaginable.

Through these examples that represent a part of the vast universe of technological urban furniture, it is possible to observe the different ways in which technology is able to act. Design linked to sustainability, advertising, and connectivity, among other aspects, reinforce how broad technology's reach can be.

## ACKNOWLEDGMENT

The data presented here are part of broader research on contemporary urban furniture. The authors thank the National Council for Scientific and Technological Development – CNPq and the Federal University of Juiz de Fora – UFJF for granting scholarships and support.

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