The Effect of Intelligent Interactive Installation in Public Spaces (To Know Each Other)
The Application of AR Portal Doors in Famagusta Walled City

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ABSTRACT

Urban spaces discuss issues that significantly encompass architecture and the design strategies dealt with relative to space; as their effects highly maneuver the public realm of the cities. On one hand, the peaking of Globalization in recent years has deemed people into finding solutions for the consequences it brings. Hence, a growing interest in both the academic and design fields flourished extensively, especially towards technology, and their possible applications towards the public realm and public space's quality heavily rely on the social interactions between people themselves and between the spaces they reside in. As a result, the main aim of contemporary architects and urban designers is to devise interactive public spaces where people's bubbles connect; creating interactions with each other and with the space they live in. People tend to be deeply indulged into the digital abyss; which can be a key feature for creators to use these 'gadgets' in a smart way to bring about life within the space. Moreover, the main aim of this thesis is to test out how technological interventions in public space can affect the social interactions of the city's public life, through case studies that show a new dimension of public space in the modern, fast, digital virtual age. One of which will be a new personal contribution of the author, where the historical public plaza of Famagusta, North Cyprus, will be showcased through portal doors with the help of AR technology (Augmented Reality). The thesis will encompass both literature analysis and the support of practical studies, using tools like census counters and formulated semi-structured interviews. To sum up, the intended finding is stimulated to prove how technology, if used effectively, can come about with remarkable ways to activate public spaces: indulging the users of the space with each other and with space itself.

Keywords: AR **(**augmented reality), coexistence, interactive technology, public spaces, the virtual dimension of space, Famagusta Walled City.

ÖZ

Kentsel mekanlar mimariyi önemli ölçüde kapsayan sorunları ve mekana göre ele alınan tasarım stratejilerini tartışır; etkileri şehirlerin kamusal alanını büyük ölçüde etkiler. Bir yandan, son yıllarda yükselen Küreselleşme, insanları getirdiği sorunlara çözüm bulmaya yöneltmiştir.bundan dolayi,Hem akademik hem de tasarım alanlarında artan ilgi, özellikle teknolojiye yönelik olarak yoğun bir şekilde gelişti ve bunların kamusal alana ve kamusal alanın kalitesine olası etkileri, büyük ölçüde insanların kendi aralarındaki ve içinde bulundukları alanlar arasındaki sosyal etkileşimlere dayanıyor. Sonuç olarak, çağdaş mimarların ve şehir tasarımcılarının temel amacı, insanlar icin sosyal etkileşimli alanlar tasarlamaktır.

Bu, ilgili aracları akıllı bir şekilde kullanarak mekanlara yaşam oluşturmaları için önemli bir özellik olabilir. Bu tezin temel amacı, kamusal alandaki teknolojik müdahalelerin kentin kamusal yaşamının sosyal etkileşimlerini nasıl etkileyebileceğini ilgili aracları kullanarak test etmektir. Bunlardan biri Kuzey Kıbrıs Gazimağusa'nın tarihi halk meydanının AR teknolojisi (Artırılmış Gerçeklik) yardımıyla portal kapılardan sergileneceği yazarın yeni bir kişisel katkısı olacaktır. Tez, hem literatür analizini hem de sayım hesaplayıcısı ve formüle edilmiş yarı yapılandırılmış görüşmeler gibi araçları kullanarak pratik çalışmaların desteğini içerecektir. Özetlemek gerekirse, amaçlanan bulgu, teknolojinin etkili bir şekilde kullanılması halinde kamusal alanları harekete geçirmek için nasıl dikkate değer yollar olabileceğini kanıtlamaya teşvik edilmesidir:bu etkinliğin aracılığıyla hedef mekanın kullanıcılarını mekanla şımartmak ve kullanıcıların birbirleriyle etkileşimlerini ortaya cıkarmaktır.

Anahtar Kelimeler: AR(artırılmış gerçeklik), bir arada yaşama, etkileşimli yerleştirme, kamusal alanlar, mekanın sanal boyutu, Famagusta Walled City.

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Chapter 1

INTRODUCTION

The issue of urban spaces becomes a significant emphasis on architecture and urban planning as its effects highly manipulate the public realm. It has also been extensively studied and intensively synthesized to be able to prioritize the quality of the urban design and the importance of mixed-use spaces within the urban layout; that is to boost the social values of the space and its local distinctiveness (Yang & Kang, 2005). In other words, the prominence of the development of cultural and social thoughts into one's human engagement is most crucial, especially when built form reflects the cultural alterations and human interactions. Each social interaction one engages in, the person gains a memorable opportunity to grow as a person who is socially giving meaning to his surrounding culturally, physically, and emotionally attached to the surrounding space (Sampson & Raudenbush, 1999).

Going back in time, just as humans started empowering their existence initiating from the Stone Age where people went out of their caves in celebration around fire, this achievement announcing that they are here, and the world now belongs to them: they can control it, they can change it (Chase-Dunn & Lerro, 2016). Through time, humans maintained the acknowledgment of their diverse backgrounds and distinct cultures in celebration of human differences amongst themselves; that is, by learning how to interact with one another. This interaction specified, opens doors of the cultural and social exchange necessary to enhance the civilization and stay connected to each other. To emphasize, the linkage between various people is

triggered by merely taking advantage of the most exceptional opportunity handed: the public space. The public space not only acts as a gathering point; but rather as a connecting, interactive point critical for the urban growth and human acceptance of one another (Sampson & Raudenbush, 1999). As a consequence, humans hold the power of public spaces that they have now, where they started the first city, from the fire gathering, they announced: we have the power of coexistence (Runciman, 2005).

Most impelling evidence of the human's importance in space interactions is then further proved via the studies of human-space behavior. To continue, the most recent studies in urban design strategies had shown that to activate public space, you need people there (Whyte, 1980). What this thesis is trying to explore more is that people by themselves are not enough. In fact, what matters is the interaction in between those people, it is what turns the space alive, creating those public spaces and the experiences that connect the often insulated bubbles that people choose to live in, their houses or cars. That will not be able to happen without triggers, and the best implementations to help are the combination of technology and art together as primary tools to activate people in the public space and consequently activate the spaces themselves (Prisco, 2016).

Through conducting comprehensive research and cases studies of how technology opens a new level of public space, a considerable examination will come in use to test a virtual application (an AR installation) on many public spaces of a city (in this case Famagusta, North Cyprus) and try to analyze and compare the data before and after the application to see the difference of interaction and how far could technology activate a public space. In return, the plan of this thesis will be focused and accomplished by means of broad chronicled investigations of the public spaces

with its progressions through time, along with nearby present-day point of view. Mainly to be concentrated toward new innovations and techniques applied or that will be used on urban strategies during the present age, so-called The Modern Age or the Virtual Age (Zenka, 2016); as will be presented by interviews supporting the benefits of the incorporation of virtual technology in that modern age respectively.

1.1 Problem Statement

The 21st century came carrying, and still continues to carry, humongous creations and immense achievements that no one can deny nor ignore. Those accomplishments can be acknowledged through various fields of science, art, culture, and technology to have developed through time in extremely high acceleration. Although records were made that assert the rapid growth in automation and telecommunications in the 21st century, it is rather ironic; that simultaneously, humans are also growing, yet apart from one another: So close yet so far away. Not to mention, humans moving from rural to urban areas, initially to enhance the civilization at an increased pace, contributed to the introduction of diverse identities of people, classes of workers, and characters of users that should be living harmoniously with each other blurring the line of ranks. Yet again, it is contradicting that the most advanced century to date stands out to be the most perilous (Grenfell & James, 2008).

In fact, the threat of humans drifting apart that the 21st century carries along is no mystery; yet various resolutions to bring back a united world is inevitable as the change starts within us. With the help of the advanced research done to enhance the world's civilization, urban design as a discipline plays an important role in designing the world that people live in. Designing the world for all becomes crucial because it hands us a key to complement the interconnection of people (Burbach, Robinson,

Jeffries, & Robinson, 2001). People as natural beings will interact and communicate once given the chance to be placed together in any form of space. So, since human experience becomes the main target of urban design studies, the study of public spaces has always been a valid point in question within the urban field of both macro and microscopic since it manipulates various social, cultural, and physical layers in an urban fabric (Sampson & Raudenbush, 1999).

Consequently, urban theorists have always analyzed the effects of the public space on people, cities, and urban design holistically. However, what is needed in the contemporary present-day investigations require that constant research studies must be undergone simultaneously to the era's advancements and achievements in order to be able to adequately review the changes of the public spaces through means of time's adaptation. Furthermore, the records of developments of modern age technology; specifically, the virtual perception, art, and culture on the public spaces will ultimately lead to a progression in the impacts those spaces have on the respective users. Hence, using technological interventions within public spaces will have the capability to bring people together. As a result, consistent case studies and continuous diverse experiments on the public spaces become of utmost importance when scrutinizing the growth of public interaction within these spaces.

1.2 Research Question, Aim and Objectives

Primarily, the strategy of the thesis is to discover how a small installation could form the experiences through different perceptions in public space, bringing the life back to city's public realm. Nowadays most of the cities around the world have crowded public spaces whilst others do not; these cities in return become a good attraction in many aspects. To emphasize, the aim of this thesis is to test the effect of interactive installation on public spaces of the city: specifically testing out the effects

of adding technologically interactive installations on these urban spots. Urban public spaces have captured many researcher's attraction to study it, but most of them, however, have been done on the general quality of space or users' effect, yet focusing on the framework of technology and art into public spaces has been rather limited.

With this intention, this thesis aims to explore the alterations and the developments of the public spaces already existing within Famagusta, North Republic of Cyprus; in order to record the evolution of social interactions and engaging activities measured in response to a divergent technological addition yet homogenous in relative to the present public space. To clarify, the goal lies in measuring the degree of change (if any) in people's behavior as a reaction to the foreign installation included as a part of the public space. More specifically, mainly focusing on the interactive artistic technological type of installation new to the city of Famagusta and its landmarks. Accordingly, the main research question is set up to be:

• To what extent does an interactive intervention add to the social and dynamic qualities of public space?

Sub-questions to be discussed for supported findings include:

How are public spaces prone to develop the social life of the city? What is the value of strangers could affect the public life of the city? How could an interactive application in public spaces effecting the individual, then consequently the city itself? How does modern-day technology enhance the social interactions and activities of public space?

1.3 Limitations

This thesis works towards investigating the various notions of technology enhancements within public spaces on its users, environment, and the city it reflects holistically. To proceed, the presentation of the significance of open public spaces in urban areas prompts their dominant job they play in making dynamic urban communities. Also, since the development of new innovations present in people's lives upgraded the expectations of everyday comforts and the social correspondences of ordinary life; the impacts of the virtual dimension will indeed reflect inside the common public realm found in all urban fabric. In this manner, this study opens an eye at the effects of those virtual passages on the life of the city's public spaces and the social interactions accordingly. To continue, these social interactions measures identify with the activeness of an urban form containing an easy installation when studying the change in communication, simple interactive gestures, or even mere interest and curiosity between users, even if strangers (According to Dunbar 2010, anyone outside the circle of 150 relationships is classified as a stranger).

With that in mind, Cyprus becomes an attractive proposition to incorporate with interviews, case studies, and practical support. That is for what it carries of touristic landmarks that strongly create social public spaces as gathering plazas; not to mention, Famagusta plays a huge role in attracting people both locals and tourists within its city exploration for its impressive historical landmarks and its famous old city that is saturated with ancient ruins and authentic valuables. After all, it creates an adequate location to test the effects of technology on the city itself; since, technology is ultimately everywhere in the modern age and the hybrid of the contemporary forms of smart art becomes crucial when combined with historical contexts.

The study of this thesis and the basis of the case study that is further introduced rely on the results of the social interaction with public spaces that are scrutinized within the Summer season as the city of Famagusta welcomes tourists and invites locals to explore alongside them as well. With that in mind, the time and day of the study has been manipulated accordingly to analyze the differences of the interaction traffic in public spaces as in to compare the movement of people and their social interactions respectively.

1.4 Research Methodology

In order to adequately research and scrutinize the analysis and the findings, certain various quantitative and qualitative methodologies are put into play throughout the thesis. In which the initiation is a thoroughly comprehensive qualitative literature review that expands with the support of two similar present cases to this research problem. However, those existing cases will be supported by the main research's quantitative application of putting AR (augmented reality) doors in different public places in Famagusta, North Cyprus. With the use of a counting census system that depends on Open CV (an open-source library for image processing, machine learning, and computer vision); to compare the effect of those virtual doors on the life of the city's public spaces; mainly by the study of whether the numbers of the users are interchanging accordingly.

In this research, tools that include AR portal doors, people counter systems and interviews will be used to synthesize the importance of democratizing and digitizing the urban designer tools of building a public space. The results to be found from the counter system that will be fixed on the site for 20 days, counting the average of public space users. To explain, these doors will contain a 360-degree photo of their locations, including the top view (by the drone) or bird eyes, not to mention that

respective music or sound effect for each door will be included further on. So, by using technology and music as tools for adding another dimension in the city's public spaces, a proposal of helping people activate these squares is suggested. That is by encouraging the users to interact with each other; merely by even talking to a stranger, in order to record effective results and numbers accordingly. Trying to prove that all these public spaces are the stages of the possible experiences that connect the often-insulated bubbles that people choose to live in, and that will not be able to happen without the help of technology and art as main tools to activate people and then activate the spaces around them (Prisco, 2016). This research will study how technology opens a new level of space and more to the public spaces, in the age of digital or what some researchers call it the virtual age (Zenka, 2016). Recorded interviews of potential users will help to prove that these public spaces can act as activated forms, and how it can influence the city's overall performance. In addition, these investigations of user's needs in public spaces after applying the technological interactive installation will contribute to findings showing if people are hungry for such art in their urban routine urban lives.

Chapter 2

THEORETICAL FRAMEWORK

To satisfactorily explore and examine the thesis's intended investigation, certain different philosophies will be put into play all through the study. The structure of this thesis is a completely extensive writing review that extends with the help of the utilization of an evaluation framework that relies on personal observation, analysis of literature, and the support of case studies in conjunction with writing surveys. To continue, the introduction of the importance of the presence of public spaces in cities leads to the tremendous role it plays creating active cities. However, since the growth of technology within the modern age enhanced the living standards and the social communications of everyday routines; the effects of the virtual dimension will ultimately reflect within the communal public spaces found in all cities. Therefore, the study looks at the impact of those virtual entryways on the life of the city's open spaces and the social interactions between the users and theirs city. From that point forward, the social dimension relates to urban life with ease with the interventions of both technological and humanistic approaches as users' comfort of communication, whether strangers or not, along with their social interactions will elevate the value of public spaces simultaneously with the elevation of the value of strangers. With that in mind, the thesis's structure is merely a reflection of the pyramid of the holistic experience of public spaces; as shown below in the figure as a summary.

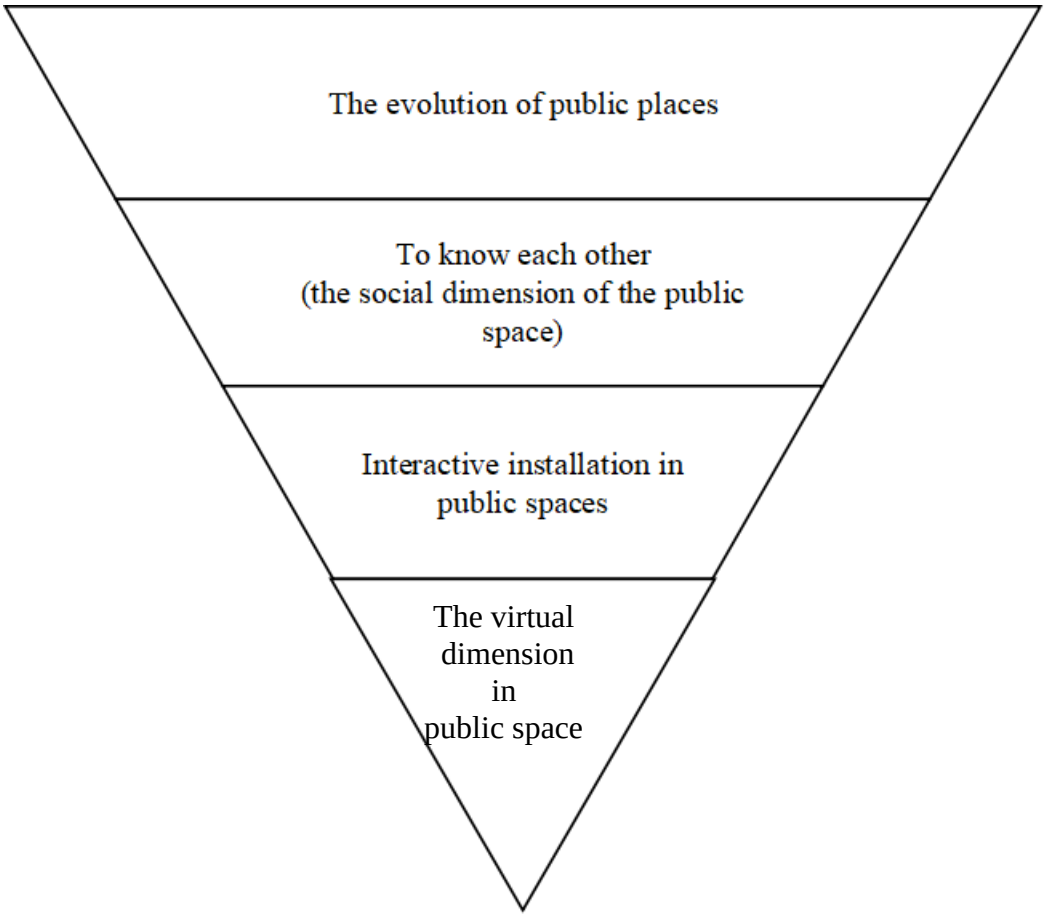

Figure 1: The Theoretical Framework Built on an Inductive Method. Source: by Author.

To initiate, the thorough analysis of the advancement of the public realm should be examined before investigating the different proportions of its effects on the development of a revolutionized urban plan. These open public spaces proceeded exclusively to add to the acquaintance of new societies with each other and the learning experiences the individuals need to share among themselves as well as other people over the world. So, this ascent in human development will only reflect on how these individual segregated groupings change accordingly to be able to deviate from human detachment, yet acknowledge of a human association.

Moreover, the quick advancement of the modern age was the contributing reason for human isolation as new thoughts of disintegration and parceling began developing, because of seeing the social diversities between individuals. In return,

there came a field of human conduct to be discussed further labeled proxemics, a manifestation of the human utilization of place and space along with their conduct towards outside components influencing their own personal space that are to be talked about further. Therefore, this investigation explicitly includes the socio-spatial estimations of open space and its relationship with various personal territories inside that space accordingly. Along these lines, public enhancements ought to be controlled within communal design strategies can be used as specific activities that can trigger sentiments of trust and security among individuals and their environments respectively. To put it in other words, all these contributing ideas reflect back to the thesis' aim of the more people are interacting within that space, the more active the space is; as the suggestion of new technological innovations in these common spaces will let individuals feel associated with the remainder of mankind and bring back traces of human union.

2.1 The Evolution of Public Places

Firstly, the comprehensive analysis of the progress of public space needs to be scrutinized before exploring the various measures of its impacts on the evolution of urban design. The history of public space varies tremendously through time from the arrangement of the alleys of ancient Babylon to the culs-de-sac of modern Phoenix, in response to the rise of the understanding of the cultural and social factors directly or indirectly on the public space in a holistic manner (Carr, Stephen, Francis, Rivlin, & Stone, 1992). It all started around the fire; Public space is yet to be an intrinsic foundation built on many principles emerging from the early human days until our current present and continuous future. As the big umbrella, public space holistically forms a huge part of the urban fabric that existed and adapted through time as it is quite obvious in the historical timeline (Hiss, 1991). It not only affected

how humans perceive spaces, yet also how humans socially interact in those spaces. If one goes back in time to 2.6 million years back to the Prehistoric Stone Age, when the main humanistic purpose was to survive, one notices that humans were dependent on each other to be able to live (Rapoport, 2013).To explain, the early man celebrated existence by gathering in their public spaces around a simple medium: fire.

As seen, the common accumulation point started around a living necessity that proves the presence of man, and that was the beginning of potential public space (Canter, 1977). As human life escalated, the basic survival needs started to develop into pure purposes of leisure and entertainment. These time fulfillments are classified as celebrations or life events that gather people together into one public space, whether for an achievement or a commemoration of a memory (Boyer, 1996) In short, the public space's roots originated from the traces of the Greek & Roman urban city scale. That is to say, dating back to Ancient Greece, the first attempt to create gathering spaces is classified as the prototype of public space (LeGates & Stout, 2015). From that initial public space model, the functional alterations were majorly noticed as the new function was merely a reflection parallel to the maturity of humanity that is adapting by time (Rapoport, 2013). For example, in Ancient Greece, the Greek Polis being the central hub of the city represents a response to accommodate vast numbers of people in self-governing, political occasions, and religious, secular assemblies (Collins, Sitte, & Collins, 2006). Then, its new successors mainly include the Roman Forum and the Roman Piazza.

Through the centuries from the early Roman urban prototypes, the development of the public space slowly but efficiently was enhanced enough for the public service to be divided into "the street" and "the square". Consequently,

"Medieval Plazas" focused on the service of large crowds, specifically within a church setting. To continue, these multifunctional spaces acted as not only gathering points, yet as distributing points various in respective to the desired function: mostly religious or informal meetings (Mumford, 1961). This urban growth is a reaction to the development of civilization and its social needs as mainly various functions were hosted (LeGates & Stout, 2015). These public spaces continued not only to contribute to the introduction of new cultures to one another and the learning development the people need to share amongst themselves and others across the world; but also to bring all pilgrims, tourists, locals together in an ample public space exchanging the richness of the world's diversity and embracing it willingly (Garcia-Ramon, Ortiz, & Prats, 2004). To continue, in recent years, contemporary urban planning strategies are being adopted in order to mirror the momentum of our time (Wessel, Sauda, & Chang, 2008). Important decisions were taken into consideration when measuring the suitable public life, not only focusing the planning on street compositions and plot patterns for concrete buildings (Bosselmann, Macdonald, & Kronemeyer, 1999). Further introducing the idea that public life in the modern age has become of utmost importance to the success of an interactive urban environment.

Within these modern urban movements were the implementation of open public spaces in various proportions with the multiplication of the usage of public green areas; since, these alive spaces enrich the social qualities; as well as the introduction of cafes and malls as public spaces (Carmona, de Magalhães, & Hammond, 2008). Therefore, the concept of cafes and malls as public spaces marks the transition of the public spaces from specifically being outdoors to introducing indoor public spaces. In the current time, along with the presence of outdoor corniches, open plazas, and public squares easily accessible to us, enclosed public

spaces took a great part of social interaction (Banerjee, 2001). Examples include malls and cafes in particular and their impact on human engagement and activeness (Oldenburg, 1999). What is ironic is the principle that humans don't change; they only adapt by different means. That is reflected by going back to the previously mentioned idea about early man around the fire, as humans celebrate their existence. The announcement of presence is parallel by seeing each other and to be seen within a public space or setting and becoming part of a pact; part of a united humanized community (Oldenburg, 1999). Furthermore, people's existence is important to the person next to them, and the cycle continues; everyone is equal within the setting, and fear is diminished amongst people; instead, comfort and feeling of place rise and release ease, bliss, and self-satisfaction (Carmona, 2010). Everything that is required to bring people together again to communicate and exchange lives is answered by going back to the history of man. (McLeod, 2007) In return, the adaptation of man shown previously reflects again in the common study of Maslow's Hierarchy of Needs that portrays the evolution of human needs correspondingly from just basic physiological survival into self-esteem and self-actualization by time.

Common factors mentioned earlier may include forms of art, music, sports, visuals, and senses common to all, regardless of culture, race, religion, and ethnicity, that draw attention to eyes and invite people to look, touch, observe, and interact with the art, other people, and space (Ben-Joseph, 2005). In conclusion, alluring factors that people commonly feel familiar with tend to incite that urge of curiosity within users and introduce the concept of giving and take through active interaction. In addition, Carmona's detailed review also addresses morphological concepts (Carmona et al., 2008). He reviews typological approaches arising from disciplines such as sociology, art, and political science, which diverge from the design literature

to focus on the relationship between urban spaces and social relationships, cultural norms, class formation, and political-economic power. From now into the future, since cities are expanding rapidly, the digital age will become more dominant, and humans will be more dependent on the more technological side of design and the virtual aspects of space (Aurigi, 2005). This will be discussed further in Chapter 3.

At the same time, additional care should go into the social aspect of the present public spaces to evaluate the contributed layer on the interactive environment (Wessel et al., 2008). In which, the social dimension will be highly triggered when these public spaces carry a sense of curiosity to allow people to engage and interact within them accordingly. Often, public spaces are unused and become empty because of the lack of eagerness to reach out to space and eventually to other people (Mean & Tims, 2005). To understand the level of when, where, and how people interact lies within firstly understanding the psychology of the human being in order to justify the users' behaviors and needs, respectively (Canter, 1977). With this in mind, the typical human behavior is being protective of oneself, in which an invisible safety guard is carried as a response to constant fear; fear of initiation, and a fear of interaction (Mean & Tims, 2005). Questions to be analyzed and asked are: Why are people afraid? What causes fear? How can they overcome this fear? With attention to the study of human behavior, people need a push to start or a lead to follow (Canter, 1977). If one person initiates, people follow as it gives them a sense of safety and comfort towards interaction with any unfamiliar or foreign engagement.

Taking the well-known Central Park in New York City in the United States of America as an illustration presenting how public space can discipline citizens into creating a better community by the act of initiation. To demonstrate, Central Park was a daunting area mostly for disadvantaged people, criminals, drug dealers, and

many more instead of being used for embracing nature and useful activities for a healthy lifestyle (Boyer, 1996). However, as some people started walking and jogging for exercise in the park, more people became more comfortable practicing their desires as well. Through that, one by one, an entire united community filled the park, and created a safer Central Park as it is known now (Carmona et al., 2008). Furthermore, urban designers realized that certain factors that are common to all people would guarantee to bring them together towards any form of initiating an interaction: physical touch, eye contact, smile, small talk, etc (Lang, 2005). As seen from a simple example, existing evidence proves the fact that users' social interactions and engagements are boosted based on a small action or even a foreign intervention that ultimately greatly heightens public life and embellishes the city's performance accordingly.

2.2 The Social Dimension of the Public Space (To Know Each Other)

2.2.1 Public Spaces: The Human Exhibitions of Their Civilizations

Back in time, around 50,000 years ago, when the world was filled with uncontrollable dangers, and everything was working to threaten the human race; yet nothing was personal (Koomson, 2016). These perils varied from adverse weather conditions, lack of food, to the threat of a hungry tiger hunting at night while one sleeps in fear. All of these pressures worked together to jeopardize the human lifespan, and as a response, humans became social animals. In a sense, they live together and they have to act with each other in order to survive and conquer. As a reaction, people formed themselves to arise in groups. In the same manner, they also tended to have friends and common contacts to be able to go to sleep while feeling safe and secure. Henceforth, sharing responsibilities and trust became crucial from the ancient times, for example: As a man in the stone age trusting others to watch his

back at night and protect him and his family from danger, then by the morning, they will exchange, the protector can go to sleep and the other will go for hunting and providing food for his family and for the protector's family in return (Sinek, 2009). Likewise, this concept is still valid as it plays an important role in the modern age, in categorizing the human interaction necessary to exist.

Moreover, the world people live in now still contains certain impurities that expose humans to hazards. For example, it could be the ups and downs in the economy, political parties leading to corruptions, impending and concurrent uncontrollable pandemics, and social competitions amongst people trying to excel careers. As one can see, there is no possible human control over those inevitable forces: it is the circle of life. However, what can be managed is the administration of the environment people choose to be in and involve themselves within: the smaller circle that will eventually grow. How? By their feelings and experiences; not via instructions (Koomson, 2016). As previously shown, people are social animals, in which any observer will notice the extensive system that runs behind their interactions commonly. So, by realizing that system and understanding how it functions within, it will be easy to distinguish between people individually. In which, it will be quickly noted how each of them is a different personality with different needs and preferences, all according to their cultural backgrounds and social perceptions.

However, even if they formulate themselves in diverse groups, organizations, races, genders, religions, and so forth, eventually, they all need to be together in order to see others and to be seen by others. To emphasize, it will always need to come together at one point, in which those diversely distinct people will all go under one emblem. In that manner, these groups will never be entirely a copy of their flags

nor race nor ethnicity, and soon they will learn to synthesize and process this idea of differences; as they will start to accept each other, and understand the significance of undivided humans (Thompson, 2016). This rise in human growth and development will merely reflect how these group variances in between themselves are so valuable and unique not to be seen as the reason for human isolation, yet for a human union.

When discussing the social value of public spaces on humans, they are mostly interpreted as people's haven: from work, from routines, from stress, from pressure, from themselves. Hence, these public spaces offer windows of opportunities and doors of new perceptions that not only speak for them; yet also call for humans (Whyte, 1980). That is to say, the presence of public spaces gives people the chance to be themselves individually and celebrate their uniqueness from each other, together (Sampson & Raudenbush, 1999). Praising differences becomes a beautiful concept to be incorporated into people's daily lives whenever allowed, as it emphasizes the significance of human diversity within cultures, religions, ethnicities, faiths, and backgrounds (Carr et al., 1992). To clarify, humans can unite together proving that they are one regardless of race and beliefs, and that is crucial; as people are designed by nature to be there for each other in their different ways (Aurobindo, 1999). As a consequence, the use of public spaces should heighten rather than hinder the exchange of communication between divergent people. These spaces elevate the human achievements of technology, science, and advancements since they present the physical picture of how people gathered, communicated, cooperated, and worked together through time to build the life they are living, also together.

The value of public spaces does not only stand there, yet it continues to grow and mature to showcase the necessity of acceptance in between humans themselves. They tell stories of how humans changed to adapt to life; and, most importantly, how

life adjusted to meet its people's needs and desires.(Littig & Griessler, 2005). They also share the adventures of social integrations and cultural shocks between humans through time; while also *exhibiting* the anecdotes of every single individual who stepped foot within that space. That is fair to say, the public space that is shared commonly by all lived through each person's story and most significantly participated in each person's experience (Dempsey, Bramley, Power, & Brown, 2011). To explain, it could just only be a space where one person passes each day to work, while another shared their first kiss there or even another who sings on the corner of the street. This shows how one public space common to all can be perceived in limitless ways, so different to every individual according to each person's memories linked back to it (Low & Smith, 2013). In short, the idea of one public space to be a shared common ground remains a fact, as design and architecture build universal civilizations across the world; mutual for all.

From a behavioral perspective point of view, one can relate the human need for proximity and intimacy by the natural tendency of people to be around each other collectively. This concept ironically returns to the initial theory of the celebration of humans around a fire previously mentioned at the beginning of this paper. To further connect to ancient times and their effects on the present man, archeologists discovered that the places, where fossils were found in a crowded manner, were merely not hunting areas nor potential bloodshed fields; these places were the public spaces they used to gather in altogether (Sinek, 2014). In return, this human quality is carried through design and urban planning to elevate the essence of nearness and closeness within the creation of public spaces, especially in the cities. In which big urbanized areas are highly advanced and contain capabilities to be able to gather large numbers of users that leads to greater exchange and greater human cooperation,

respectively (Fainstein & DeFilippis, 2015). In short, the social dimension that is triggered by these public spaces not only prompts the sentimental connection of humanity within people, but also provokes the sense of safety and security physically and emotionally between each stranger: ultimately bringing them closer together.

2.2.2 Social Dissolution: The Bubbles of Isolation

After scrutinizing the social value of public space, the question still stands however of why did humans originally start distancing? How did that happen? The rapid evolution was the cause of human segregation and distancing. That is to explain, once extreme comfort and self-satisfaction were achieved within the human race, new notions of dissolution and partitioning started evolving, in response to noticing the social and cultural disengagements between people. To clarify, the fulfillment of oneself through time clashed with the character of together to yield a new perspective of social systems and a communal structure (Grenfell & James, 2008). That scheme of differentiating social organizations led to what is now known as social classes, financial differences, categorized circles, and working statuses. As pride, power, and human ego were the leading determinants of the development of social life, privacy and isolation arose, and an *individual* rather than a *communal* identity appeared (Sinek, 2009); that is merely defined by the reflection of one's flag and the number written in their bank account. In short, the value of diversity in the flowering of human progress shifted from being a blessing of prosperity to becoming indignation of deterioration.

Nevertheless, in reality, people usually like to keep a distance between themselves and the other, as it is in their nature to build these isolated bubbles that they choose to live in (Edward, 1966). From that, Architects and Urban planners have to use this quality and adapt it into a better relation, since that individual bubble

should be treated as space. Those spaces between humans can be connected by common possible channels, like through the spaces out of their houses and cars in the public space of the cities. Besides, with the domination and growth of the corrupt public media, that is aiding in promoting those gaps in between the people rather than getting them closer, just as the concurrent globalization tore people apart instead of unifying them via the developments of the century.

In other words, humans have ascended to reach an age that has far more communication tools yet to come; however, it turns out to ironically carry along alienation, estrangement, and hostility (Grenfell & James, 2008). Respectively, the idea of a personal bubble comes adequately while analyzing human interaction against a public space. Such analysis becomes crucial to classifying the identity of personal space. (Edward, 1966). To clarify, a personal bubble is defined as an imaginary measure of a circular or elliptical bubble surrounding an individual, acting as a defence mechanism against the surrounding (Calhoun, 1950). Moreover, it is a comfort zone that trespassing without permission will be quite threatening to the comfort and security of a person. This bubble is confirmed by diverse variables manipulating one's comfort safe zone that is altered according to the place, the density of surrounding people, the safety measures, and the social norms of the environment, respectively. As a result, these factors are always taken into consideration while designing for an open functional public space established to achieve social interaction and human coherence. To further demonstrate the natural behavioral reactions against the surrounding, the pigeon is taken as a straightforward example emphasizing the imaginary personal bubble. The pigeon will stay on the ground close enough to humans at its measured comfort; however, once any external factor crosses its own set bubble or limits of safety, the pigeon will instantly fly away

from the danger of its upcoming close surrounding (Allee, 1958). As a result, the principles of public space and personal bubble are universal rudiments worthy of understanding, to be taken into consideration when interacting with a communal environment.

2.2.3 The Study of Proxemics in Urban Spaces

In the area of study of public space, there is a more saturated field of human behavior analysis with the name of proxemics, a concentration inquiry on the human use of space and their behavior towards external factors affecting their personal public space, in which human behavior in communication and social interaction is considered a reaction against any components of discomfort or change (Edward, 1966). In short, proxemics can be classified as the boundaries set by each individual, necessary to distinguish between themselves and the others (Hall et al., 1968). Furthermore, this particular sensitive field of the study concludes that the personal space of each individual is determined by the variable cultural and social backgrounds, making each human unique.

In return to the central science of proxemics, it spreads into a various set of factors that are put into play when exploring the human responses towards others. So, the study of the social and cultural cohesion becomes essential when discussing the proxemics designated by human behaviour (Cristani et al., 2011). As a result, the standards of public space became a global variation according to each individual, their world, and how they shape it. Moreover, urban designers, being in response also unique individuals, given the opportunity for a public space to be comfortable enough for a person to shape their surroundings, and be in control of their potential social connections within the environment respectively and conveniently. Proxemics it is a complex subject containing several independent elements that should be

incorporated together smoothly and harmoniously to satisfy the anthropological needs of humans (Calhoun, 1962b). To explain, the thorough scrutinizing of the relationship between public space and human space is the comprehensive outlook of the field to comprehend the necessities of public space design and the creative thoughts to link people together throughout the possible interactive channels.

2.2.4 Territoriality in Human Interactions within Public Spaces

To demonstrate, Edward introduces the science of proxemics to demonstrate how man's use of space can affect personal and business relations (Hall et al., 1968) , which, as previously mentioned, consists of sub-factors interfering: Territoriality and its leading component the bubble of isolation. To explain, it is referred to as a universal behavioral boundary with the name: Territoriality; and that goes with multiple typologies to be further discussed below. Some of the main pinpoints to be taken into consideration while defining the term territoriality involve the socio-spatial values of public space and its relationship with different regulatory territories within that space. (Hall, 1966). To enumerate, the term territoriality belongs to the field of animal behaviour in their natural habitat. So, as an adequate definition of Territoriality: it is the action taken by the animal to claim its ownership and defend its own space of belonging against other foreign species accordingly; some animals achieve this possession by making noises or by the power of scent (Carpenter, 1958). Yet, it is evident that this is, in fact, a universal principle within studying fields of not only animalistic but humanistic behavior in reaction to the surroundings.

To further continue the concept of Territoriality, it was initiated as a fundamental concept in the study of animal behaviour, first founded by Howard in 1920s; which is usually defined as a behaviour by which an organism characteristically lays claim to an area and defends it against a member of its kind

(Hall, 1966). From that, it is understood that by all means, human attitudes towards their possessions become very relevant to the concept of Territoriality within the public environment and public space, respectively, creating personal bubbles. These bubbles are interpreted to distinguish between the respected personal space that is individually private and the opportunities of encouraging the interplay of potential social interactions. Some certain bubbles of Territoriality can be arranged to form the rudiments of laying an authoritative claim, mainly: The thermal space, the olfactory space, the tactile space, and finally, the fobbing space, etc. Under these circumstances, thermal space can be interpreted as the sensational feeling present when one is too close to the other to feel the heat transferred through the medium of air in the space present in between. To maintain comfort, one must maintain distance (Barnes, 1963). While measuring the smelling sense in which the scent becomes an influential factor to determine the distance involved between two humans. Not to mention, this olfactory space technique is mostly widespread within the animals' natural habitat to asset properties amongst themselves. As a result, the smelling sense is crucially analyzed to estimate comfort measures, potential trespassing, and safe distances.

On the other hand, tactile space is by definition tangible and touchable; in short, within one's reach. This specific space comes with great sensitivity as the distance between two people is minimal and shrinks over time. So, the tactile space shows comfortable territoriality that can be shared in between. Finally, in the discussion, the fobbing space is the most accentuated space by the human's greatest sense: sight. To explain, fobbing space represents the space where human eyes focus the most accurately. The attention and the concentration of the eyes are inevitably one of the most powerful sociological dimensions that should not be neglected when

deliberating the principles of territoriality within public spaces and urban design strategies (Hall et al., 1968). To conclude, these reciprocated territories are human-driven behaviors fundamentally feeding the urban design's attempt to prompt their interaction in the public space as this study trying to prove by using the modern tools, while considering their private bubble.

Respectively, the idea of a personal bubble generated from the roots of territoriality comes adequately while analyzing human interaction against a public space. Such analysis becomes crucial to classifying the identity of personal space. (Hall, 1966) To clarify, territoriality is defined as the knowledge that deals with the amount of space that people feel it necessary to set between themselves and others (Barnes, 1963); in response, a personal bubble is on the other hand defined as an imaginary measure of a circular or elliptical bubble surrounding an individual, acting as a defense mechanism against the surrounding (Allee, 1938). Moreover, it is a comfort zone that trespassing without permission will be quite threatening to the comfort and security of a person. This bubble is confirmed by diverse variables manipulating one's comfort safe zone that is altered according to the place, the density of surrounding people, the safety measures, and the social norms of the environment. In short, the previous variables control at some levels on the potential channels of interactions; correspondingly, these factors are always taken into consideration while designing an open functional public space established to achieve social interaction and human coherence.

As a result, the principles of public space and personal bubbles are universal rudiments worthy of understanding, to be taken into consideration when interacting with a communal environment (Whyte, 1980). Through that, one can understand the different effects of territoriality and the bubble of isolation separately, in order to

fully grasp them together as a working system holistically within public space. In other words, the invisible bubble of space that identifies each person's territory is essential to promote a key dimension involved with modern society (Mean & Tims, 2005). To conclude, it is a matter of the fact that territoriality becomes designated to be the fundamental principle originating from the science of proxemics to include the bigger bubble that is further degenerated to create smaller personal bubbles individually attained and carried by each person within any public space; simultaneously allowing for the chances of possible interconnections between people within one's own comfort.

Since discussing the social disengagement within humans in-depth and its original causes of the immersive modern globalization, one must not overlook the smarter solutions that should be taken into account where using the main source of the social divisions and transforming it into a useful hand to rebuild what was once lost, becomes the optimal decision. As a result, globalization's central issue lies in causing the bubble to increase in between people since it becomes a more difficult task to cross boundaries of personal comfort, leading to a disruption of the linkage between them (Grenfell & James, 2008). From that, in this research, utilizing the principal cause globalization as a tool to restore human unity using modern tools. Not to mention, incorporating common interests such as art into technology will guarantee to bind the advantages of the modern era useful for social interactions within public spaces (Burbach et al., 2001). As a consequence, the possibilities of human unity and unanimity can be explored back through the duties of urban design and its uses of public spaces to grant an opportunity to crave back the sense of wholesomeness that was once lost; yet is not too late to gain again.

On that note, public spaces became the places where cities can promote their images; but more importantly, where thousands of people with thousands of varied thoughts individually exist there to represent their culture (Carmona, 2010). Through that freedom of self-expression offered, coming together in these shared spaces triggers pleasure, freedom, and relief in a union, resembling going back home after a busy working day, take under advisement that it is only achieved within the help of technology: *the language of today's societies* (Zenka, 2016)

2.2.5 Social Engagement in Public Spaces

The clash of two: escaping from the crowd or escaping to the crowd? As initially mentioned, people follow people (Whyte, 1980); but for activating a space, that is not enough anymore. Theories may suggest the importance of not only bringing more people to the space, but also attracting the activate people to that space. However, on this matter, there are two opinions present in the body of literature; some researchers state that people more likely want to stay away from other people, while tending to use terms like a break or an escape from the crowd (Carr et al., 1992) , or as an oasis in all these deserts of congestion. On the other hand, other propose that people follow people, in which a space is alive by its people (Whyte, 1980). As a response, looking at the existing midline in between all these theories proves that people need places where they can be themselves exactly amongst other people. Amongst those two ideas Charles Montgomery, in his book *Happy city*, talks about the relation between a happy life and the urban form of the cities, he states that crowdedness pushes people usually to stay away and hide (Montgomery, 2013). Hence, suitable public spaces give the people **choices** to escape only when they need to, bringing people close to each other but not so close as to cause discomfort (Milgram, 1984). That midline of comfort becomes the main

concern publicly, as people nowadays are seeking adequate places yearning for ease and convenience. The urban designer needs to give people the chance to personalize the space according to the individual's needs required to cultivate comfort. So, public spaces need to be flexible, in the hopes that people become part of the crowd, yet individually and uniquely themselves within that crowd.

Another decisive point often overlooked in city planning, affecting the urban design and public space strategies, is the high density currently excelling by time within communal environments. To explain, Crowding and social behavior are co-dependent on each other within a specific environment. Initially, this study was adopted on animals to estimate the relationship between the animalistic approaches and reactions with the humanistic responses likewise within a society. (Hall et al., 1968). As an experiment, rats were taken and put freely to mate and adapt in a controlled environment. Results showed how their population stabilized at 150 rats at a time in a quarter acre of land. Besides, each group of a maximum number of 12 rats combined to form personal territories amongst themselves (Hall, 1966). This experiment concluded that the rats would fight aggressively in a chaotic living environment unless they formed a specific order, social hierarchy, and settled for the organization of distributed groups within.

This process was named by the principle of behavioral sink (Calhoun, 1962). To continue, aroused speculation about the similarity of the effects of crowding on humans provoked the study of density within an urban public space. It is no coincidence that recent studies of human behavior and social responses reported that a human could not hold more than 150 relationships at a time surrounding them (Dunbar, 2010). Robin Dunbar, a credible professor at Cambridge University, concluded that a single figure will not be able to physically, emotionally, and

mentally withstand and maintain more than 150 close relationships and various personas similar to the stable number of the rat population in the previously mentioned experiment conducted (Dunbar, 2010). In other words, human responses to crowding will differ in reactions to the atmospheric ambiance triggered by the high density or overpopulation in the public spaces. It becomes more than just an area statistic, yet a more personal face to face daily interference with crowding, within routine activities in the street, public functions, or even the household. Consequently, the social behaviors in correspondence can either involve acceptance and adaptation or annoyance and rejection according to the personal space that has been giving to the users and according to the types of linkages, which urban designers have created in the city's urban spaces.

Not to mention, the most critical principle in human social relationships does not become defined by the number of people one has as social acquaintances, but rather in the types of people befriended. In which, the thought of how to bring about some of these interactions within people to become part of the close 150 circles attained becomes crucial to the aliveness of the social dimension within people. To explain, the concept of the comfort of social interactions between people within interactive public spaces opens up the opportunity to include strangers and invite them to communicate within their intimate territory amidst a crowd. In return, the active public space henceforth uses the chance to apply modern technological interactive tools available worldwide to provoke active people to reflect the city’s urban life; making it alive once again with social value rather than simple numbers.

Milgram (1984) a credible social psychologist, mentioned that some crowdedness in the cities leads to direct isolation. In his research that compared people's interactions in small and big cities, it was noticeable that people in the

smaller towns were much more willing to interact and help strangers than people in the big ones. Not to mention, Milgram (1970) adds that the nervous system of the human body will tend to get overwhelmed when bustling people surround humans; that is why people tend to put a protective barrier between themselves and others going back to what it has called as personal space. Andrew Baum (1973) also studied the same phenomenon after Milgram in 1973. He followed and analyzed the behavior of students at Stony Brook University in two different ways of living. Firstly, one being at the dormitories with students living in long corridors with shared bathrooms and a communal lounge area, while the second group was in a different type of dorm, consisting of separate suites with three students for each bathroom and lounge areas. Baum noticed that in the first case, students were complaining more of stress and asked for fewer social synergies, while the second group were talking to each other a lot more and with more interactions. To emphasize, the good city gives its people a balanced social environment, meeting the needs of privacy, and at the same time, it is encouraging people to engage with each other on a small and a big scale thoroughly.

2.3 Art and Interactive Installation in Public Spaces

2.3.1 Installation in Public Space and the Linkages of Isolated Bubbles (Triangulation)

It is impossible to instruct two people to trust each other, and then expect them to do. Likewise, it is not possible to force two people to love each other. It is not something that is taught; it is a feeling that comes out of actions. That is to say, there must be an action that can trigger those feelings of trust and safety. It is only then by default people will start to talk to each other and interact or collaborate, even if no one told them to (Sinek, 2009). Likewise, it is hard to identify the time one starts to love someone else because there is no specific time for that; it would happen through

time and experiences. It is those small things that can be added every single day to the feeling of trust or love; that could be as simple as the bright morning smile while someone is passing by their neighbour going to work; through that gesture, people start to trust each other or even love each other.

Henceforth, this concept is reflected within the public spaces; any small action could change the community's behaviour with each other by time, even the simple *Hi* when a person passes by another could make a significant change in the cities public life (Hyslop, Montgomery, Helliwell, & Chan, 2013). Digging within the roots of urban design studies, planners were more interested in the complications of street and pedestrian flows of the cities, transferring to the term public spaces. To give an example, designers started to notice that people usually stop to have a conversation with someone they might know, and when the friendly catch up takes longer than expected, then people start searching for a space close by yet away from the continuous pedestrian movements and the busy streets. As a consequence, designers took from that everyday situation that the need for public spaces started in its pure form. In which, a simple greet is an initiative for more social interaction requiring more time and space for convenience; so, if one meets another, and they stop for a *Hi* call, it is a call for socializing where more questions will come to occur for the flow of the conversation (Whyte, 1980). It is an example of what this research is exploring, desiring for more questions, answers, and interactions. In short, it is to drive more people to stop and interact: what are you doing? What is this! or it looks strange, isn't it !?, hoping it will give others this power to get closer to a stranger and talk to them or interact with them even if it is simply just an exchange of smiles.

Whyte (1980) in his book *The Social Life of Small Urban Spaces*, defines a specific crack that might happen in the isolation shells that people have in the public

spaces as a triangulation. To explain, he was describing it as a process where an external incentive causes a connection between strangers as an example, the book was describing a scene of two strangers standing on one end of a street's corner, while a third man passes by them holding a sign, protesting loudly about taxes. In return, these two standing men have been linked now by this external factor and will exchange comments about this action in a way that close friends usually talk to each other, forgetting the fact that they are strangers (Whyte, 1980). People return to their nature since they are designed to socialize, in which one stranger next to you in the bus station will tend to tell you all about his story if he or she gets that chance. The incentive for the linkage of public spaces' term *stranger* could be a physical object, an action, or even just a simple view. As seen in Brooklyn Heights, where they have a fabulous view from the top of the tower across the river, and it was open to the public, where it is common for people to get thrilled by the view together and enjoy some compliments and initial small talk in regards to the shared perspective they are experiencing together.

Many similar examples are rather very common in people's everyday life; and most probably everyone has experienced it one way or another (Whyte, 1980). On another hand, in modern life, people usually tend to drive their cars whenever it is possible to do so. So, if urban designers want to encourage walking over driving, then they should offer them a walkaway that is as good as driving a car if not even better. The question still stands at how? How can urban designers encourage people to get out and be a part of the community again? Jeff Speck (2013) discusses that public spaces should not only display safety and offer comfort; it should also intrigue (trick the people curiosity). In other words, curiosity is the key that will let people stop and leave their cars to go against their regular ways to discover and explore. In

some public spaces, a simple yet exciting artwork could have a potent impact on social life within its space. That is to say, a comparison study done on Manhattan square before and after applying *The Four Trees* installation, proves all the significant benefits activating the pedestrian flow of the plaza towards space and the users' interactions (Whyte, 1980). People are allured and triggered to witness the sculpture; so in return, they will either touch it, stand under it looking upwards, or even comment about it to friends around whether physically in person or as most of the modern ways of socializing: through the virtually sharing via photos or selfies by their phones; in a way to brag about the experience and persuade others to join them.

2.3.2 Social Engagement in Public Spaces

As it is shown, there is an apparent correlation between trust and public space formation in any community (Hyslop et al., 2013). In which, the way urban planners shape their public space matters a lot and how it consecutively shapes the active city. And since these public spaces of the city around them in return shape the number of social connections they can get every day, the more people interacting within that space, the more active space is (Streb, 2017). When people see a live performance or an exciting installation in one of the public spaces of the city, what happens is that those people will take a step back from their busy daily life. They will stop for a moment and watch, smile, and they might interact with a stranger, trying to share this moment with others: by taking photos, sending snaps, or even carrying this joy through their days and discuss it with someone else later.

Standing together in this linked experience, furthermore continuing their routine back to city life, they will disperse with these feelings trying to deliver it to the other in any form of positivity. Installations in these shared spaces will let people feel connected to the rest of humanity (Konyalian, 2016). So, can designers turn the

public spaces again back into a machine where people would like and trust each other even if it is for a short period? One of the examples that could hold an excellent impact at this context was that Ryan (2001) created a simple poster called *Stranger On A Stranger* where two strangers put their hands upon the poster solely still strangers, and they are not allowed to remove them until they interact and are no longer strangers (Brennan, 2011). In short, where Brenna hung up his poster in NYC Street, trying to establish quick public social interactions; that helped people to interact with each other. Other social experiences can be formed in many more performative and artistic ways, remove hand when no longer strangers but this time using more modern tools, and leaving the public space when no longer stranger.

2.4 Case Studies Using Interactive Technology in Public Space

The interactive installation is a term referring to a concert form of an interaction space or installations for generally a semi-public or public space (Olsson et al., 2020). Not to mention, this type of installation does not just act as a form of visual appearance, yet a tool of interaction with everyday users, to ensure maximum engagement between users, the surroundings, and space holistically (Olsson et al., 2020). As an example, as present in one of the public library at the local central municipality library Denmark. They put an interactive floor, using a projection mapping technology on the floor consisting of a smart camera that tracks people's movements aiming to trigger the sense of collaboration between multiple users. In return, using sight senses simultaneously with the projecting visuals adds to the aesthetic experience as well as the encouragement to interact with the installation present with the surrounding foreign users; maximizing the social comfort within a public space. Meanwhile, it also projects personal messages sent by the users through emails on the floor in the event of special occasions for more personal experiences

and meaningful attachments (Krogh, Ludvigsen, & Lykke-Olesen, 2004). To conclude, this is just one example of many existing interactive installations already tested within public spaces provoking social engagement with the aid of technological interventions; as more will be provided further in order to compare records of active spaces.

2.4.1 The Audi City Lab (Mogees for Audi City Lab) Milan 2018

Audi City Lab or Mogees for Audi City Lab, typically an exhibition of vehicles that sets up individuals together to discuss Audi cars, is like a dynamic space. However, for this situation they attempted to make individuals meet up even in the display of the autos themselves, it is genuinely contacted independently from anyone else, yet by how individuals were contacted. It is at Audi show by Bruno Zamborlin. Mogees for Audi City lab in Milan in 2018, utilized the vibrations received from the clients of the space and move it to the type of sounds and hues; as a state of intelligent correspondence in the middle of the clients and their environment. They utilized the vibrations out of the fingertips of the guests to produce an active type of reaction, a way of interaction in between this semi-open space and the users, an intuitive response of the light and music permitting to follow more guests to the 50 * 50 meters exposition (Zamborlin, 2018). So, this newly established way of interaction as described opened new doors of incorporating art with technology in various means.

Figure 2: The Audi City Lab.One Person’s Music Will Be Continued By The Next; Finishing Each other Source (Zamborlin, 2018).

By moving the clients' activities into melodic notes and hued drove react continuously utilizing the algorithm of Mogees sensors created by Bruno Zamborlin (Poletkin, Yap, & Khong, 2010) the idea has been taken via the instantaneous interaction of the region to mirror how Audi made the engine noises of their vehicles homogenous with their indoors design, just like how the sound of technology disappears in nature. As Zamborlin (2018) describes how this visible intelligent establishment speaks to another path for individuals to see the surrounding, humans start sharing their joy in their first visits to the Audi city on the media. In return, a reaction from the general society occurred, and individuals with every single diverse age and levels were intrigued to come and perceive how it could be to speak with physical spaces that simply have a special spirit. Likewise, reflecting back to show how people will tend to want to live this interesting experience that brings performance to life.

They situated ten of the Mogees sensors in the 2500 square meters display zone circulate the sensors under the catwalk and in the vehicles' manifest there, and because vibrations are everywhere round; the Mogees sensor read that vibrations out

of the users' actions and transfer it to a manner of communication between the visitors and the gap contents (Zamborlin, 2016). Mogee allows to tune the customer's actions and convert that into actual-time series of lights and sounds occasions, so when the location is empty it will be quiet and as someone walks in, it begins to interact with him; similar to a live structure trusting that somebody will wake him up so that it will give the space a different feel. Also, by defining the gestures and converting them into sounds, people will gain their effects on space. Mogees Ltd's superior sensor-tech usage of patented AI transforms any item of any fabric into an intelligent surface - in this manner flawlessly consolidating the physical world and the information world without the requirement for consoles, fastens or contact screens. Through that, it attempts to give the whole of correspondence happening on the present world some substantial measurement of the tangible. So, what Audi attempted to address out of this show was to add a substance and visual senses to that space that satisfy the need of individuals experience and desires (Zamborlin, 2018), so that the visitors have the chance to live the experience of the tangible dimension and enhance the communication between people.

The use of Mogees combines a vibration sensor with the progressive tune software program, transforming any object into a unique musical device. Audi City Lab aims to provide an atmosphere for the visitors to explore the hidden sounds around them and express the feeling of a new dimension of space. The guest can experience every single move or touch tap in various ways and see how each element, such as the floor and car converted into a musical device that are encouraging people to interact more with each other to see what kind of music that they can perform and enjoy. In which, one person's music triggers the next person to follow the melodies and continue the harmony; engaging socially and physically. So,

the Mogees signals acknowledgment innovation: that specifies how the user needs to play his or her own instrument by recording the user's very own motions, for example, hitting, scratching, or striking it in various ways. Consequently, people would see the exhibition from a new perspective. The touchpoint of Audi City Lab in Via Montenapoleone will feature the 3-D sculpture called *Light Motion*, representing the lines of the Alcon concept car. As well as, the light motion ring elevates high above water to give the perception of a repeatedly interchanging sky. That offers the user a sensual feeling of being high within the clouds. Like if the user is in another space. Audi City Lab is an excellent example of how Audi brings life to the historical courtyard of Archbishop's Palace. It makes the place alive again and bring joy to it as well. The use of technology, in this case, created a second dimension for space, this dimension enhances the communication between people and technology and more among people themselves. Wherein many scenarios of observing the people's interactions, people were motivated to participate, interact, or ask, driven by curiosity, what is going on? From what is noticed, it is quite clear to discover how a small installation or an interesting intervention could outline the experiences through different observations within the space; and if new technological concepts and similar attitudes were taken to more public spaces, it is predicted that activeness and life will be mirrored back to the city's public realm.

2.4.2 (Location-Aware Music) in Central Park, New York City, America

Brothers Ryan and Hays Holladay (2014) are musicians/music producers that have developed a new concept called Location-Aware Music. Initially, they were intrigued by the idea of integrating art with technology. They began by creating site-specific audio and video installations or planning interactive music concerts. Over the years, they came up with the concept of Location-Aware Music as a composition

for physical space. The inspiration came from an art installation titled The Gates by Christo and Jeanne-Claude, which was a set of over seven thousand vinyl gates placed in Central Park in New York City (Holladay, 2014). According to Ryan Holladay, the Gates invoked a dialogue between the surroundings and the users, and were not simply stationary and inanimate objects like paintings on a museum wall. The thought that occurred to him then was the possibility of creating music specifically for the landscape, just like the Gates responded to the layout of the park.

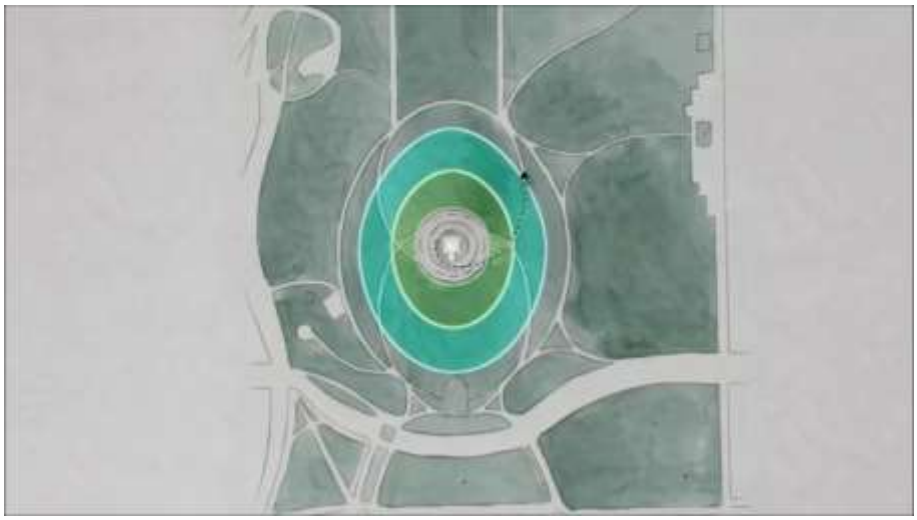

Figure 3: This Figure Presents The Zoning Strategies of Virtual Music Distribution around Central Park (Holladay, 2014).

Consequently, the Holladay brothers released The National Mall, a location-sensitive album created for National Mall Park in Washington, D.C. It was essentially a mobile application that used the phone's GPS data to map the park and play music for it (Holladay, 2014). There were multiple musical segments geo-tagged throughout the park, which were activated depending on the user's location. By extension, this implied that the way someone walked would trigger a note, and by traversing a certain path, a unique musical score would be created for the person to

listen to. The album was not made to listen to from start to end, like a normal playlist, but rather depended on the user's movement pattern. This was likened to story books where the reader gets to make choices and reach a particular ending for the story, but in music form instead. Moreover, Washington Monument in the middle of the park acted like a focal point or radial center. The closer the user got to it, the more instruments they could hear, the faster the tempo of the music, and the more exciting it became, almost reaching a crescendo.

Ryan Holladay (2014) described it as though all the sounds radiated out from that massive pillar. If a user were to start from the Washington Monument and walk away from it, the entire musical sequence would happen in reverse. After exiting the perimeter of the park, the music would fade to silence and the play button on the application would disappear, signaling the absence of any interactive locations. Furthermore, 'The National Mall' was unique in many ways and far from a typical music album, but the most important aspect of it was its direct relation to the location it was created for. It added a virtual dimension to the park that did not previously exist. The application itself would not work without the landscape. People in other parts of the world could not listen to it because of its location-sensitive nature, and it was necessary for them to be there in person to experience it. The requests for a CD or downloadable mp3 version of the album simply could not be accommodated. Six months after the creation of The National Mall album, the Holladay brothers mapped music and developed an album for Central Park, which was twice the size of the National Mall park (Miller & Matviyenko, 2014). They were thus successful in finding new methods of combining technology with music and adapting to the current digital age. The essential philosophy was not to merely enhance old techniques, but rather to create entirely new, unexploited concepts and ideas. Hence,

these existing interactive examples not only provoke the active sense within users in public spaces; yet also, offers the opportunities to experience a whole unique dimension new to the users' daily routine. So based on existing experiences of the hybrid of art and technology, fascinating new interventions of common art mixed with a twist of contemporary technology could entirely diagram the encounters through various perceptions inside the space. With that in mind, if new innovative ideas and comparable perspectives were taken into consideration to social gathering spaces, it is anticipated that liveliness of the public spaces will be extremely heightened with active people in a city; as this thesis reflects. As a consequence, technology becomes a huge aspect of the growth of innovation that will aid in the maximization of social and communal interactions.

Chapter 3

THE VIRTUAL DIMENSION OF PUBLIC SPACES

> "We go back to some streets more often than others… Maybe a street unlocks memories, or offers expectations of something pleasant to be seen, or the possibility of meeting someone old, or someone new... Because some streets are more pleasant than others, we go out of our way to be on them." (Jacobs, 1993, p.23)

As the modern age grows, new innovations continue to empower individuals to live and explore possibilities to the fullest; through creating full new windows of opportunities to all individuals to be able to improve further how they encounter space and experience it. Following the same manner, the best way to be taken is to combine the benefits of the given advancements in front of one's span and adjust it according to one human's own adequate practical space and appropriate social solace. Furthermore, creators, scholars, and technology specialists progress testing virtual techniques that are being adjusted to study their impacts on space, the city, and the urban realm comprehensively. Not to mention that taking noteworthy thoughts of the social associations and human conduct examines, became key when studying the effects of social interactions within public spaces. In return, proposing new high advances, for example, the VR and the AR were classified as chances taken by designers to assemble an enhanced reality as explained further in this chapter.

3.1 The Digital Age Effects

Thousands of years ago, before the rapid growth of the 21st century, globalization flew to the public carrying with it a massive amount of data and information. That offered great possibilities within reach, in which, with one click, it can put any needed subjects and information wanted upfront directly and feed the curious (Chase-Dunn & Lerro, 2016). At the same time, the exposure of interaction with technology still drags humans to live within the limits of 2D space screens. As a consequence, it is still strange how humans communicate these days; and results in a standing question of why is humanity imprisoned within small pixels only? While humans are exposed to a vast new world of opportunities that awaits the attention it deserves. Nevertheless, what is quite particular about the expansion of the new reality through the same technology, is the conceptual approach that the devices no longer perform as a 2D screen in people's hands; nonetheless, it can first feel them and touch them back to some extent (Zenka, 2016). To explain, technology enables people to act like people to the fullest through bringing full new content and injecting it to the real people live in to enhance further how people can experience the space. So, the best path to be taken is to merge the advantages of the given technologies within one's reach and to adapt it simultaneously to human's own realistic space and behavioral comfort.

Urban Designers usually study human behavior, characteristics, and social activities very carefully to be able to analyze and somehow predict the future responses that come along the new future. However, the level of prediction one can has within this digital age is recently very minimal because of the highly accelerated speed of technology and data growing by the second (Littwin & Stock, 2020). Furthermore, this digital era's reflection can instantly change from day to day,

meaning, for example, that the past five years will have nothing to do with the new developments in the next five years (Zenka, 2016). It was slow progress through time, which is now classified as fast progress through minutes. In relationship to that, humans evolve simultaneously yet not at the same speed. Human behavior most commonly will change and evolve to adapt to the new high-quality conditions present before one hand. So, human interaction will react accordingly and social interaction between individuals in various communal environments will evolve respectively.

On the other hand, the competition arises when humans are trying to move way beyond time and space to achieve what was once *an impossible*. Consequently, the progression of humans to mature and unfold has to be at extraordinary measures, especially at this expanding digital time. This digital age comes with significant advantages, excellent opportunities, and immeasurable possibilities. To be provided by tremendously easily accessible technologies and a worldwide web of all data and information, it would be a shame not to reflect this greatness to the public good (Greengard, 2019). As designers, theorists, and strategists, advanced technological strategies are being adapted to the effects of space, public space, urban, and urban design holistically, all by taking significant consideration of the social interactions and human behavior studies. Proposing new high technologies such as VR and then adding the AR were chances taken by creators to build their reality literally. This sense of control over reality gives humans the power to challenge themselves to create and shape my world, our world, the next big thing, the more realistic, the better (Mouratidis & Hassan, 2020). Taken the examples of VR and AR will be discussed further below.

3.2 Proxemics Interaction

The original science of Proxemics previously mentioned in the thesis is thus expanded, and new concepts are introduced to adapt to the new technological era people live in. This focus is a presentation of a new perception of Proxemics: The Proxemics of technology rather than physical position. As mentioned previously, part 2.2.3, when Edward hall put the foundations of the proxemics science, defining the public distancing and social distancing in the public setting, and he continues to the personal distance and the intimate distance, depending meanly on physical dimensions of the communication, (Yung & Khoo-Lattimore, 2019). In 2010 Ballendat et al. extending the study from Proxemics to proxemics interaction, while the first one is generally talking about the spatial correlations, the second introduces the study of the devices' understanding for the nearby people and their devices (Ballendat, Marquardt, & Greenberg, 2010) where proximity no longer perceived as a form of positions but also as a movable identity depending on technology.

Dourish in 2001 grounded the concept of embodied interaction: the integration of technology into everyday people's lives. Through that, the proximity of technological devices is studied to record analysis of the effects of these advancements on people, places, and public spaces eventually and respect to each other (Moran & Dourish, 2001). Context-aware computing is where machines start having a context-aware understanding of the surrounding (Schilit, Adams, & Want, 1994). Revolutionizing the technology in the last decade led to an immersive ocean of new tools that have been open to the public, architects and urban planners have to wear the lead of creative applications toward enhancing the people's public life

One of the great advantages of the usage of technological growth is the opportunity to allow certain applications to offer the chance of social ventures for

users within shared public spaces (Yung & Khoo-Lattimore, 2019). To continue, these applications can have various types, mainly two kinds: the ones who wait for people's will of participation such as Opinionizer and FunSquare; and the ones which present the interactive play to the people directly such as FishPong. Furthermore, Opinionizer becomes a fun interactive public application safe for people to share thoughts and brainstorm opinions in regards to a commonplace, interest, and spaces in general. (Opinionated classified as a survey app, where it is collecting opinions form big range of users) It also gives a chance for people to feel and be included within the close by the environment they are present along with all the other users and provoke the sense of a united community.

On the other hand, FunSquare can add fun and enjoyment to the surrounding by providing a small interactive facts displayer and a referred quiz after that to engage people in solving together in order to play stress and worry away in their day; even if it is short term leisure. Not to forget, the last application called FishPong takes an exciting turn in social interaction ways within shared public spaces. In which, it relies on the form of attraction via sounds and physical activities using simple tools as the mugs people use (Yung & Khoo-Lattimore, 2019). It automatically uses those mugs as **tangible controllers** to play a game virtually; thus, this way people are intrigued to experience the activity as well and interact with the users, and the public space as a whole. The previous examples, such as the FunSquare, build a social triangulation, an exciter that motivates people to interact with strangers in those public spaces (Whyte, 1980).

3.3 The Smartphones as An Available Tool in Everyone's Hands

Today's media is all about sharing moments and news with the close people and also to the far world, but shortly, it will mostly revolve around sharing

experiences. In today's world, people carry the possible tools of interaction right in their pockets, in which the technology is now highly developed to a new level where everything needed is within people's reach everywhere, right in people's hands. Meanwhile, the cellphones have been used to increasingly activate the idea of shared spaces, even within its limits in capacity and small size (Khoo-Lattimore, Mura, & Yung, 2019). Nevertheless, it is yet considered to be a tremendous opportunity to be used for free for the benefits of the urban designers and socialists; since they are available tools almost in everyone's hands, and standing back without using them in the design process of any city will be a considerable loss. So, the question relies on how planners and urban designers are capable of navigating this savanna of possibilities successfully. Furthermore, technology is a helping hand that can, in return, help motivate close people to interact, and that becomes practical by the usage of apps. As an example, such as the (People Nearby Applications) which were developed impressively as an alternative to virtual communication that brings people together in real life: like Tinder and Happn, that are both popular platforms for dating used globally (Hsiao & Dillahunt, 2017). In short, the media and the ease of social communications in the modern age not only provide an impressive opportunity for enhanced social lives of people, yet also elevate the social society as a whole contributing to the identity of a contemporary environment.

Additionally, with the constant data flow of people's locations, activities, and interests on Facebook and Instagram and other new types of social media, the algorithm of those online social services will correspondingly suggest friends who share the same location and interests. This yet shows a detailed description of cases when the research mainly focuses more on individual recognition and the study of public spaces. Moreover, another application like Snapchat will ask for location

permission, which correspondingly then allows anyone to view and track their own friend's live location on the map, nearby or around the globe. This concept shall sound scary to some extent, but imagining the opportunities that those kinds of informative data can provide for designers when it is formulated in its right path is beyond intriguing and overwhelming to the addition of new creative dimensions to the world of space design and interactive social behaviors correspondingly (De Souza e Silva & Frith, 2010). those kinds of applications are classified as location-aware apps which allow the users to correlate with nearby people depending on their locations; and at the same time, get people out of their concrete surrounding into a more variable technological environment (De Souza e Silva, 2006). Moreover, this wide variable technology offers a range of interactive experiences involving other people, other spaces, and other opportunities for virtual communication and personal sharing; heightening the social interactions between humans in a shared environment.

To continue, one type of sharing consists of a virtual filter that actually uses the concept of AR technology to create this fun and commonly used form of social communication. To explain, this well-known filter needs a system with a camera alongside a face identification network that works to analyze the face features and enhance it with fun more interesting additions as abstract flower crowns, animals, or any virtual backgrounds. This diverse collection of animated quirks and characteristics that users in all ages play around provides a new way for the users' intervention; which introduces an open source to the users allowing them designs those filters accordingly. Some of those apps including these AR-based effects are available for the public such as the Lens studio application for Snapchat and the Sparck AR for Instagram and Facebook (Keskin, 2019). To conclude, these technologies with all their varieties uses, and strengths contribute to the growth of

the social dimension in individual people's lives. However, it should be more utilized for the public service to enhance the city’s environment as well as holistically. So, the incorporation of the new virtual dimension easily available as mentioned above in design strategies and urban planning will eventually add to the value of the social interactions amongst people physically in public spaces

3.4 AR That Connect the Real World with Virtual Dimension

to understand AR it should first go back to VR, the concept of VR started to emerge way back from 1838 when Wheatstone, once invented the stereoscope, which was based initially on the idea of providing different images for each eye to be seen as a three-dimensional (3D) image (Wheatstone, 1838). Moving at a rapid pace, this simple technology was the prototype of what we now call as VR or Virtual Reality: a complete immersion in another simulated world with variable senses by shutting down the physical world and absorbing that new virtual dimension (Burdea & Coiffet, 2003). The VR experience becomes a spectacular new dimension of the world created by humans to trigger the most important sense (Greengard, 2019): vision mainly. To clarify, vision is not just a device used to gather information and collect data; it is rather a sense that can communicate intangible things like feelings and moods. That is highlighted as eyes can truly communicate feelings, emotions, and thoughts; in other words: eyes can converse what words cannot (Edward, 1966). Moreover, humans synthesize experience by seeing, and also learn faster and more efficiently by seeing. So, through seeing, people relate similar things, or similar feelings the next time we encounter them; all by just the power of memory. As a result of these factors, the main focus of the digital age people now live in was to follow a famous line that goes as why don’t I just show you instead? (Zenka, 2016).

Equally important, the notion of the technology behind the AR aiding in building a bridge in between the abstract ideas within people's minds and the physical world (Carmigniani et al., 2011). In which, AR differs from VR in allowing for the possibility of a connection between two individual parallel worlds. To emphasize, this opportunity creates a very critical needed door of potential collaboration; or in other words, a new way of sharing and exchanging common thoughts and shared ideas. One of the best descriptions of AR suggests that the learning process does not have to start over, again and again, every time and every new generation; in fact, nowadays it is just a knowledge transformation, limiting the concept of interchanging differences and accepting them; not to mention, knowing each other accordingly.

Scientists define augmented reality as an enhancement of reality by the generated computer environments (Jung, tom Dieck, Lee, & Chung, 2016). Furthermore, especially in public spaces, the applications of the AR technology can plug people into the infinite possibilities of the space use and the limitless opportunities of social interactions with all the surroundings given within reach (Khoo-Lattimore et al., 2019) . Therefore, AR as a linkage passage between what is possible and impossible introduces a new world of various functions with diverse variables within people’s control.

3.5 The Technological Augmentation of Public Spaces’ Interactions

Additionally, the opportunities and possibilities given to enhance a public space are highlighted in the AR (Augmented Reality) technology. Another use of other dimensions involves adding the virtual into the real world, bridging them together smoothly and continuously. In comparison to VR, AR, however, adds virtual entities into the real physical world rather than altogether leaving the reality to

live another virtual world (Zenka, 2016). When discussing public space and the technological effects on urban design strategies, AR has been used widely to support the urban design and architecture activities. We can define the AR to be used as a visual platform to support the design process and the collaborative design team environment (Khoo-Lattimore et al., 2019). Alternatively, more as a trigger of the interaction as to how it is used in this research, it allows the urban solving processes to be assessed from many perspectives that without it, it is impossible to be provided by the standard concrete methodologies commonly used in the past.

Technologies and art as an ensemble widely affect the urban typologies of public spaces, and the traditional application of architecture is not enough anymore to cover the need for urban design. Urban spaces become an art of technologies by itself (Sancar, 2003). With the help of technology, it can present that kind of public space where it gives a livable organic quality to the city; it is like the human body is what is truly needed. When people stop thinking of those spaces as a concrete form but rather as a sensation for life, it will be able to breathe and grow without any limitation and as a live form (Whyte, 1980). Henceforth, the public space in the cities where it is designed to determine how people will cooperate. That is the purpose: Spaces that push collaboration more than separation, places where sharing things are as good as having your won.

3.6 Art, VR & AR as A Tools to Activate Public Space

Besides, the success of VR and AR main functions at the beginning of these developments were gaming and entertainment; however, further on, this technology was proven to be very valuable to multiple disciplines including education, security, design, and business. For instance, art being a universal global common language has a significant effect on technology and vice versa, respectively (Anderson & Jiang,

2018). To explain, art and technology go hand in hand to support the space dimensions since art in a humanistic trait to the perception that is quite effective when manipulated correctly and adequately.

The great dilemma of creating art and then making the people perceive it in a certain way is a global phenomenon. Some might argue that the user should touch and feel the artwork to perceive the art piece's holistic meaning, whether it is a painting or sculpture or other modern forms; like in the case of this study were AR has been used as an art installation in public space. Others will argue back that this will lead the great artworks to diminish in quality and expose them to corruption easier and faster. However, on the other hand, when an art piece is given some distance, one appreciates the decisions taken by the artist on a human scale. For example, when looking at a painting from a distance, one can realize the techniques the artist chooses to play with paint, light, and shadows according to a humanistic eye level to create an illusion to the viewer. That is because the value of art is heightened when one cannot touch it, yet can only see it (Liu, Hu, & Schedl, 2017). As humans, we are tempted to appreciate things that we cannot reach; we are attracted to what is not easy to access. Consequently, it is a common default that the most significant artworks of all time are only provoking the human's greatest sense: vision. So, the technological side incorporating art can add to the experience of appreciation (Hall, 1966). Using the VR to break boundaries such as in museums and art galleries or even bird eyes view of a historical plaza like the example this research will study later on; one will be able to live the artwork itself using all their senses virtually if necessary. There will be one's own choice of experiences rather than the standards of limitations.

On the other hand, a common argument lies behind the discussion of the non-favored effects technological additions on art. To explain, since modern time technology offers a virtual experience within one's own reach, this advantage might lead to some misleading effects that light must be shed on. In which, the ease of reach of experience takes away from the physical experience and physical appreciation of the real-life place, space, visual, and sensual design (Yung & Khoo-Lattimore, 2019). As a consequence, this technological option will act as a replacement of experience rather than an enhancement; which is not the concept that should get across. Furthermore, feelings will arise that are translated as there will be no need to actually spare the expenses, visit places physically, and live the experience holistically; as long as there is a free substitute that is just enough (Kim & Hardin, 2010). So, a major loss in the public spaces' stories is rather noticed that ultimately proposes a serious loss of a city's identity.

In return, this thesis replies to this argument by its practical case study that will be further discussed through the means of merely just enhancement not a replacement, paying close attention to the fine line between the two terms. As another interesting example, traveling by default has been classified as a virtual extension of reality (Williams & Hobson, 1995). People usually escape to places like Disneyland, with the ability to experience highly simulated activities and enhanced leisures not found easily anywhere else; in other words, places that incorporate these exciting simulations into a platform of temporary realities (Cohen, 1979). In the same manner, on a closer and a more approachable level, VR and AR applications on public spaces can push these realities one more step further (Williams & Hobson, 1995). Studies done by Daniel A. Guttentag shows that one of the most significant advantages of VR that it is able visualizing three-dimensional environments

(Guttentag, 2010) and growing the world people are very familiar with into a more attractive and intriguing dimension interesting enough for people to be curious and want to be included in it. In that way, the limitless reality explores the different layers that can be manipulated to develop into more advanced practicality.

The researchers were thinking about the possible applications of the VR and AR for the use of the public, and their assumption was based on the notion: that the more conscious participation people are exposed to, the more information will be delivered in a short time (Cranford, 1996). To continue, most of their efforts went on predicting the far future rather than exploring ways to be involved more with the near people's daily life (Hine, 2000). That is a possibility that might explain why VR and AR technology were introduced late to the world, and well later delayed to be available to the public (Yung & Khoo-Lattimore, 2019). As it is explained before: VR is a 3D environment generated by the computer where it gives the chance to interact and navigate around, causing almost a real simulation in the users' minds using a fake stimulation of one or more of the users' five senses respectively (Guttentag, 2010). So, for any VR application, three main elements illustrate VR usually: visualization, Immersion, and Interactivity; while the developed version AR connects the users to the real world within the availability and accessibility provided in everyone's hands nowadays *the smartphones***.**

To clarify, this research is merely involved more with what are the potentials that AR provide to interact with the surrounding. To demonstrate, mainly, this interactivity is achieved by using sensors or devices like joysticks or wireless handheld controllers (Yung & Khoo-Lattimore, 2019). Equally important, the term virtual environments are commonly used with most of the theoretical VR studies more than the common term virtual reality, as by Ryan Yung explain: the VR

dimension is like another parallel world to the real one, which is represented as a reflection of all its aspects enough to make it a credible built environment (Yung & Khoo-Lattimore, 2019). For that reason, this research considers these technological layers not just as additional dimensions with a boundary to space; but as virtually limitless clouds of opportunities worth to be sought, especially in enhancing the social interaction opportunities between people of shared communities. In other words, it would be like adding another color to the main seven Rainbow primaries, or creating a new type added to the seven music tones; this wider door of opportunities with limitless choices leaves the imagination of a whole new level of richness in life and humanity holistically quite satisfying and intriguing to one's mind.

As previously seen, many diverse topics are all corresponding to the same target, maximizing the active users and interactive cities by a great exchange of communication between humans using all means both virtual and physical. However, these concepts should be adequately grasped to be applicable in any design to be called successful. In return, this thesis calls out for more comprehensive research references that are concurrent with the accelerating modern technological age, in order to fully take advantage of the advancements responsibly within the field of human social engagement. To conclude, the main thesis' layout revolved around a solid foundation of research and comprehensive rhetorical and theoretical basis in order to deeply understand the concentrations of public space and its correlation with interactive social design. Additionally, multiple examples and real public designs are discussed and explored thoroughly to record the outcomes and various experiences held by users common relatively. However, this research doesn't stop here. In which an exclusive personal experiment is studied to be used an inclusive case study to be further added and deeply included within this study's future findings as will be

shown further. In short, it is the transition needed from a theoretical world of urban design studies into the practical world.

Chapter 4

CASE STUDY

In view of all the theoretical approaches involved in the bigger part of this thesis, yet it is necessary to include analytical support that is recorded in the practical world to ensure the most accurate findings. As a consequence, in order to verify the theoretical assumption, the research has been conducted with a case study by following a qualitative and quantitative research design methods previously mentioned into which validates, if any, the aim of the thesis studying the effectiveness of technological installations within public spaces. Through a versatility of tools that are actively used in the methodology and the production of the case study, the following records are taken into consideration when scrutinizing the expected results, if any. These tools include a programmed application providing AR Doors Portal to several landmarks around North Cyprus along with a smart people counter system that provides a precise record of the census of users within the urban environment.

4.1 Case Study of Famagusta (The Application of AR Portal Doors)

To further introduce the case study to be performed, a comprehensive analysis of the tools is required to grasp the layers of production and steps of execution of the research. As per part of the research, the main objective lies within working on the public spaces of the city, and the effect of interactive technology on the public realm. That is to say, using technology and art as tools to get the blood back to the heart of the cities (its public spaces), mainly focusing on the historical

landmarks branding the Cypriot cities, specifically Famagusta. To clarify, Lala Mustafa Pasha Mosque which is the central pieces of authentic gothic architecture found in Famagusta, North Cyprus, located strategically in busy touristic Walled City (Figure 2), where the maximum attraction and attention are given to its by users. Through these specifications, it is seen that unlike most of the recent studies that focus on how to get people to urban spaces, this thesis focus on the most essential element which is the actual social interactions between people rather than the individuals themselves. In other words, the social dimension of space and the value of interaction with a stranger: As the researcher calls it (to know each other).

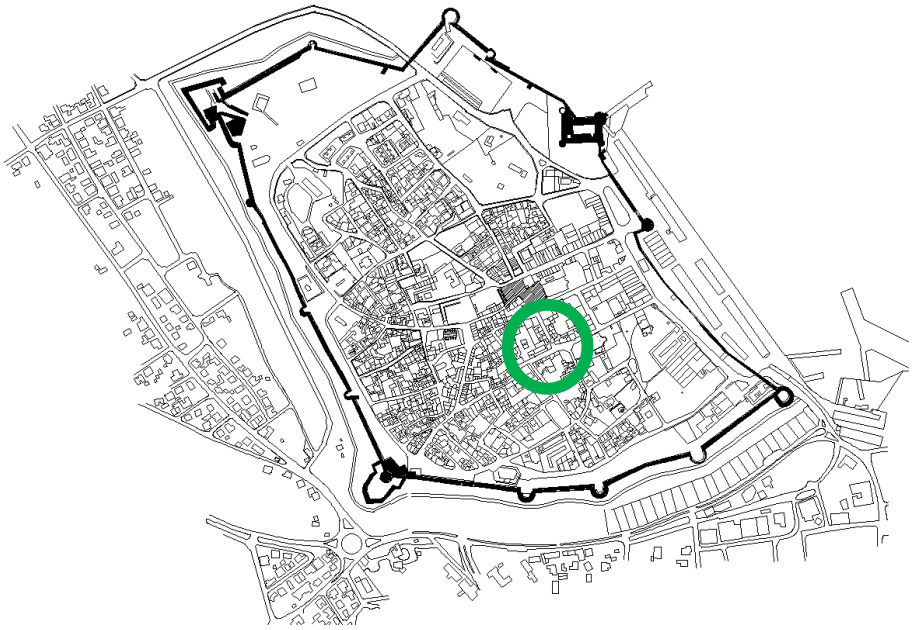

Figure 4: The Walled City o Famagusta. Namik Kemal Square Highlighted. Source: State Planning of Famagusta; Author's Edit.

So in this case study, the research will be composed of how people interact with each other in one of the historical public plazas in front of Lala Mustafa Pasha Mosque (Namik Kemal Square) Famagusta city, North Cyprus (Figure 4,5); where people have been pushed by a programmed technological installation to interact with this public space and with each other. Also, by using the people counter system

previously mentioned, it loads all the required data by teaching an intelligent camera algorithm to recognize people's movement and count them through using that public space. Furthermore, the outcome would be presented through a holistic comparison of the number of users before and after the application within a time frame of an observational month (May 25th -Jun 15th) _around 20 days_ in addition to an executing month (Jun 12th - August 10th). To further continue, the study was conducted for 2 hours per day along with 3 weekdays joined with 2 weekends in order to conclude the findings and analyze effects of technology taking into consideration all settings and elements of time, date, and place within a month duration as mentioned.

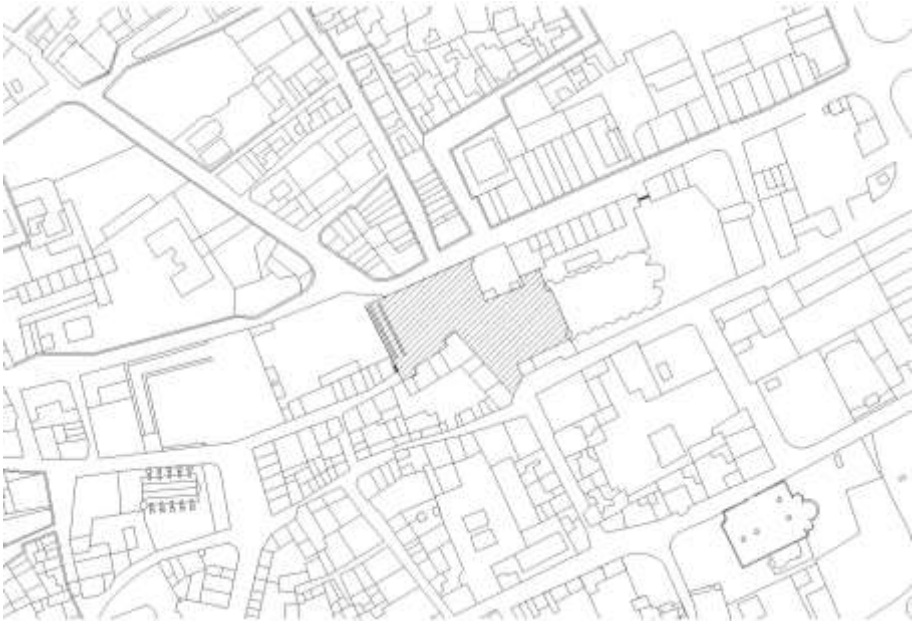

Figure 5: Namik Kemal Square. Source: (The Main Square or Piazza in The Old City of Famagusta , 2015); Author's Edit.

Figure 6: Namik Kemal Square. Source: by Author.

Steps of production will involve locating virtual AR doors (Figure 6) in different places of the city, as these doors will contain a 360-degree photo of their locations, including a bird eyes perspective, in which respective music for each door will be added. One of these 360-degree photos is composed of 31 full 4k resolution photos taken in situ by a drone, overlapped, edited and processed via an application to create this all direction panorama view photo visually accurate to the public plaza itself. Through this, a new layer to which people can see the city from a different perspective; since this case study encourages the ideology of urban exploring.

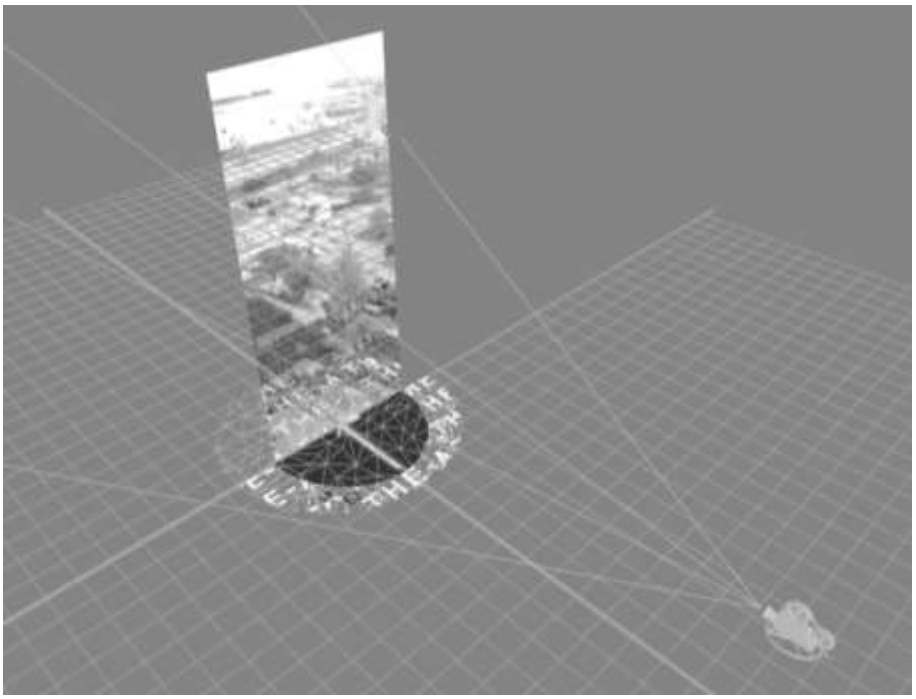

Figure 7: AR Portal Door, Door No.20. Source: Screenshot from Lens Studio. Source: by Author.

Figure 8: AR Portal Door from The Site by One Of The User's Phone. Source: by Author.

So, by using technology and music as tools for adding another dimension in the city's public spaces, a proposal of helping people to activate these squares, and encouraging people to interact with each other, where they might talk to a stranger is

highly granted. For this study, this application will require wooden boards with a maximum 140 cm height to be fixed in the location of the AR virtual doors, in a location where the visitors of these places can see it clearly within the plaza. On these boards, the barcodes of the virtual doors are to be scanned, along with a smart camera that counts the number of users of these places before and after the application along two weeks to analyze the effects of this approach. That is achieved by the involvement of the commonly used application Snapchat platform to program these doors to be scanned by the users' phones (a tool within everyone's reach) and then activated via their phone's camera around them (Figure 8), where they can go in, walk and check around. After the approval of Snapchat itself of the doors, they will be available for the public service. Through this, it will give another layer for the urban fabric of the city. In other words, it is a new dimension of the spaces or a new way for both the citizens and tourists to look at the city from an unusual angle that will elevate the city's landmarks, and attract more people, especially the tourists, to these spaces to achieve maximum social and cultural richness while bridging the past, present and near future in a union. Consequently, the analysis of the effects of this application by the proof of numbers, along with the researcher's contribution of physically being in situ talking to potential users, finding where they come from and where they would love to go, how frequently they used this place, and what they think about this experience.

So on, well after the recordings of the presented experiment previously mentioned, an important measure very crucial to the involvement of the thesis is the interview procedure in which the architect is physically talking to people to get fruitful feedback and various personal experiences ranging from very diverse backgrounds. These interviews will help result in open discussions of how these

public spaces turned into more alive fabrics and how they can influence the city's overall performance. Furthermore, interviews with the users of the space after applying the interactive installation will hence not only offer a deeper understanding of the findings also verify the accuracy hypothesis of the thesis that people are hungry for such a technology in their urban routine's life.

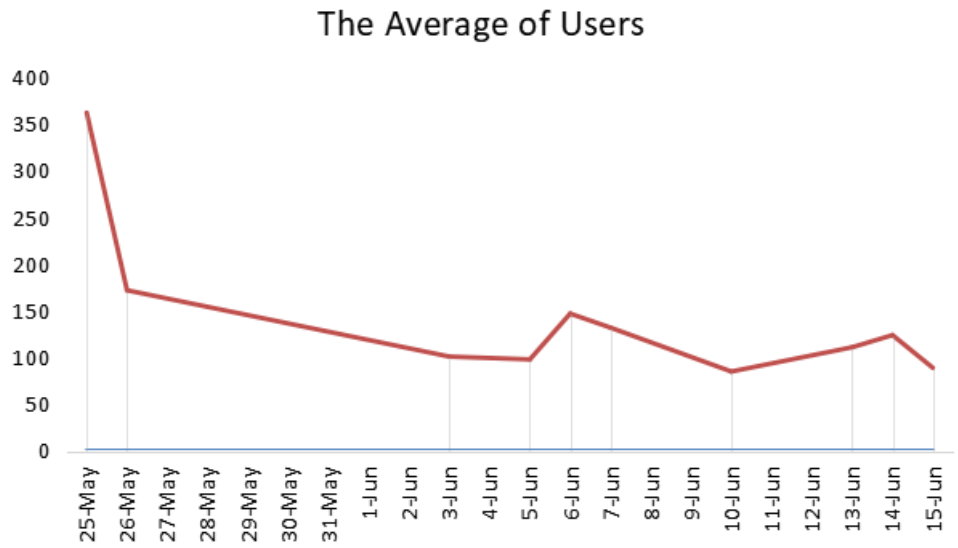

Figure 9: The Average of The Public Space Users. Source: Author's Data.

This diagram above (Figure 9) shows the recorded results of the counter system's installation for 20 days to get a general overview of the average number of people visiting the public plaza; conducting around 60 passing people per hour with an observation overview of two hours at sunset time from dates beginning of the 25th of May to the 15th of June. Moreover, the analysis proved that because of the current ongoing Covid-19 pandemic, people were hesitant to approach gathering spaces. However, as shown in the graph, the reaction of people going out safely after the downfall of the virus escalated on the first day of the public holiday on the 25th of May. In return, the decrease of people exploring the public space contributed to

regaining a more adequate average of 117 people for every two hours that only varied through weekends with more people.

When discussing the social interactions between people, it is reasonable to label it as minimal and short. In fact, during the observation period conducted above, the researcher observed the amount and the quality of the social communications and instructiveness between people or potential users. The only exchange of contact that the researcher witnessed between people was during the period of time while the counter system was put in place for the 20 days. The following only social incidents happened were while a tourist was asking for more historical information about the mosque located opposite, another interference occurred while people asking each other for some touristic photos in front of the surrounding landmarks, and finally a short interruption by a strawberry seller encouraging people to buy fresh fruits. These cases show how the social interactions that occur within the public plaza that is studied are very slight as only 3 stranger interplay took place out of all the numbers portrayed in the diagram above.

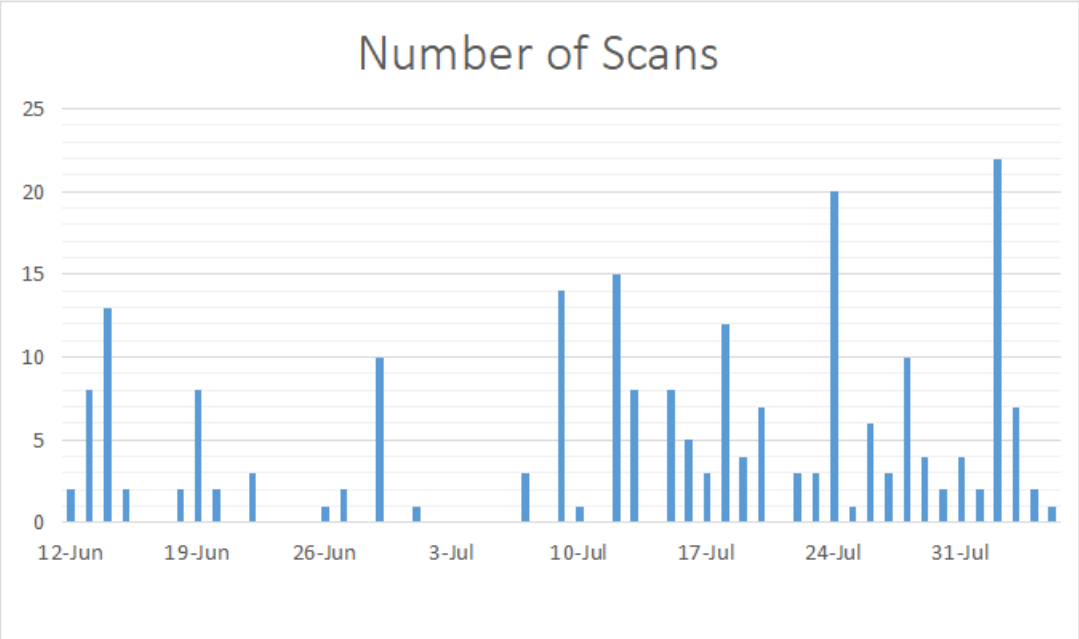

Figure 10: The Numbers of Scans of The AR Portal's Barcode. Source: Author's Data.

On the other hand, (Figure 10) presents the recordings of conducted observations on the number of users using the added technological installations and activating the public plaza in front of the Lala Mustafa Pasha for a period of more than a month from the actual installation date, from 12th of June to 5th of August. The recorded amount of people who scanned the barcode of the installation varied from weekends and increased when exposed as an announcement on social media; which in return proves the effect of media exposure on the growth in public spaces. Recordings show that the highest number of users who scanned reached 22 on the third of August, clearly showing a continuous slow incremental increase as the days continue.

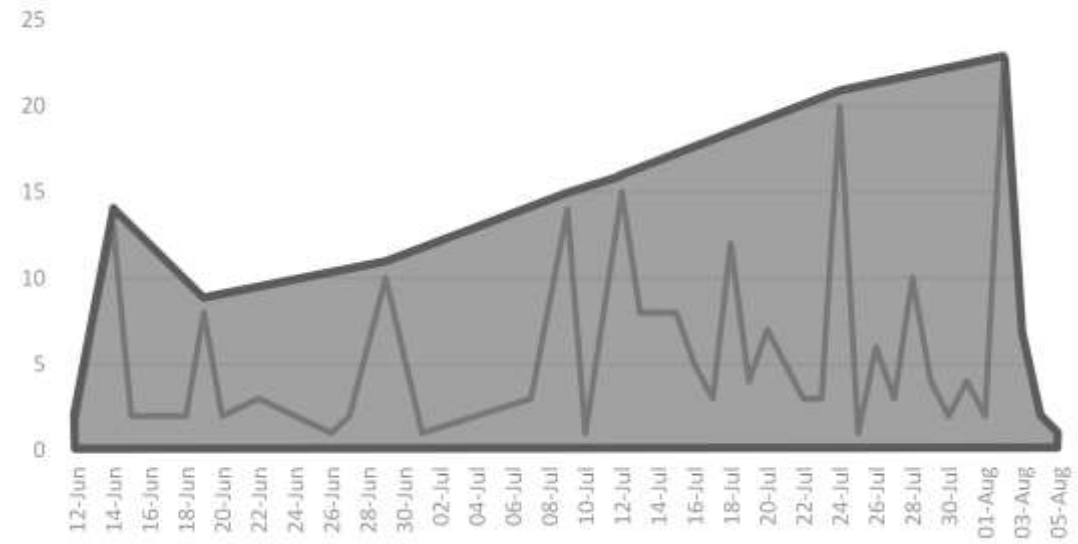

Figure 11: The Number of Users for The AR Portal. Source: Author's Data and Edit.

The overall increase presented by the graph above (Figure 11) showcases how the intervals of people using the interactive installations are slowly yet effectively growing. It started via observational testing done by the researcher from the 8th of June to the 12th in order to check all the required criteria and accessibility issues that may come into concern. Following the experiment, it is presented that the interest within people matured with the high curiosity noticed between users. As one person triggers the next with a simple gesture of looking around, talking with each other, or simply asking for help using the installation. Likewise, this increase allows for the practical support of the effectiveness of new technological enhancements on the service of the people in public plazas that also reflect back on the urban layout and social standards within the surrounding. Through that, it is noticed that people only need encouragement via technological interests or even humanistic curiosity to venture for new influential elements.

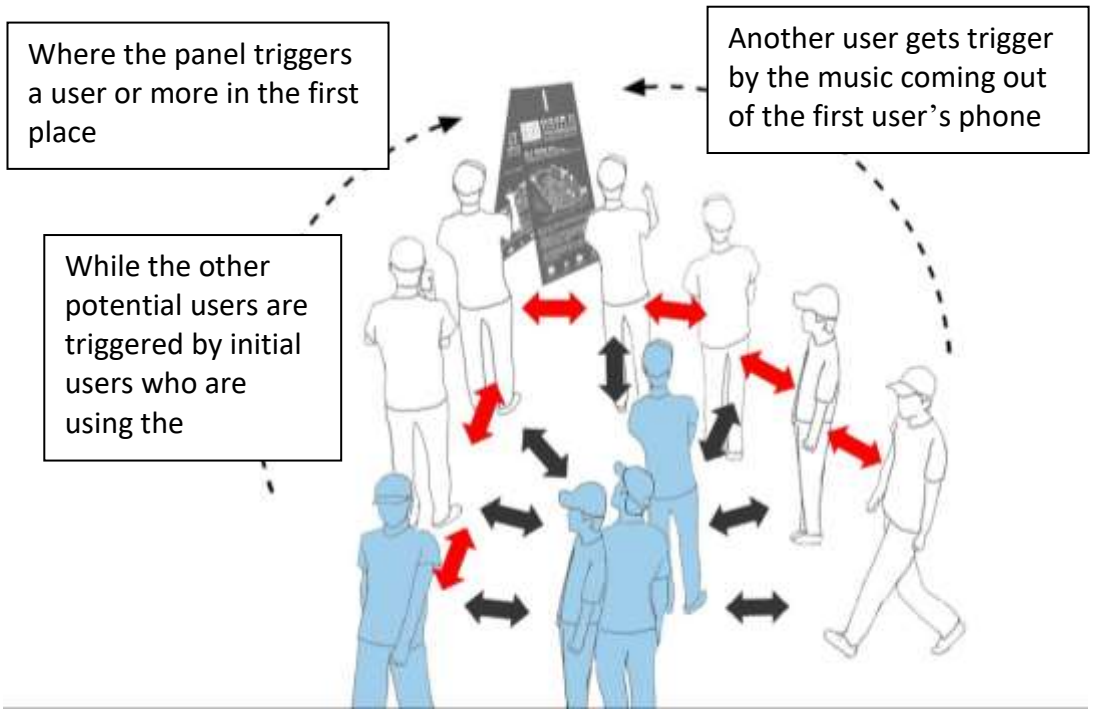

Figure 12: Visual Representation of Interaction. Source: (Wang, Boring, & Greenberg, 2012); Author's Edit.

Figure 13: Example of A Live Social Interaction Using The Interactive Installation As a Technological Intervention That Provokes Engagement Between Individuals. Source: by Author.

To explain the scenario presented by the visual support, the social opportunities of the interactive installations are put in place. It is suggested that people follow people, and this picture not only represents the humanistic approaches noticed by the researcher, yet also proves the concept of humans become the social

triggers themselves. Likewise, people become a huge part of the success of the artistic technological installation itself. In other words, the scene depicts the study of human behavior within the installment of a technological interest. One person comes across the display panel and the curiosity pulls them towards reading and trying the experience promised. To his right, his friend comes directly to pull out his phone once he glimpsed the barcode on the panel in excitement to know what idea is all about. These two people created a visual engagement that also invited other users to participate in space's activation. To demonstrate, as the gestures of the interactive users grasps the attention of another passerby, they create a visual interaction that tends to keep heads stopping and turning. While one interaction led to the other, another passer is driven towards the foreign public acts presented in front of them by means of intrigue as music started playing out of the user's phone. So, attractive music coming from the portal AR doors with their animation introduced the involvement of the human senses and the personal interests within the public space.

As a result, all these small yet eventful scenes happening at once create a holistic public social dimension visible to all potential users who might also join along with strangers according to their sense of social comfort. Not to mention, the researcher compared the average social interaction that happened between people and conducted an overview that resulted in only a few people to be labeled as contributors of exchanging social contact within public space. Yet, as seen an addition of interest within a public space serves as an element of human union depicted whether visually or physically; also portraying, how the influence of the installation was transmitted into a stronger effect when individual humans themselves became the complementing simulators of the public space alongside the technology built. In short, reforming the phrase into people follow active people.

In order to support findings, conducted interviews concentrate on how technological innovation opens other layers of engagement as a contribution to public spaces, especially in the period of the advanced virtual age. As a result, recorded interviews of 20 potential users of various ages and backgrounds will assist with demonstrating the impact of technological tools in elaborating how the public life is modified using technological interventions and interactive installations, and how they can impact a city's existing urban realm. Likewise, these recordings of users' needs within public spaces in the wake of applying an intelligent addition will reveal if individuals are eager for such an interesting enhancement in the city's shared public spaces in addition to explore people's own experiences.

Those interviews recorded with anonymous people around the selected site expressed the enhanced experience they took part in with various perceptions, one participant quoted saying: "it was amazing how the blending of the historical walls and the sound of the sea altogether, with the shadow of the silhouette that shapes the skyline of the walled city of Famagusta from a new perspective". This expression not only emphasized the role of an interactive installation on all the senses of the given usual user involved but also showed the effect of the user's perspective to the installation, the public space, and the urban environment around that was once a typical routine. Moreover, the new dimension added is a representative of the new image driven by the user's experience of the public space even if they are used to it, and respectively of the urban surrounding environment of Famagusta's landmark public spaces. At the same time, a different introspection of the public space was given; and that's defined by the curiosity of one's being. For instance, a local with their child suggested approaching the interactive installation's experience as "a kind of game"; a new way to find all those portals around the city. As well described by

the user of the public space, he mentions how in the AR portal doors, they should physically interact by moving around and walking through to discover it: an interactive physical activity that makes the experience more personal and memorable; as each individual lives a different story with that public space unique to the consecutive other. Moreover, the addition of turning around to check the 360 birds-eye view of its points, adds a new level where they can see the city from different perspectives: focusing on the fact that it reflects urban exploring throughout all Cyprus. In short, as quoted: “Once you start with one, you will never stop till you collect them all.”

Furthermore, the notion of the social engagement of all types of users within the whole experience is noticed: as a holistic concept. In which, the existing cafe with their workers become part of the installation as they encourage their customers to experience the city in a different way; an opportunity they could have missed. Given by the employee who continues to explain how the user is to be a part of it in everyday life, with an open stage of possibilities for the public to play and interact with each other; perhaps just smile to a stranger as an act that they might never have done without that intervention within the public space. That public play is prompted by the urge of social engagement and communal sharing that play with the user’s senses altogether as a community rather than an individual; hence: for the public. Therefore, social gatherings and communal engagements were encouraged and enhanced to learn from each other about the city’s value. “This simple installation not only helped us understand the depth of the historical places in this city but also intrigued us to read more and visit all the other cities once we can before traveling back home” a tourist mentions as he returns with more friends to share the same experiences. Furthermore, understanding multiple variations of experiences of people

is necessary in inspection; international university students also shared some thoughts by pointing out the significant role that technology places not just in people's own fields of study also with everyday experiences to the public. In other words, one participant describes: "Technology is not only for professionals or students; it is in fact for the public service of all users of all ages. In which, as shown in this experiment, the technological addition was simple but extremely effective".

However, one detail received some attention as a flaw that can be further solved, in which the internet should be present everywhere in order to achieve the holistic experience within the public plaza; in addition to the application Snapchat that should be downloaded already before initiating the experiment. In addition, based on personal observations, some users were seen struggling with the manipulation of the application Snapchat itself when trying to access the doors in the scanning section. So, some help and guidance from people around who were able to share the experience actually turned into social engagement. As a result, a small struggle initiated more social contact and eased the communication and interaction between strangers present altogether within a single united public space. In return, everyone is welcomed regardless of the diversities in culture found. These public spaces are therefore the invitation for humans to come together all equal and unite with new innovations that will grow and gain more attention; minimizing any technical struggles that can be solved easily. Thus, reflecting back to the thesis' aim of enhancing the social spaces within a city via small technological interventions.

4.2 Findings

Taking into account all the hypothetical methodologies discussed in detail within this thesis' proposition whether theoretical or practical, yet it is important to incorporate expository conclusions to guarantee the most precise recommendations.

In return, one can conclude specifically from previous diagrams and interviews that a well thought virtual art addition will give a new coating for the urban texture of the city. In a sense that it can be further described to be another component of the spaces' exploration or an alternative adventure for both the residents of the city and the tourists to grow a more interesting perspective of the surrounding context that reflects the identity of the city itself. Not to mention, it is likewise seen within personal observations that each user have the ability to provoke interest within the other users around; that could be either with a fundamental sign of encouragement to potential users in the public space or just simply making eye contact explicitly with an outsider to invite them for sharing the same experiences. Through this, it is seen that the city will be observed in a new way that will raise the city's cultural worth, and elevate its visiting physical value; particularly to the traveling tourists that are promised with public spaces saturated with social and cultural treasures while connecting all the past, present and futuristic arts of the city.

Following the examination of the case study done and presented above, it is introduced by the enthusiasm inside individuals that developed thoroughly via their high interest of a foreign addition. It is also observed during the experiment that one individual triggers his/her consecutive with either basic signal of glancing around or even short chats with one another, specifically with a stranger. Consequently, it is important to notice a fundamental principle that is concluded within the study that describes: when technology can understand the real world, it will change the way people interact; since humans are natural explorers, they can instantly understand an environment, just by being present in it. Through that, it is seen that individuals just need support by means of new technological accessories that attract human curiosity to wander and try out compelling components that are foreign to one's eyes. As a

result, the study portrayed the concept that the actual numbers calculated through the conclusion of the experiment are not what matters the most; it is the community being created within a united public space.

To explain, those numbers provided become no longer as important as the physical humanistic union designed; in fact, making the quantity irrelevant relative to the quality of the urban users drawing the life of the city public spaces. The contributing technological elements are concluded to be valuable resources for urban strategies to take into consideration during design and planning processes. As shown, those AR doors was used within social triangulation and efficiently acted as a fracture to help in dissolving personal bubbles between people; where it is motivating people to simply talk or shortly interact with each other. In that manner, public spaces' interaction is then transformed to a form of a technologically-mediated person to person interaction where the technological layer plays a minor role in the background of the social dimension of the city.

Based on the interpretations of the given interviews, it is visible to notice the new passion the hybrid of humans, art, and technology brings out in people. In addition, users clarify how they themselves are to become a piece of the holistic experience in regular day to day existence; welcoming a whole new window open for opportunities for people, in general, to play and associate with one another. Moreover, the physical aspect of the experience becomes critical when studying the effects on the activeness of the public space; reading numbers and statistics will only fulfill one half of the whole picture while the rest is drawn by social interplay and real communal perspectives. In the same manner, this interplay may vary from a simple grin to a more advanced interaction within people since they are handed a common chance to share a communal interest together inside that public space;

physically, socially, and culturally. Consequently, that social layer is provoked by the inclination of social commitment and mutual sharing that enhances the sense of unity within an environment; addressing the issue of public space: the service of the public rather than one individual at a time.

In the same manner, considering all the speculative strategies talked about thoroughly inside the literature review, it is quite imperative to join interpretive ends to ensure the most exact theoretical conclusions. To demonstrate, one aspect comes about that technology has the capability to draw people together rather than push them apart where the globalization present could bring humanity interminably closer to each other, rather than increase the gap in-between them. Hence, instead of strict judgments of zero and one in the computing world; what if zero and one both come at the same time to appreciate all the opportunities in between? What if this new dimension that the machine language that is altered reflects on the realistic approaches in design? In which, instead of a parallel strict range of black and white, female and male, rich and poor; a new social layer is initiated that values the different prospects that come with it: introducing all shades of gray and midpoints to give the user the infinite possibilities of the modern age. In other words, this concept promotes the limitless probabilities design can grasp dealing with social interactions in communities. So with the help of technology in planning strategies, the proposition that the poor, rich, males, females, white and black all together come at the cities' public spaces, accepting each other with all those differences complementing and completing each other rather than segregating in between.

In order words, the proper usage of the achievements presented in the 21st century carries opportunities of new, more adequate systems with greater ranges and immeasurable capabilities to grow and mature further into a safer, closer, and a more

unified world for people to live in and experience. In which, under any circumstances and most importantly regardless of color, race, ethnicities, etc., all humans come equally as one in the potential places of the city where art and technology can come together to serve the interests of social unity again. (Kipman, 2016). Not to forget, in an additional relationship to that, humans evolve simultaneously yet not at the same speed. Hence, human behavior most commonly will change and evolve to adapt to the new high-quality conditions present before one hand. In return, designers and city planners are the responsible to bring those tools to the public in their perfect representation of what a communal urban fabric layout is.

At the same time, a point often overlooked within the social interactions and human behavior analysis relative to urban space is the accurate distinction between the intentions of installations in public spaces. That is to say; an often misconception goes beyond the idea of transforming the character of people into *extroverts*. To explain, the true aim of interactive installations within both main public spaces and smaller ones is to act as a tool of encouragement and a form of the trigger to push the curiosity of users to interact with each other; rather than the concept of changing the characteristics and qualities within specific individuals. Furthermore, the main target of public spaces is the holistic community and their boost of social interactions, whether temporarily or for a short time: minutes. In return, recent technological advancements become a major yet easy role for the social developments of interactions within users in a common space. As a matter of fact, new technologies are capable to gather people in close by places together to not only prompt common conversations and interests between strangers, but also provoke social matches that stimulate shared experiences and prevalent conversations. In short, this enhancement

of social linkage between users becomes the true purpose of the usage of interactive public spaces.

Henceforth, the question of whom do people follow? It can be answered by people follow people, but the adequate answer would be, People follow ACTIVE people; according to the previously analyzed comprehensive studies of social interactions within public spaces. Yet, the tools that have been used to activate people have to be updated in which technological and virtual layers of interventions should be more responsibly and creatively utilized as presented in this thesis' main case study of the application of AR portal doors in Famagusta. So, it is noticed that people's physical presence is not enough anymore for an engaging public space since the observation conducted by the author along with the support of relative interviews of actual users, proved that the main aim becomes the engagement socially, visually, and physically between people in order to achieve an elevated social public life. The answer of active people is appropriate more in all public spaces outdoor or indoors; in order to achieve a livable interactive space overwhelmed with communication, exchange of social and cultural diversities, and acceptance of people's individuality by promoting the sense of a united community. Consequently, this thesis aims to find the determinants to trigger the active sense within users in a public space, focusing on the contemporary measures of the technological advancements that must be put in use to elevate the public space and drive into a different dimension captivating a new essence of active public space in the modern age.

Chapter 5

CONCLUSION

In conclusion, the concern of more active urban spaces turns into a critical accentuation on the design strategies that are to be created as its various layers profoundly control the urban fabric. It has additionally been broadly contemplated then scrutinized in order to prioritize the organization of an urban structure and the influence of its functional public spaces to emphasize the social demands of people within the public space and its environment's peculiarity. In the same light, the noticeable quality of the advancement of technology on social musings within human communications becomes cooperatively critical, particularly when a new well thought constructed urban planning mirrors the intended social interactions and eventual human union, driven by virtual interventions. As shown previously, every social cooperation one participates in, the individual increases an essential chance to develop as one who is socially offering significance to other people's environment by growing alongside the city's growth.

From the beginning of time, the principle of language initiated with the introduction of human interaction. Further on, language and interaction become dependent factors of each other. Without people interacting with one another, with space, or both, forming a language would not have been necessary; as there would have been no essence of communication in the first place. However, as the modern innovations are emerging in this age, a universal language rose; containing a tremendous amount of available files and data that reflect back as smart technology

on all fields. In return, this universal familiarity united a new common language for all people to use and interact with accordingly. So, as public spaces in urban cities act as homogeneous gathering spaces for humans to come together, interact, and communicate; people's experiences tell the stories from diverse perspectives about the same space that carries that communal language.

In other words, these public spaces when alive and active, share the experiences of social encounters between people through time; while drawing the tales of every single person who ventured foot to visit that space. In return, the active public space that serves communally survived every individual's story and took part in every person's journey. This concept reflects the fundamental place attachment of urban space. In which, a crack started in the wall of space perception introducing that even if the technological installation is no longer there in the plaza; it is still in people's memory of the value that it carried once and will continue to carry. Technologically active Urban public spaces change people's focus from daily concerns of the future into a door the infinite opportunities that exist all around them. Moreover, the public space is an open stage for its users where various scenarios of everyday life can be written. To emphasize, Shaftoe (2012) mentions that the first and the most important one is that the public space defined as the creation of art creating of memorable experiences for the user of the city, and the second key is that the public spaces are the only antidote to people's addiction to interaction. As a consequence, give the voice to the art and technology to be a part of the urban pattern of the city. Since technology will only contribute in the public space by making cities more creative and open to others as advanced innovation becomes the driving fuel of busy active spaces. For that reason, for further studies, the experiment executed in the case study Chapter 4 could not only be extended worldwide; but also, could be

programmed to allow the doors to be located in Google Maps and accessible to the world. Through this, more steps are to be initiated to further explore opportunities of more AR applications and virtual dimensions that can elevate the public realm.

In the same manner, the good city has a capability to embrace all the different choices of the people that live there, and to help balance them spatially (Kyrhyzbaieva, 2019). In which, the inclusion of technological installations within urban layouts to activate public spaces and plazas becomes fundamental. This century conveys various chances of new, more sufficient virtual frameworks with more prominent reaches and limitless capacities to develop and mature further into a more secure, closer, and more brought together city for individuals to live in and encounter; disregarding any segregation of cultures, races, and ethnicities. All people come similarly as one in the designed public spaces of the city where technological creativity and new innovation can meet up to serve the interests of social interplays. As Whyte (2012) adequately describes "Streets are the rivers of life in the city" (p.7), cities started with people in their streets and will never be without them. In short, cities started from WE are here and will never continue successfully with ideals of isolation; rather they will grow with accepting each other _coexistence or no existence_ (Escajeda, 1999); or in other words: To know each other.

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APPENDICES

Appendix A: Semi-Structured Interview

Place: Namik Kemal Square, Famagusta, North Cyprus.

Date: From 20th Jun to 10th August, 2020,

Time: Noon hours.

Interview Consent Form

Description of the project

The main subject of this interview is to test the effect of interactive installation on the city public spaces: specifically testing out the effects of adding technologically interactive installations on these urban spots. Accordingly, the main research question is set up to be: To what extent does an interactive intervention add to the social and dynamic qualities of a public space? So, this research will study how technology opens a new level of space and more to the public spaces, in the age of digital or what some researchers call it "the virtual age." recorded interviews of potential users will help to prove the hypothesis of how these public spaces alter into activated forms and how it can influence a city's overall performance. In addition, these investigations of user's needs in public spaces after applying the technological interactive installation will contribute to findings showing if people are hungry for such art in their urban routine's life.

- ✓ I confirm that my participation in this research project is voluntary
- ✓ I understand that I will not receive any payments for participation in this research interview
- ✓ I understand that most interviewees will find the discussion interesting and thought provoking. I have the right to decline to answer any question or to end the interview

- ✓ I confirm that the research interview will last approximately 2 -3 minutes
- ✓ I understand that the researcher will not identify me by name in any reports using information obtained from this interview and that my confidentiality as a participant in this study will remain secure
- ✓ I have read and understood the explanation provided to me
- ✓ I have been given a copy of the consent form
- ✓ I wish to review the notes, transcripts, or other data collected during the research interview
- ✓ I agree that the researchers may publish documents that contain quotation by me

By signing this form, I agree to the terms indicated above.

Participants' signature

Researcher's Signature

Interview Questions

- What do you think about this experience? And how it affects the city's public spaces?

- How does this technology enhance social interactions in this public space from your point of view?

- Augmented reality (AR) and the virtual dimension of the public space, what could be the other possible applications for this technology?

Appendix B: Overview of the Respondents

Interview 1:

- What do you think about this experience? And how it affects the city's public spaces?

- I personally think it’s a great way to interact with one another, also understand the “Space” around us and the environment in a virtual manner.

- How does this technology enhance social interactions in this public space from your point of view?

- It creates some sort of self-reflection leading curiosity and the urge of wanting to know what other people feel. Making it a very positive social interactive experience.

- Augmented reality (AR) and the virtual dimension of the public space, what could be the other possible applications for this technology?

- Maybe by enhancing all our senses ((sense of vision), (sense of hearing), (sense of touch), (sense of balance), (sense of smell), (sense of taste) contribute, respectively, to the perceptions of vision. Therefore, automatically our brain relates to the common reality in the virtual world and then makes it a more successful augmented reality.

Interview 2:

- What do you think about this experience? And how it affects the city's public spaces?

It’s a positive experience and it gives a whole view of the public space along with the location of public within the city.

- How does this technology enhance social interactions in this public space from your point of view?

It’s somehow new for people and it would trigger their curiosity to see what is it and how does it works. In this way they would get around it and creating a new public experience.

- Augmented reality (AR) and the virtual dimension of the public space, what could be the other possible applications for this technology?

I think as long as the imagination is endless within these technologies so I would like to see some graphic design of that particular public space and to see a dull or rotting public space in a different vibe with different colors and design.

So in future if anybody has proposal for a public space they can get the rank of it by checking its virtual design first

Interview 3:

- What do you think about this experience? And how it affects the city's public spaces?

It was an amazing experience. Something I haven’t try it before in such a public spaces. However, it affects the city's public spaces by evolving with increased interactive contact, a sense of fun and general creativity that can give a place vibrancy.

- How does this technology enhance social interactions in this public space from your point of view?

These new technologies are influencing the way that may develop social networks, understand places and location.

- Augmented reality (AR) and the virtual dimension of the public space, what could be the other possible applications for this technology?

Maybe VR (virtual reality) application can be used to give the experience more reality feeling.

Interview 4:

- What do you think about this experience? And how it affects the city's public spaces?

I think it's a good approach, but I think it would have been better if there was a more 'traditional' way to show the city, so users can actually FEEL the essence of the space.

- How does this technology enhance social interactions in this public space from your point of view?

It does enhance to some extent but I don't think it's 'universal enough'... there are people with difficulties such as people with color blindness, and some people hold on to their traditional ways, so they might not get acquainted well to the new piece of technology.

- Augmented reality (AR) and the virtual dimension of the public space, what could be the other possible applications for this technology?

Make it more universal, and more simplified, and if possible, for people with color blindness for instance and people with little to no experience with new gadgets, because this is a traditional city, not many would know about such stuff, maybe tourists would.

Interview 5:

- What do you think about this experience? And how it affects the city's public spaces?

The walled city of Famagusta is a beautiful place, and it's history holds years of culture and traditions. I think it provides a great opportunity for people to have a bigger perspective of the city, both visually and also enlightening the people of the

city about the history of the place. - How does this technology enhance social interactions in this public space from your point of view?

Technology is one way that tends to grasp the attentions of the viewers the most. People walk around with their cellphones, creating their own sort of "bubble" that no one can invade. These portals really attract the passerby's, averting their attention from their phones to the portals, getting 'strangers' closer to each other, arousing curiosity, questions, and shared emotions and expressions between each other.

- Augmented reality (AR) and the virtual dimension of the public space, what could be the other possible applications for this technology?

I think maybe 3D hologram visualizations of how some the ruined remains of castles, etc. would've looked like, would be a great addition. So people can see and and feel the essence of some of the lost pieces of the city, if they were to be present.

Interview 6:

- What do you think about this experience? And how it affects the city's public spaces?

It was an interesting experience, give me the chance to see details I couldn't see it before.as well as, It’s make the public space more alive.

- How does this technology enhance social interactions in this public space from your point of view?

People become more socially connected through virtual spaces instead of meeting in physical public spaces , so this kind of technology used in public spaces enhance social interaction in public space.

- Augmented reality (AR) and the virtual dimension of the public space, what could be the other possible applications for this technology?

Maybe at some points or specific one XR (cross reality) technology can be used.

Interview 7:

- What do you think about this experience? And how it affects the city's public spaces?

I liked the experience, it gave me a new point of view to the public space. Also, it's defined as work of art in the public realm.

- How does this technology enhance social interactions in this public space from your point of view?

By giving the people a new experience they didn't try it before, people always need a reason to be in a place and public space activities always best way to make any public space alive , so if this activity give new experience people would love to try it and be there.

- Augmented reality (AR) and the virtual dimension of the public space, what could be the other possible applications for this technology?

What more common application used nowadays is VR (virtual reality).

Interview 8:

- What do you think about this experience? And how it affects the city's public spaces?

A new experience for me in Cyprus and in such an old city I found it very exiting experience and give new concept to the public space , its make people from different areas and background want to be there .

- How does this technology enhance social interactions in this public space from your point of view?

Most of the time people search for new experience in their life, unforgettable one, want a place where they can't be bored in, and since technology offer that in an easy

and simple way, just scan to see the city from different view. The space will be more active.

- Augmented reality (AR) and the virtual dimension of the public space, what could be the other possible applications for this technology? I think MR (mixed reality) will give the space another different and interesting point of view.

Interview 9:

- What do you think about this experience? And how it affects the city's public spaces?

It was an experience that give me the view that usually only architect think and search about. Give me the felling of flying while I am standing on ground, such a wonderful experience. I would like if there was a general information about each place included with the view. Just to have a link between public space and public culture. It’s improve the management of public spaces and facilities and better connect residents with local facilities and events.

- How does this technology enhance social interactions in this public space from your point of view?

It’s give people the chance to learn more about the places and since it can be used and visited by anyone and freely, people will prefer to be there more than anywhere else.

- Augmented reality (AR) and the virtual dimension of the public space, what could be the other possible applications for this technology?

VR (virtual reality) can give the people more sense of spaces and dimension.

Interview 10:

- What do you think about this experience? And how it affects the city's public spaces?

It’s a very good idea and creative. However, the user can view the area from top and have different experience, in this way people can interact more

- How does this technology enhance social interactions in this public space from your point of view?

People can benefit by sharing knowledge and questions together. As well as, enriching people’s mind

- Augmented reality (AR) and the virtual dimension of the public space, what could be the other possible applications for this technology?

As an addition to the augmented reality, the 'realm' inside of these portals can evolve in a way where people interacting with these gates from other pin points of the city.

Interview 11:

- What do you think about this experience? And how it affects the city's public spaces?

It’s a unique experience in a magnificent historical place, although I found a bit difficulty because it is through an online application that popular but not to everyone.

It affect the cities spaces by giving you a chance to see by bird eye view which is very interesting.

- How does this technology enhance social interactions in this public space from your point of view?

technology enhance the social interactions between people for example I checked it me and my friends when we were doing that, a discussion was opened about the top view of the place, and what is that and what is here and what there .

We start to talk deeply about the place. Also it gives us the feeling of belonging to the space.

- Augmented reality (AR) and the virtual dimension of the public space, what could be the other possible applications for this technology?

I'm not so sure about what could be the others mobile apps we would use it. But according to me Facebook and Instagram is the most popular apps among my generation that I prefer to use them usually.

Although I would be a good point if it could be offline.

Interview 12:

- What do you think about this experience? And how it affects the city's public spaces?

The idea was new for me, I really like it, and I think with the right use will open much more application for the public spaces.

- How does this technology enhance social interactions in this public space from your point of view?

If it like the game where it can offer the users more interaction environment I think that will make it better.

- Augmented reality (AR) and the virtual dimension of the public space, what could be the other possible applications for this technology?

I have seen one example on internet where the users can check the information of the historical building around them using the AR that will be nice if government can applied in Cyprus.

Interview 13:

- What do you think about this experience? And how it affects the city's public spaces?

It was hard to me a bit to understand what it is, actually without my son explaining to me what is this and how to use it I will never be able to know.

- How does this technology enhance social interactions in this public space from your point of view?

It might help but again I am not sure that everyone will know how to use it, it is more for the new generation than us.

- Augmented reality (AR) and the virtual dimension of the public space, what could be the other possible applications for this technology? I don’t know.

Interview 14:

- What do you think about this experience? And how it affects the city's public spaces?

It is an amazing idea, how to use a social media platform to be part of a historical place.

- How does this technology enhance social interactions in this public space from your point of view?

When people get familiar with this kind of technology, it will has a lot in the future of the city public life, but I cannot see it in this level yet

- Augmented reality (AR) and the virtual dimension of the public space, what could be the other possible applications for this technology?

I wish to see more clear photo I think will improve the quality of the AR.

Interview 15:

- What do you think about this experience? And how it affects the city's public spaces?

It totally new for me, I like it and now I am going to check the other doors.

- How does this technology enhance social interactions in this public space from your point of view?

I think it will effect in way or another, it like a game for the people.

- Augmented reality (AR) and the virtual dimension of the public space, what could be the other possible applications for this technology?

Maybe videos instead of the 360 photos or live video also will be a nice experiences.

Interview 16:

- What do you think about this experience? And how it affects the city's public spaces?

It is a representative of the new image of my experience in this plaza even though i thought i am used to it; but it proved me wrong.

- How does this technology enhance social interactions in this public space from your point of view?

It gives a very different side of the city that people want to continue exploring.

- Augmented reality (AR) and the virtual dimension of the public space, what could be the other possible applications for this technology?

It can be used in cafes and indoor spaces in malls

Interview 17:

- What do you think about this experience? And how it affects the city's public spaces?

It was a great experience as a family activity; my kids were very excited in trying this new game in the plaza and tried it multiple times.

- How does this technology enhance social interactions in this public space from your point of view?

It helped us interact together as a family and then with other families present there to share our experiences

- Augmented reality (AR) and the virtual dimension of the public space, what could be the other possible applications for this technology?

It can be applied for educational purposes in school activities as pictures, videos, and games

Interview 18:

- What do you think about this experience? And how it affects the city's public spaces?

It was nice to discover this new technology next to my workplace, I can come and experience it daily differently.

- How does this technology enhance social interactions in this public space from your point of view?

It was a great opportunity to encourage people and visitors to my cafe to talk to each other and build relationships

- Augmented reality (AR) and the virtual dimension of the public space, what could be the other possible applications for this technology?

I would suggest not to use it too much so it would not lose its value as a special experience

Interview 19:

- What do you think about this experience? And how it affects the city's public spaces?

It was very interesting to discover what is it actually and how does it work. It was hard at first, then we managed with some help from the employees around

- How does this technology enhance social interactions in this public space from your point of view?

It was the most fun part of exploring the city and I shared it on all my social media platforms to tell more people about it

- Augmented reality (AR) and the virtual dimension of the public space, what could be the other possible applications for this technology?

This should be used more often for tourists who might not be able to travel yet can try the experience abroad.

Interview 20:

- What do you think about this experience? And how it affects the city's public spaces?

Very very interesting to see an application of technology in real life social experiments not only studying how they are helpful tools in the university

- How does this technology enhance social interactions in this public space from your point of view?

Technology involved in everyday life encouraged everyone to come together and talk about how cool it is with each other

- Augmented reality (AR) and the virtual dimension of the public space, what could be the other possible applications for this technology?

Putting more technological activities everywhere in public will advance the new generation in becoming more modern with virtual everyday smart objects

Table 1: Some Data Form The Interviewers. Source: Author's Data and Edit

	Question 1		Question 2	
	Positive	Negative	Positive	Negative
Interview1	✓		✓	
Interview2	✓		✓	
Interview3	✓		✓	
Interview4		✓		✓
Interview5	✓		✓	
Interview6	✓		✓	
Interview7	✓		✓	
Interview8	✓		✓	
Interview9	✓		✓	
Interview10	✓		✓	
Interview11		✓	✓	
Interview12	✓		Not clear	
Interview13		✓		✓
Interview14	✓			✓
Interview15	✓		Not clear	
Interview16	✓		Not clear	
Interview17	✓		✓	
Interview18	✓		✓	
Interview19	✓		✓	
Interview20	✓		✓	

Appendix C: People Counter System

For any cases want to study people gathering, it is one of the best systems to count people through a long period of time with a minimum cost and effort. It need a good quality camera connected to a computer system where a good graphic cared is required for processing the videos, the camera fixed directly to the plaza from an angle of view were the whole square was clear, run unattended for two hours each day, and automatically adjusted to any change in the sunlight

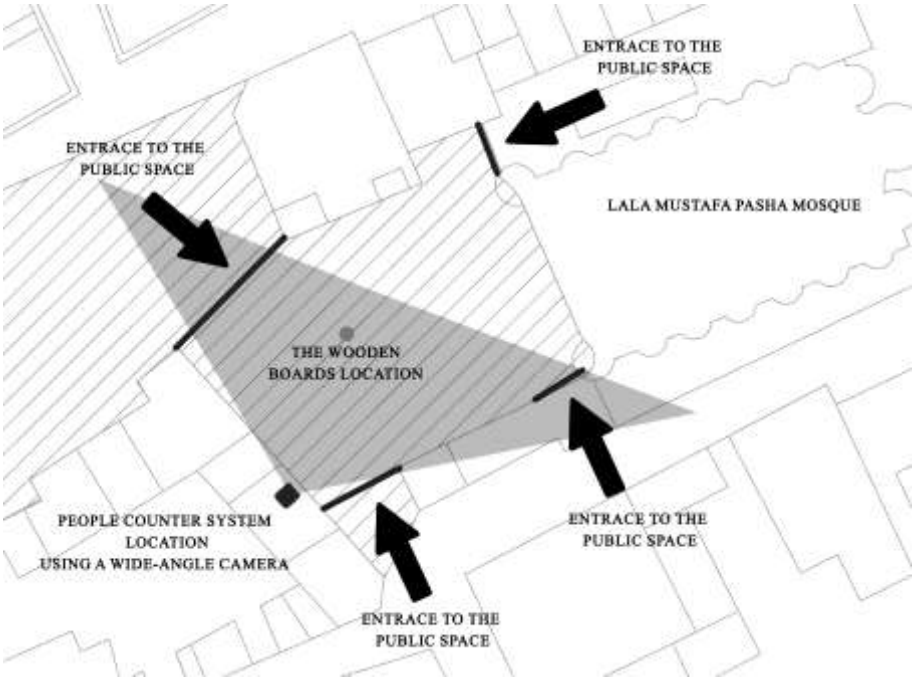

Figure 14: This figure showing the people counter system location and the main four entrances of the public space where the counting lines are located and the location of the wooden board. Source: by author.

Figure 15: A view from the counter system. Source: by author.

Table 2: Numbers of Public Space's Users. Source: Author's Data and Edit

25-May	Monday	362
26-May	Tusday	172
03-Jun	Wednesday	101
05-Jun	Friday	98
06-Jun	Saturday	147
07-Jun	Sunday	132
10-Jun	Wednesday	85
13-Jun	Saturday	111
14-Jun	Sunday	124
15-Jun	Monday	89

Appendix D: Users' Scan for the AR Installation

This case study will require wooden boards with a maximum of 75 cm height to be fixed in the location of the AR virtual doors, in a location where the visitors of these places can see it clearly. On these boards, the barcodes of the virtual doors are to be scanned

Table 3: Numbers of Installation Scan. Source: Author's Data and Edit

12-Jun	2
13-Jun	8
14-Jun	13
15-Jun	2
18-Jun	2
19-Jun	8
20-Jun	2
22-Jun	3
26-Jun	1
27-Jun	2
29-Jun	10
01-Jul	1
07-Jul	3
09-Jul	14
10-Jul	1
12-Jul	15
13-Jul	8
15-Jul	8
16-Jul	5
17-Jul	3
18-Jul	12
19-Jul	4
20-Jul	7
22-Jul	3
23-Jul	3
24-Jul	20
25-Jul	1
26-Jul	6
27-Jul	3
28-Jul	10
29-Jul	4
30-Jul	2
31-Jul	4
01-Aug	2
02-Aug	22
03-Aug	7
04-Aug	2
05-Aug	1