Toward an Architecture of Hertzian Space

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ABSTRACT

Cities today are intricate hybrids of physical and informational space. Brought into being through complex yet common everyday techno-social practices, these hybrids rely on the wireless spectrum to enable a variety of media, information, and communications events that continually make and remake the spatial conditions of urban life. This paper examines the relations between this Hertzian space and the architecture of urban environments. Building on a longstanding discourse surrounding the material and immaterial limits of urban architecture, it asks how we might begin to think about shaping the Hertzian space of contemporary cities through the practices and promises of urban computing and locative media. Coaxing architecture beyond its professional and disciplinary boundaries and, at the same time, recasting contemporary media art within broader social, cultural, and political contexts of urban space, the essay attempts to outline a conversation between these fields of practice that share a common theater of operations: that of the contemporary city.

Figure 1 Gloop 4 Communications in Living City, Archigram, Living Arts No. 2, 1963

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1 BEYOND MATERIALITY IN ARCHITECTURE

When it is raining in Oxford Street the architecture is no more important than the rain, in fact the weather has probably more to do with the pulsation of the Living City at that given moment (Cook 1963).

In the introduction to an issue of *Living Arts* magazine published in 1963, British architect Peter Cook claimed that architecture, at least as it was traditionally conceived, no longer played a significant role in shaping the urban experience. This issue of *Living Arts* was a catalog for "Living City," an exhibition organized by the young British architecture collective Archigram and presented at the Institute for Contemporary Art (ICA) in London. At the time of the exhibition, "swinging" London epitomized the modernization of British cities in the 1950s and 1960s (Sadler

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2005). The glare of neon lights, the proliferation of urban advertising, the glitter and glam of new (American) products displayed in storefront windows, or the horror of "garishly decorated restaurants" (Brooker 1969, 269)—this illuminated "pop" city became the curse of "proper" British architects and urban planners. This urban vernacular, "Living City" claimed, made fussing with the detailing of urban facades or interior lobbies irrelevant, as people on the street received them as fragments, at best, being more influenced by ambient, immaterial, and kinetic forces than by the detailed formal articulation of space and material.

In the face of contemporary conditions, declaring a crisis in architecture as a means of arguing for its reinvention is a classic—indeed, a well-worn—tactic. Thirty years after "Living City," Rem Koolhaas introduced the concepts of Junkspace and the Generic City to describe the global, undifferentiated extension of built space, where the drive toward Bigness supersedes the attentive detailing of architectural and urban design. Declaring, "The city is no longer. We can leave the theatre now" (Koolhaas 1995), he echoes Archigram's assessment that the "old" tools, techniques, and obsessions of architecture are no longer relevant to current conditions. "People can inhabit anything," he claims. "And they can be miserable in anything and ecstatic in anything. More and more I think that architecture has nothing to do with it" (Heron 1996).

Today, as the data clouds of the twenty-first century descend on the streets, sidewalks, and squares of contemporary cities, we might ask: to what extent are these Hertzian weather systems becoming "as important, possibly more important" than built form in shaping our experience of the city? On any given day, we pass through transportation systems using magnetic stripe or Radio Frequency ID (RFID) tags to pay a fare; we coordinate meeting times and places through SMS text messaging on the run; we cluster in cafes and parks where WiFi is free; we move in and out of spaces blanketed by CCTV surveillance cameras; and we curse our wireless provider when its cell towers are not in reliable range of our place of residence. Hertzian space is all around us, coming in waves of various frequencies, lengths, and intervals, embedded in manifold ways within the course of our everyday lives.

Given these conditions, how might we begin to think about how to shape these environments? To what extent can we see this as a way of practicing a new kind of urban architecture? Recent work on urban computing and locative media has begun to examine the larger urban implications of the proliferation of mobile, embedded, wireless, and pervasive computing technologies throughout the material fabric of everyday life (Crang and Graham 2007; Dave 2007; Ellison et al. 2007; Galloway 2004; Greenfield 2006; Shepard and Greenfield 2007; Kindberg et al. 2007; Shklovski and Chang 2006). Yet, surprisingly, little work has been done to place these technological developments within the larger context of public at large as a radical statement from young upstarts operating at the periphery of the architectural establishment. It would be many years before Archigram would build anything at all, preferring the speed and expedience of publishing architecture zines over the patient practice involved in making buildings.

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In the passages that follow, I attempt to cast issues of urban computing and locative media in terms of a broader and long-standing discourse on architecture and urban space. My intent is not to lay professional or disciplinary claim to this still relatively uncharted territory. Rather, I am interested in examining how this dialogue between technology, sociality and urban space not only offers a new opportunity to bring architecture beyond itself but also opens new avenues for critical exploration in the evolving and related fields of urban computing and locative media.

2 ENACTED SPACE

The modern city exists as a haze of software instructions. Nearly every urban practice is mediated by code. (Amin and Thrift 2002, 125)

Two years prior to "Living City," author and urban activist Jane Jacobs published her influential book The Death and Life of Great American Cities (Jacobs 1961). In one extended passage, she describes the cycle of daily (and nightly) activity transpiring on Hudson Street, located in her neighborhood on the Lower West Side of Manhattan. This narrative of a sidewalk "ballet," as she calls it, takes the form of a list of casual events, encounters, and interactions between neighbors, workers, and passers-by:

Mr Halpert unlocking the laundry's handcart from its mooring to a cellar door, Joe Cornacchia's son-in-law stacking out the empty crates from the delicatessen, the barber bringing out his sidewalk folding chair... Simultaneously, numbers of women in housedresses have emerged and as they crisscross with one another they pause for quick conversations that sound with either laughter or joint indignation, never, it seems, anything between... Longshoremen who are not working that day gather at the White Horse or the Ideal or the International for beer and conversation... As darkness thickens... the ballet goes on under lights, eddying back and forth but intensifying at the bright spotlight pools of Joe's sidewalk pizza dispensary, the bars, the delicatessen, the restaurant and the drug store. (Jacobs 1961, 52–53)

If Archigram viewed the city as an environment that conditions our emotions, today, the "feel" of the street is defined less and less by what we can see with the naked eye (Hill 2008). Taking a cue from Jacobs, Dan Hill describes the informational ballet transpiring on a typical street today in terms of what we cannot see:

We can't see how the street is immersed in a twitching, pulsing cloud of data... This is a new kind of data, collective and individual, aggregated and discrete, open and closed, constantly logging impossibly detailed patterns of behavior. The behavior of the street.

Such data emerges from the feet of three friends, grimly jogging past, whose Nike+ shoes track the frequency and duration of every step, comparing against pre-set targets for each individual runner. This is cross-referenced with playlist data emerging from their three iPods. Similar performance data is being captured in the engine control systems of a stationary BMW waiting at a traffic light, beaming information back to the BMW service centre associated with the car's owner.

The traffic light system itself is capturing and collating data about traffic and pedestrian flow, based on real-time patterns surrounding the light, and conveying the state of congestion in the neighborhood to the traffic planning authority for that region, which alters the lights' behavior accordingly...

In an adjacent newsagent's, the stock control system updates as a newspaper is purchased, with data about consumption emerging from the EFTPOS system used to purchase the paper, triggering transactions in the customer's bank account records.

Data emerges from the seven simultaneous phone conversations (with one call via Skype and six cellular phones) amongst the group of people waiting at the pedestrian crossing nearest the newsagent.

To understand the implications of this folding of people, street, and data onto each other requires thinking about space in non-visual ways, where formal geometry and material articulation become less relevant than the topologies of networked information systems and their intersection with the socio-spatial practices of daily life. Martin Dodge and Rob Kitchen have suggested that these kinds of "code/space" need to be understood ontogenetically, that is, as something continually brought into being through specific practices that alter the conditions under which the space itself is (re)produced. Building on the work of Adrian MacKenzie (2002; 2003), they differentiate between technicity (the productive power of technology to make things happen) and its realization through transduction (the constant making anew of a domain in reiterative and transformative practices) (Dodge and Kitchen 2003). These assemblages of code, people, and space, thus, are brought into being through specific techno-social performances or enactments within the course of daily life.

3 THE MOBILE DEVICE AS TERRITORY MACHINE

Imagine Hegel, Marx and McLuhan encountering the keitai [mobile phone] of the twenty-first century. Georg Hegel is astonished at seeing the spirit of the era dwelling persistently in our palms. Karl Marx complains that it is an alienating fetish object. Marshall McLuhan, his eyes sparkling, chimes in that it will turn the whole world into a village—no, a house. But in the next moment, he comes upon a realization that appalls him. "But wait!," he exclaims. "My wife and children will have the equivalent of a private room with a twenty-four-hour doorway to the outside world, fully equipped with a TV, a bed, and even a bathroom. Where would my place be in such a house?" (Fujimoto 2006)

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Today, a new approach to the old problem of "programming" space arises with contemporary everyday practices involving mobile devices and wireless information systems. In Japan, for example, the mobile phone has been described by Kenichi Fujimoto as a personal "territory machine," capable of transforming any space—a subway train seat, a grocery store aisle, a street corner—into one's own room and personal paradise. Born out of the so-called girl's pager revolution of the 1990s, the mobile phone became a key weapon in a young Japanese girl's arsenal for waging gender warfare against older "raspy and thick-voiced" oyaji, intent on peeping at young female bodies from behind a newspaper. Armed with her keitai, speaking freely in a high-pitched voice, "wearing loose socks and munching snacks," these kogyaru "couldn't care less if a subhuman oyaji peeked at their underwear or eavesdropped on their conversations" (Fujimoto 2006, 98). These techno-social practices remade space in the Japanese city in new ways, transforming the paternalistic communities of city streets and subway cars into private territories for women and children.

In the West, spatial practices involving the iPod are, perhaps, more familiar. Michael Bull (2000) has studied how people use these devices to mitigate the contingencies of daily life. On one level, the iPod enables one to personalize the experience of the contemporary city with one's own music collection. When you are on the bus, at lunch in the park, or shopping in the deli, the city becomes a film for which you compose the soundtrack. The iPod also provides gradients of privacy in public places, affording the listener certain exceptions to conventions for social interaction within the public domain. Donning a pair of earbuds grants the wearer a certain amount of social license, enabling one to move through the city without necessarily getting too involved and, to some extent, absolving one from responsibility to respond to what is happening around one. Some people use earbuds to deflect unwanted attention, finding it easier to avoid responding because they look already occupied. Faced with two people on the sidewalk, we will likely ask the one without earbuds for directions to the nearest subway entrance. In the same way, removing one's earbuds when talking to someone pays the speaker a compliment. So, in effect, the iPod becomes a tool for organizing space, time, and the boundaries around the body in public space.

What is significant here is that as these mobile devices become ubiquitous in urban environments (and in many places they already are), the technicity of architecture as the primary technology of space making is challenged by the spatial transductions these devices afford. Regardless of the formal geometries and material arrangements of a space as defined by architecture, and irrespective of the normative activities or uses encoded (or elicited) by its program, these devices and the ways in which we use them have, in fact, become as important as, if not more important than, architecture in shaping our experience of urban space.

4 URBAN COMPUTING, LOCATIVE MEDIA, AND THE READ/WRITE CITY

With Apple's introduction of the iPhone G3 in the summer of 2008, urban computing and locative media—formerly indicating somewhat experimental research or artist-driven explorations of "near-future" technologies—are now being mainstreamed to the masses. Moreover, while the business of forecasting future trends in technology is fraught with intellectual peril, a few projections, based on technologies that are now readily available to many, can reasonably be made. Above all, we are beginning to see social practices emerge by which location-based or context-aware media and information are consumed in urban environments, and, in turn, urban space is transduced. Yet, the implications for architecture and urbanism remain far from clear.

One observation is that the way we read the city is changing. As Varnelis and Meisterlin (2008) note:

As we have grown accustomed to navigating the city with our smartphones and our printouts from Google maps, we have come to know it from above, as a two-dimensional, planimetric experience. Instead of seeing ourselves as part of the city fabric, inhabiting a three-dimensional urban condition, we dwell in a permanent out-of-body experience, displaced from our own locations, seeing ourselves as moving dots or pins on a map.

Figure 3 Amsterdam Realtime, Esther Polak, 2002

Here, the emphasis on reading the city through "intelligent" maps, and on the implications for urban experience of the habitual patterns by which we use them, implies forms of passive consumption with which we are all likely familiar. The city becomes a network of nodes and pathways through which we circulate like data packets. If every extension of our capabilities leads to a corresponding amputation of another (McLuhan 1964), clearly wayfinding skills grounded in physical geographies run the risk of atrophy in an age of intelligent maps. Reports of mishaps stemming from reliance on GPS-enabled SatNav devices are becoming common. Recently, the London Daily Mirror reported that these devices have been responsible for at least 300,000 accidents, including that of Paula Ceely, 20, of Wales, who "vowed never to listen to her SatNav again after she was directed into the path of a speeding train at the Ffynnongain level crossing in Wales. The train slammed into her car, leaving the student within inches of her life" (Carey 2008). Fortunately, no one was hurt in this instance.

If location-based technologies such as GPS navigation systems can lead to both a disembodied experience of the city as well as potential bodily harm, this has as much to do with the ways in which we use the technologies and the practices by which this space is enacted as it does with the technology itself. In this regard, revisiting early work in locative media that focuses on urban environments is instructive. Amsterdam Realtime (2002), a project by the WAAG society in association with Esther Polak, traced movements through the city of people carrying GPS-enabled devices, which transmitted their location in real time to a remote server that, in turn, projected these movements as an animated "map" in an art gallery (realtime.waag.org). This map represented the city not as a static network of streets, buildings, and spaces, but as a series of traces that aggregate over time to represent the city as different people traverse it. Here, the traditional authority attributed to maps and their ability to structure the way we navigate cities is subverted. Rather than a map that informs how one moves through a city, one's movements inform the map.

Further, the ability not only to read, in situ, bits of media and information associated with specific locations in the city, but also to write or otherwise add geocoded data to these urban data clouds, leads to more subtle shifts in the way we experience the city and the choices we make within it. As McCullough (2006) notes, cities have throughout history been inscribed by various information layers that shape our experience of urban space, be they "grand expressions carved in stone facades, mundane signage in the streets," or smaller markings identifying significant sites or directing traffic and pedestrian flow. These urban annotations, in the past, have been governed by various public and private agencies, defined by different communities of practice: utilities providers, tax assessors, insurance underwriters, urban historians. When open to public consumption, these markings have generally served specific private interests, such as local business improvement districts (BIDs) or community associations. One of the more significant aspects of urban computing and locative media is how they open up the process of urban annotation by enabling ordinary people to contribute to the information layer overlaid on contemporary cities.

5 TOWARD AN ARCHITECTURE OF HERTZIAN SPACE

The Hertzian space of cities, once the territory of governmental agencies, private enterprise, and networks of ham radio operators, has evolved into a dynamic and contested site, where many competing interests are beginning to shape a new information overlay. In addition to and, indeed, beyond the established frequencies of radio waves carrying radio and television programs, police communications, and other wireless signals, today's urban data clouds are made up of "a new kind of data, collective and individual, aggregated and discrete, open and closed, constantly logging detailed patterns of behavior" (Hill 2008). This is the behavior of the street: constantly enacting new spatial relations and organizational adjacencies that are every bit as architectural as the formal articulations of bricks and mortar that constitute the traditional city. That this urban ballet of people, data, and space is predominantly non-visual should be less a detracting factor than an intellectual challenge to those invested in the design of urban space. Beneath the threshold of public vision, a new city is emerging, one requiring new methods and techniques by which we can productively engage in its design and formation.

As with other aspects of the physical world, such as land, water, and air, the electromagnetic spectrum is a limited resource. Under US law, the spectrum is considered neither private property nor that of the federal, state, or local government. Regulating the use of these abstract frequency bands has become essential, however, in order to limit interference between competing uses. Hardin's "Tragedy of the Commons" (1968) illustrates the dilemma in which multiple individuals acting independently in their own self-interest can ultimately destroy a shared resource, even when everyone knows this is in no one's long-term interest. This has led to the effective privatization of parts of the spectrum, such as when the US government, in 2008, auctioned off to the telecommunications industry the 700 MHz band previously reserved for analog television broadcasting.

Figure 4
Life: a user's manual, Michelle Teran, 2003

Yet, if parts of the wireless spectrum have become effectively reserved for private use, a kind of "public" space exists in the form of the industrial, scientific, and medical (ISM) radio bands. Because communication devices using the ISM bands must tolerate any interference from ISM equipment, these bands are typically given over to uses intended for unlicensed operation, since these devices typically need to be tolerant of interference from other devices anyway. ISM frequencies such as the 2.4 GHz band are set aside for license-free use by systems and devices such as WiFi, Bluetooth, cordless phones, and wireless surveillance cameras, and it is within this frequency range that a number of recent projects have attempted both to probe and to shape this new public terrain.

"Life: a user's manual" (2003), a project by Michelle Teran, is a series of public performances and online mappings that examine the hidden stories captured by private wireless CCTV streams, and how they intersect with the visible world around us (www.ubermatic.org/life). The project employs a low-cost, consumer-grade wireless video receiver to capture live image feeds from private wireless surveillance cameras, and create a sequence of views into the spaces and lives of the city and its inhabitants while they are walking down the street.

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As Terran notes, "Private use of wireless internet, cordless phones, bluetooth and wireless surveillance cameras has turned the average consumer into 'micro-broadcasters' who transmit their personal narratives through the airwaves." Here, nominally private territory is rendered in a highly public way by conducting walking tours through Hertzian space, where the intimate details of everyday urban lives are exposed to the tour participants and passers-by alike.

Jonah Brucker-Cohen's WiFi Hog (2003) is a project that addresses the proliferation of free wireless nodes in public parks, airports, libraries, and schools, and the corresponding encroachment on this space by corporate pay-per-use providers competing for signal dominance (www.mee.tcd.ie/~bruckerj/projects/wifihog.html). Brucker-Cohen describes the project as "a personal tool to enable both private interaction in public space as well as social obstruction and deconstruction of shared resources." The tool consists of a WiFi-enabled laptop connected to a Portable Video Jammer (PVJ), which is able to block network access to open nodes for Internet traffic not originating from the WiFi-Hogger's IP address. By allowing a means of control to come from anyone, not just corporate or community wireless network operators, WiFi Hog subverts claims of ownership and regulation over free, unlicensed bands of the spectrum.

Figure 5
WiFi Hog, Jonah
Brucker-Cohen, 2003

The Tactical Sound Garden [TSG] Toolkit (2006) is an open source software platform for shaping the sonic topography of urban public space (www.tacticalsoundgarden.net). The Toolkit enables anyone living within dense 802.11 wireless (WiFi) "hot zones" to install a "sound garden" for public use. Using a WiFi enabled mobile device (PDA, laptop, mobile phone), participants "plant" sounds within a positional audio environment. These plantings are mapped onto the coordinates of a physical location by a 3D audio engine common to gaming environments—overlaying a publicly constructed soundscape onto a specific urban space. Wearing headphones connected to a WiFi enabled device, participants drift through virtual sound gardens as they move throughout the city. The project draws on the culture of urban community gardening to posit a participatory environment, where new spatial practices and social interactions within technologically mediated environments can be explored and evaluated.
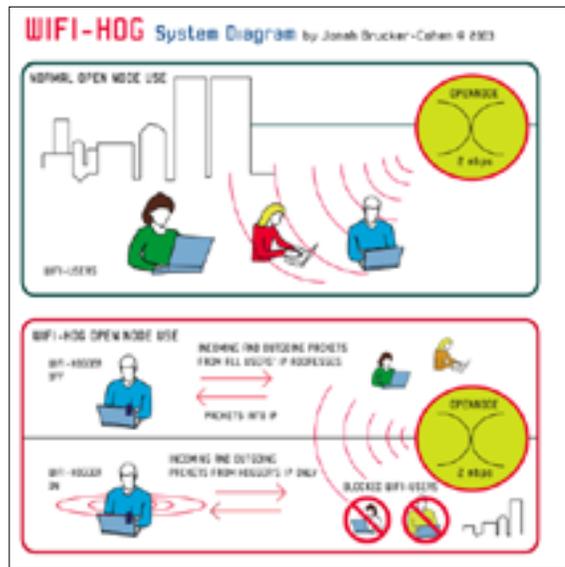

Figure 6 Tactical Sound
Garden [TSG] Toolkit,
Mark Shepard, 2006

There are many other examples one could mention; more are appearing each week on blogs maintained by art and technology enthusiasts, as well as software developers and application distributors worldwide. Few, however, take the larger urban environment and its attendant challenges and opportunities—historically the purview of architecture and urban design—as a context within which to directly intervene, and not simply as another venue for consuming media and information.

CONCLUSION

Urban computing and locative media hold the promise to achieve what architecture and urban design have long aspired to: opening up the design of urban space to more inclusive and participatory processes, resulting in urban architecture that is adaptable to the increasingly ephemeral forces at play in contemporary cities. Realizing this promise involves shaping the ambient qualities of Hertzian space as if they were a weather system, and structuring the techno-social practices that continually re-make the spatial conditions shaping our experience of the city.

Such an immaterial urban architecture may find little acceptance within a profession so highly invested in the material practices of the real estate development and construction industries. Yet, if architecture is to remain relevant vis-à-vis

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urban space, it may have no choice but to grow beyond its current professional and disciplinary boundaries. At the same time, if urban computing and locative media are to be considered in terms of their potential to address urban conditions, their practices need to be re-evaluated in the larger framework of everyday life and urban public space. Only then, can they move beyond the production of novel experiences for consumer cultures or limited (art) audiences, and critically engage the social, cultural, and political realities of contemporary cities.

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