Mapping Invisible Surveillance on the North Avenue Smart Corridor, Atlanta

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Abstract

This paper presents a speculative mapping exercise as a feminist resistance method with the aim of rendering surveillance technologies and their fields of view visible. The focus is on the North Avenue Smart Corridor, located in Atlanta, Georgia, which is one of the world's top ten most surveilled cities. Through the design of these speculative maps, I question our relationship with surveillance. More specifically, I show that unnoticeable materiality and invisible processes of smart surveillance technologies prevent the public from forming an opinion on their intrusion into daily life. Acceptance of these technologies allows powerholders to protect and enhance their power over marginalized communities. Therefore, by mapping the intensity of surveillance, this study aims to raise awareness against the lure of technocracy in so-called smart cities. It situates the reader in the position of surveillance sensors and allows the reader to speculate on what they can see. In doing so, it seeks to highlight the oppressive agency of these technologies and question their appeal to objectivity with the potential to disrupt their patriarchal powers. Can we free ourselves from the oppressive gaze of smart surveillance by mapping, seeing, and understanding its remarkably limited fields of view?

Keywords

surveillance, technocracy, policing, smart cities, mapping

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Introduction

Speculative mapping can be an exercise in feminist sense-making and potential resistance toward the surveillance apparatus of smart cities. This study presents one such approach to reveal the technocracy of intensive surveillance on Atlanta's North Avenue through a series of speculative maps. In September 2017, Atlanta launched SmartATL, with North Avenue Smart Corridor as its pilot project (Key 2018). Smart city projects combine advanced surveillance technologies with Internet of Things (IoT) and artificial intelligence (AI) to record and analyze a vast amount of data. These technologies process Big Data to produce actionable information that can guide policymakers. In response to North Avenue's urgent need for infrastructure improvement, the City of Atlanta invested in surveillance infrastructure to turn North Avenue into a smart corridor regulated by data-driven policies and actions. As part of the project, every junction on North Avenue was equipped with several CCTV cameras and smart sensors watching and collecting data.

North Avenue passes through the heart of Atlanta, borders two prominent districts—Downtown and Midtown—and connects the east part of the city to the west. Besides being an important axis of Atlanta's transportation network, North Avenue is strategically situated in Atlanta's sociopolitical and socioeconomic context (Figure 2). First, North Avenue connects the Black neighborhoods in the east of the city to the gentrified and prominently white neighborhoods in the west of the city. Moreover, it is an invisible border between Downtown, the decayed old city center with high population of Black people, and Midtown, the developing new city center with high population of white people. North Avenue functions as a transition zone between Black and white neighborhoods. Second, North Avenue reveals a drastic contrast between the wealth of the companies and the institutions that occupy the buildings on the avenue and the poverty of the people who occupy public spaces on the avenue. On the one hand, North Avenue accommodates wealthy companies and institutions, including the headquarters of Coca-Cola Company, south part of the Georgia Tech Campus, Bank of America Plaza, Ponce City Market, and several high-end hotels and residences. On the other hand, there is a high population of homeless people who shelter on and around North Avenue. There are several homeless shelters and food distribution centers in Downtown close to the North Avenue. This sociopolitical and socioeconomic context of North Avenue makes me question why North Avenue was specifically selected as the pilot project of SmartATL.

Figure 1. (A) Google Earth satellite image showing Midtown and Downtown neighborhoods. (B) Google Earth Street view showing the intersection between Spring Street and North Avenue. The smart surveillance cameras can be seen attached to the traffic light. Images are adapted from Google Earth.

Figure 2. Mapping of demography in the neighborhoods surrounding North Avenue, shown in solid orange line. Population data from 2010 Census (United States Census Bureau). The red circles represent the locations of homeless assistance centers.

In the North Avenue Smart Corridor presentation, former Mayor Kasim Reed stated that “the Smart City project's goal is to improve roadway and public safety, mobility, and the environment through technology deployment and data analytics” (Reed 2017). For example, traffic lights can react to what is happening in real time to increase traffic safety and reduce traffic time with the help of smart city infrastructure (Levine 2017). These promises, however, are not without their pitfalls. These technologies pose many challenges often associated with Big Data projects, such as scaling, preparation, and analysis of data, security breaches, and privacy concerns (Allam and Dhunny 2019). Moreover, the system's liability in processing data is questionable considering the inaccuracy and biases of IoT and AI algorithms (Dubrofsky and Magnet 2015; Buolamwini and Gebru 2018; Eubanks 2018). These are significant issues because, as Gavin Smith explains, developments in surveillance technologies guiding the decisions of public policies “bring significant implications for meanings and uses of public space, as well as for democratic principles and civil rights such as privacy, anonymity, accountability, and equity” (2020, 5). In his book *Undercover*, Gary Marx also warns about the extensions of such intensive surveillance into the individuals' privacy, liberty, and rights: “The new surveillance is justified by positive social goals—the need to combat crime and terrorism, protect health, and improve productivity. Extensions occur gradually; it is easy to miss the magnitude of the change and the broader issues it raises. Our notions of privacy, liberty, and individual rights are quietly

shifting, with little public awareness or legislative attention” (1998, 220). Besides the technical and ethical issues of the advanced surveillance technologies, Marx highlights another significant issue regarding the lack of public awareness and debate on surveillance technologies due to their slow and gradual intrusion into our lives.

The acceptance of advanced surveillance technologies without a robust public forum maintains and enhances the oppressive power of authorities aligned with racist, sexist, and ableist practices; thus, smart city technologies are designed to escape our attention to protect their agency over public life. These devices are attached to traffic light poles at a higher level than the human eyes. As the French term *surveillance* suggests, they watch—*veiller*—the streets from above—*sur*. They blend in with the built environment and merge with the existing infrastructures. We do not notice them unless we are intentionally seeking them out. We do not know if they are working or broken when we pass by them. We do not know what they see, sense, or record because, as Trevor Paglen (2016) puts it, the images they capture are invisible to the human eye but only available through machine-to-machine seeing apparatuses. There is no longer a human looking at images, nor human-readable images. Life on North Avenue is reduced to zeros and ones only readable by machines and algorithms. Not only are the material technologies of surveillance, such as cameras and sensors invisible, but so is the process that makes their data function for certain actors.

Figure 3. Conceptual sketch of the mapping study. Drawn by the author.

Drawing on Beth Coleman’s (2009) and Simone Brown’s (2015) call to shift the gaze as a feminist intervention, I use a series of speculative maps to situate the reader’s gaze in the position of surveillance technologies. In doing so, I aim to intervene in the asymmetrical relationship of surveillance technologies and their subjects.¹ I approach mapping as a creative practice, whose “agency lies in neither reproduction nor imposition but rather in uncovering realities previously unseen

or unimagined, even across seemingly exhausted grounds” (Corner 1999, 213). In these mapping studies, I used open-source map applications such as Google Maps and Google Earth as the main media where I virtually walked on the North Avenue to collect information on the number, location, and viewing angle of the CCTV cameras. After I mark the number and specifications of every camera, I speculate on their invisible surveillance fields to highlight our involuntary exposure to intensive smart city surveillance. By making the invisible images of surveillance technologies on North Avenue visible, I raise awareness of their existence and their current structure of power and participation. In the last part of the article, in light of what this mapping study uncovers, I question the selection of North Avenue as the pilot project of SmartATL and discuss the increased policing and criminalization of minorities and marginalized people.

Mapping Study

Mapping has been broadly used as a practice and method of analyzing and criticizing urban issues and revealing socio-spatial power relations (Harley 1989). Situationists, inspired by Guy Debord’s “Theory of the Dérive,” have instrumentalized maps as collective visualization of mobility in postwar cities (Debord and Jorn 1957; Sadler 1999). Today, several artists and scholars, such as James Bridle, Maarten Inghels, Ester Pollack, and Drew Hemment have developed different practices and methods of mapping to criticize surveillance technologies. In this study, I analyze and criticize the surveillance on the North Avenue Smart Corridor through a series of speculative maps. I focus on nine of the sixteen signalized junctions on the North Avenue between State Street NW and Juniper Street NE in these maps. For each junction, I analyzed surveillance fields horizontally on a top view of the avenue (Maps 1–6) and vertically on street facades (Map 7). To produce these maps, I first determined the types of smart cameras, their numbers, locations, and viewing angles and marked them on a base map. I was able to collect all the data needed for this step through the visuals provided by Google Maps and Google Earth satellite view and street view. The street view application allowed me to virtually walk on North Avenue, stop at junctions, and detect surveillance devices without physically strolling the avenue.

Second, after marking the specifics of the surveillance devices on a base map, I calculated the field of view for each of them and diagrammed them on the map. To do so, I needed technical specifications of the cameras and their image sensor format and lens size (Figure 5A) (Space and Naval Warfare Systems Center Atlantic 2013). However, the SmartATL project does not disclose the image sensor format and lens size of cameras. Therefore, the field of view is estimated by using specifications of similar cameras to the ones used on North Avenue. Based on the Google Earth images, I identified two types of CCTV cameras: one type is a C-mount CCTV camera, covering a single view angle. The other one is a dome CCTV camera covering all angles with a 360-degree rotation (Figure 4)

(BusinessWatch Group 2019). I determined the specifications of the C-mount CCTV camera as a 4 mm focal length with a 70° view angle and a maximum 700 ft. distance (Figure 5B) (BusinessWatch Group 2019). For the dome CCTV camera, I determined the maximum distance as 650 ft. (Figure 5C) (Dinning 2019). Based on these specifications, I marked each camera's field of view on the base map.

Figure 4. (A) A C-mount CCTV camera and (B) a dome CCTV camera attached to a traffic light pole in the intersection of Spring Street and North Avenue. Images are adapted from Google Earth 2020.

Figure 5. (A) A schema illustrating the calculation of field of view. (B) A C-mount CCTV camera's field of view on top view. (C) A dome CCTV camera's field of view on top view. Image credit: (A) Adapted from CCTV Technology Handbook (2013), (B, C) drawn by the author.

Lastly, I transferred the processed information onto a digital map adapted from Google Earth satellite view using Adobe Photoshop. I emphasized certain concepts such as the intensity of surveillance and their fields and what these devices can see and cannot see in each map. To identify a surveillance field, which is the area a camera can see without any physical obstruction, first, I positioned the camera and its field of view on the map. Then, I determined areas visually obstructed by physical barriers such as buildings and tree clusters. By doing so, in these maps, I situate the reader in the position of the surveillance devices. I

transfer the gaze of the surveillance technologies to the reader who is now able to speculate on what these devices can and cannot see.

Map 1. Settlement. Produced by the author.

Map 1 shows the number and location of the CCTV cameras on North Avenue, with their fields of view overlapped on the base map. North Avenue is a vital circulation corridor positioned between Downtown and Midtown. Anyone moving between these two prominent neighborhoods has to pass through North Avenue. If a person moves through the North Avenue between the State Street NW and the Juniper Street NE, they will potentially be captured by forty-seven cameras from different angles. This map shows that a network of surveillance devices provides continuous surveillance throughout the avenue.

Map 2. Intensity. Produced by the author.

Map 2 shows only the field of view of every CCTV camera juxtaposed on top of each other. The darker orange color represents an overlap of multiple fields. Therefore, the darker the area on the map, the more intense the surveillance is. If one stands in these darker orange areas, they are more likely to be observed and recorded simultaneously by more than one camera.

Map 3. Single Field. Produced by the author.

Map 3A shows a C-mount CCTV camera's field of view and its surveillance field. The dot on the map represents a CCTV camera. The area shown by the dashed line represents this camera's field of view, and the area highlighted with orange shows the surveillance field. Map 3B shows the juxtaposition of all the surveillance fields of the CCTV cameras at North Avenue and Spring Street junction.

Map 4. Under Surveillance. Produced by the author.

The view of CCTV cameras is visually interrupted by physical barriers such as buildings and dense groups of trees. In Map 4, such interruptions are recorded. The areas that are outside of surveillance fields are erased from the map. Similar to the density map, the darker areas represent a higher intensity of surveillance. Since the cameras do not receive any data about the areas hidden inside and behind physical objects, these areas do not virtually exist for them. Thus, these areas are left blank on the map. This map clearly illustrates the continuity of surveillance fields uninterrupted throughout the entire North Avenue.

Map 5. Invasion. Produced by the author.

Map 5 is a juxtaposition of Map 2 and Map 4. In addition to CCTV cameras, thermal cameras are positioned on North Avenue. These types of cameras can detect body temperature despite any physical barriers. We are still observed in an enclosed environment, even if we think we are away from the gaze of CCTV cameras.

Map 6. Invisible. Produced by the author.

Map 6 illustrates unknown or unrecognizable areas by the surveillance devices. Erasing these areas under surveillance on North Avenue from the map creates the reverse image of Map 4. The areas shown on the map are the leftovers from the surveillance. This map assumes that no other surveillance sensors are placed on the side and parallel streets. A map of all the surveilled areas, including side streets leading to North Avenue, might leave us with even much smaller leftover areas free from surveillance, if they exist anymore.

Figure 6. Panoramic view of Downtown and Midtown from the junction of the North Avenue and 249D Exit. Images adapted from Google Earth 2020.

Figure 6, the panoramic view of the city taken from one of the junctions, shows that if there is no physical barrier restricting the field of view, surveillance devices can cover a large portion of the city. For example, the ones looking east on the intersection of the North Avenue and 249D Exit from the highway have an uninterrupted view of Downtown and Midtown.

Map 7. Beyond the Horizon. Produced by the Author.

Map 7 marks the high-rise buildings that partially enter the view of CCTV cameras positioned in the intersection of North Avenue and 249D Exit. It shows that in certain conditions, surveillance cameras, in fact, have a much broader coverage.

For example, they can see the top portion of a building in Midtown, which is a mile away. The length of the covered area by these devices is almost equal to the North Avenue's length.

Map 8. Vertical Surveillance Fields shown in the intersections of North Avenue and (A) Tech Parkway, (B) Techwood Drive, (C) 249D Exit, (D) Spring Street, (E) West Peachtree Street, (F) Peachtree Street, (G) Juniper Street, (H) Piedmont Avenue. Produced by the author.

Map 8 shows surveillance fields in the vertical direction marked on the street facades. These maps give an insight into the surveillance in a three-dimensional medium. The surveilled areas are highlighted in orange on the street facade images. Besides open public spaces such as streets, sidewalks, and parks, CCTV cameras can also see the private buildings' balconies and seemingly private spaces.

Reflections

These maps reveal the mind-boggling intensity of surveillance activities on the North Avenue Smart Corridor. The smart cameras positioned on top of the traffic lights in every junction work as a networked entity to cover the entire North Avenue without leaving a blind spot on it. Even though the type of surveillance practices extends throughout the city, the intensity decreases gradually towards the city's periphery and suburban areas. The decrease in intensity can be observed even in the parallel streets to North Avenue. For example, the number of cameras on the intersection of Peachtree Street and North Avenue goes down from six to four just on the next junction, Peachtree Street and Linden Avenue NE. While these maps focus on the gaze of the smart cameras, they lack coverage of other smart sensors like license plate readers and infrared and thermal sensors. We do not know the exact range of sensors that smart city technologies deploy because the smart city practice remains opaque to the public.

While these maps display only the physical context of the North Avenue and create an illusion of “the god trick” of the surveillance technologies, I aim to uncover the biased and oppressive position of surveillance technologies by reflecting on the sociopolitical and socioeconomic context of surveillance technologies on the avenue. These maps reveal the broad coverage of smart surveillance technologies on North Avenue, rendering everyday passersby involuntary participants in the data collection of smart cities. The cameras have the agency to identify you, recognize who you interact with, and record your activities on North Avenue. Furthermore, the surveillance is not limited to public places. Smart cameras are capable of monitoring the facades of private buildings, watching you in the windows of your home. Even though smart cameras are unnoticeable, their intrusion into our lives is consequential. The data collected and processed through automated technologies are used to shape and defend the policies that affect public places and how we experience them. Data-driven policies enforced by authorities raise the question of how the data is transformed into “actionable information.” For what? By whom? Based on what values? What type of actions?

Instead of investing in the conspicuous need for infrastructure improvement to make the public places of North Avenue accessible and equitable to everyone, the City of Atlanta invested in smart surveillance technologies, which, in fact, cause

damages to fundamental rights. Such a big investment into surveillance raises the question, whose body is watched and disciplined, particularly in the case of Atlanta, the most surveilled city in the United States (Shelby et al. 2020)? The surveillance on North Avenue captures people commuting between predominantly Black neighborhoods and white neighborhoods, as well as homeless people, ninety-four percent of whom are Black (*Homeless Point-in-Time Count* 2016). Considering what the surveillance captures on North Avenue, what happens when the issues of oppressed communities enter the frame of surveillance? Rachel Dubrofsky and Shoshana Magnet point out that this type of surveillance practice is “processes that are simultaneously about seeing and not-seeing—that is, some bodies are made visible, while others are made hypervisible” (2015, 7). On North Avenue, these technologies make people of homeless, low-income, and racially diverse communities hypervisible to the gaze of surveillance. How are these communities impacted by the surveillance and policing aspect of smart city technologies? What role do they play in transforming data into policies? What are the prejudices that the smart city algorithms hold against these oppressed communities and individuals?

Historically, Atlanta has had a bad record of using city infrastructure to control and segregate races. Ronald H. Bayor (1988) shows that, in the 1950s and 1960s, the City of Atlanta used highways and roads as racial buffers—that is, barriers and boundaries between white and Black communities. While these buffers still physically exist today, they are enhanced with surveillance technologies as in the case of North Avenue Smart Corridor. The fact that North Avenue is a transition zone between predominantly Black and white neighborhoods, and it is one of the most surveilled parts of the city brings race back to the discussion of why this specific site is selected as a pilot project of SmartATL.

Surveillance practices discriminate against Black and Brown people and people who signify as lower class. For example, recent police data shows that Black and Hispanic drivers are more likely to be stopped and searched by the police than white drivers (Goel and Phillips 2017). These practices result from surveillance that renders certain bodies and communities visible as a threat to the system. As Coleman asserts, “a person is not being shot for ‘being black’ per se but rather for appearing threatening, resisting arrest, or other ‘disruptive’ behavior. None of these stimuli of police attention are named as racial in policy; nonetheless, they are rendered racial in practice” (Coleman 2018). In her book *Dark Matters: On the Surveillance of Blackness*, Browne (2015) shows that contemporary surveillance practices have been shaped by a historical account of controlling Black bodies. From a Black feminist perspective, she argues that “under these conditions of terror and the violent regulation of blackness by way of surveillance, the inequities between those who were watched over and those who did the watching are revealed” (Browne 2015, 21).

Building on David Lyon's concept of digital discrimination (2003), Browne claims that in addition to the constant surveillance, the invisible process of data conversion systematically disadvantages minority groups while privileging advantaged groups. The smart surveillance technologies convert the captured images into raw data, and then profile, circulate and trade them between various databases. As Browne points out, "such data is often marked by gender, nation, region, race, socioeconomic status, and other categories" (2015, 17). Surveillance technologies increase the surveillance and criminalization of oppressed bodies because they are trained with biased data. Artificial intelligence that supports surveillance technologies reflects racial, sexist, homophobic, transphobic, classist, and ableist biases of the society in their data processes. Moreover, these technologies have high rates of inaccuracy. For example, facial recognition systems have been shown to misidentify people of color, women, and young people at high rates (Klare et al. 2012). Besides the biases in the AI algorithm, their phenotypic and demographic inaccuracy damages law enforcement's essential rights and accountability (Buolamwini and Gebru 2018). Smart surveillance technologies re-establish the patriarchal gaze of society through smart surveillance.

Increased surveillance shaped by biased and inaccurate algorithms makes minorities and marginalized people more susceptible to policing and criminalization. Elizabeth E. Joh argues that "as smart cities become 'smarter,' they increasingly embed policing itself into the urban infrastructure. Policing is inherent to the smart cities" (2019, 178). She adds, "as cities become 'smart,' connected and watchful, policing will become a less visible and a more embedded aspect of the urban environment" (181). In their *Wired* article "How to Protest Safely in the Age of Surveillance," Andy Greenberg and Lily Newman (2020) make recommendations to Black Lives Matter protesters about how to avoid being recognized by smart surveillance. They warn against wearing colorful clothing with logos, showing one's full face, or driving because smart surveillance technologies can easily identify protestors with the help of facial recognition or license plate readers. In another recent example, city authorities all over the world have used smart surveillance technologies to monitor and govern people's mobility and interactions to track COVID-19 infections (Smith 2020; Hossain, Mohammad and Guizani 2020). Besides increased mass policing, smart surveillance technologies contribute to the self-policing of marginalized people, which recalls the panopticon's disciplinary gaze as outlined by Michel Foucault (1995). In the Foucauldian panopticon, however, inmates are disciplined to behave as if they are under constant surveillance since they cannot know whether they are being watched; on North Avenue, citizens are under constant surveillance. They are disciplined to monitor their behaviors because the automated surveillance might target them due to their race, gender, sex, or disabled bodies. People who suffered from invasive surveillance and punitive public policies must be extra cautious about how they behave in public. Any action that can be

detected by the algorithms as an offense can have punitive, life-changing consequences.

This study uncovers the biased and oppressive power of surveillance technologies over minorities and marginalized people by situating the reader in the position of the smart sensors and making them speculate on what these technologies can and cannot see. It argues that the invisibility of these technologies and their processes prevents the formation of strong public opinion and debate on their impact. Blind acceptance of these technologies helps the powerholders maintain and enhance their oppressive power. It damages the essential rights of citizens, perhaps beyond repair, and increases discriminative practices based on racist, sexist, and ableist policies. Smart surveillance leads to disproportional policing and criminalization of minorities and marginalized people. Biased and inaccurate automated data processing systems further amplifies the impact of surveillance due to the biased and inaccurate automated data processing system. Therefore, a strong public understanding is necessary to govern smart city technologies' agency for any meaningful intervention on these entrenched, unequal power relations. Mapping the unnoticeable materiality and invisible processes of intensive smart surveillance technologies is one method of intervention, as exemplified in this study. While each map in this article reveals intrusive aspects of surveillance, the crucial question to ask is whether and how we can free ourselves from the oppressive gaze of surveillance.

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Note

¹ It is also important to highlight that the strategy of shifting the gaze is in conversation with the concept of the *flâneur* and its feminist counterpart *flâneuse* in surveillance studies. However, given the extensive literature and the brevity of this article, I will leave out further elaboration on this relationship.

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