DECIPHERING CULTURAL MARKERS OF SPACE: A STUDY OF UNDERSTANDING

URBAN LANDSCAPES AND HUMAN BEHAVIORS FOR A SMOOTHER TRANSITION

OF AUTONOMOUS VEHICLES IN OUR ECOSYSTEM

A Project Report

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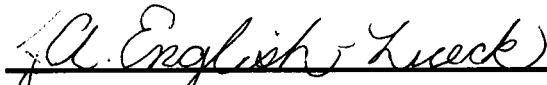Bhargavi Pawar

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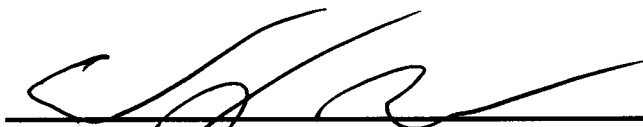The Undersigned Graduate Committee Approves the Project Report Titled

Deciphering Cultural Markers of Space: A Study of Understanding Urban Landscapes and
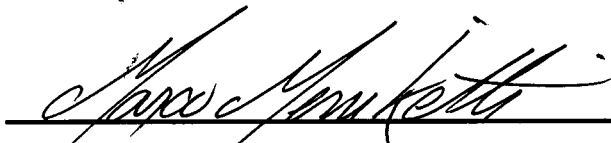Human Behaviors for a Smoother Transition of Autonomous Vehicles in our Ecosystem

By

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Abstract

The Nissan Research Center is conducting exploratory and generative research on the role of automobiles in living communities to design autonomous vehicles more appropriately. Their objective is to enable autonomous vehicle technology to perceive and understand human behaviors, potentially adapting to different types of environments and landscapes. This research project contributes to this exploratory and generative research by looking at three phenomena that act as cultural markers of space. First, I classify important urban design features that shape cities as *streetscape design elements*. Next, I look at various *mobility behaviors* practiced by different types of space users. Lastly, I look at *vernacular landscapes* as managed landscapes of everyday space-use. Furthermore, I identify various stakeholders that shape urban infrastructure and mobility within the landscapes to better identify structures of power that shape neighborhoods in the Bay Area. These stakeholders are potential collaborators that autonomous vehicle companies can partner with to facilitate a less chaotic transition of autonomous vehicles into our mobility ecosystems. I conducted fieldwork in three neighborhoods of the San Francisco Bay Area – South of Market in San Francisco, Downtown San José, and Downtown Campbell. Primary research methods for this project consisted of conducting observations of physical infrastructure and mobility behaviors, spatial analysis of space-use, interviews with informants with special knowledge (specialists) in the urban planning and transportation fields, semi-structured interviews with different types of people using the spaces, and social media research on publicly available data about people's activities and use of space using geo-locational tags. In addition to identifying cultural markers and power structures, this research also identifies use cases for autonomous vehicle technology. These use cases illustrate potential future applications of autonomous vehicle technologies within our infrastructural ecosystem.

Acknowledgments

I would like to extend my deepest gratitude to Dr. Jan English-Lueck. Thank you for your guidance, excellent feedback, and always pushing me past my comfort zone. A special thanks to Dr. Melisssa Cefkin, who has been instrumental to this project. Thank you for your assistance and enthusiasm about this project. Without you, and Dr. Jan English-Lueck, this project would not have come to fruition. Next, I would like thank my committee members – Dr. Gordon Douglas, Dr. A.J. Faas, and Dr. Marco Meniketti for their expertise and feedback on this report. Many thanks to all the interviewees for their insights. Especially to the specialists from the San Jose Downtown Association, San Jose Department of Transportation, and San Francisco County Transportation Authority. I also want to extend my gratitude to my cohort members – you guys were a great support system throughout this journey. I will always cherish our companionship.

 I owe my deepest gratitude to my parents and sister for their love and support in this journey. To my parents, I would not be here today if it weren't for your sacrifices. Last but not the least, a heartfelt thanks to Brent – thank you for your continued support and encouragement.

Table of Contents

Illustrations

Tables

Figures

Glossary

cultural markers. Cultural markers refer to the physical and behavioral characteristics that distinguish a space highlight its identity. I classify these markers into *streetscape design elements*, *mobility behaviors*, and *vernacular landscapes*.

habitus. 'Habitus,' one of Pierre Bourdieu's (1990) theoretical concepts, is a system of acquired values, habits, and knowledge that are developed over time through every-day experiences. These acquired values, habits, knowledge, and ways of thinking help us to navigate our daily lives. Moreover, a person's habitus is associated with social class. For example, a person from a low-income background has a different set of values and habits than a person from a high-income background. This difference in values will influence how a person will interact with a streetscape.

place-making. For the purpose of this study, I use the term place-making as a process of creating shared and meaningful spaces. One of the ways people engage in place-making is through community events and activities. Place-making is also a way by which people form attachment to place. Those highly composed visions of space will differ from the ways space users imagine and move through those spaces.

representations of space. 'Representations of Space' is a concept proposed by sociologist Henri Lefebvre (1991), and it refers to space that is conceived and planned by engineers, urbans planners, and architects, etc. through maps, codes, and plans.

representational spaces. 'Representational Spaces,' another concept proposed by Henri Lefebvre (1991), refers to the actual lived space of different types of space users. For example, these space users have their own way of navigating landscapes, and their movements are overwritten by the formal layout (representations of space) of space.

streetscape design elements. In this study, streetscape design elements include urban design features that characterize and play a role in shaping cities and neighborhoods. Examples of these urban design features include street trees, streetlights, pavement, murals, and seating structures, etc.

vernacular landscapes. Vernacular landscapes are ordinary functional landscapes that have evolved through human activities (Alanen 2000; Birnbaum 1994). Vernacular landscapes reflect cultural character (Birnbaum 1994) and local identity (Krase and Shortell 2011). For example, streets and sidewalks are examples of everyday functional landscapes. What makes these spaces vernacular is how these spaces are claimed by cultural identity, whether it's through street art or urban infrastructure.

Chapter 1. Introduction

The Nissan Research Center has been exploring different ways autonomous vehicles will engage in urban environments in a socially acceptable manner (Vinkhyuyzen and Cefkin 2016). The purpose of this research project was to independently collaborate with Dr. Melissa Cefkin, a principal scientist at the Nissan Research Center, in her ongoing research of how autonomous vehicles can potentially switch modalities to adapt to different types of physical and social landscapes, particularly focusing on Bay Area neighborhoods such as Downtown San José, South of Market in San Francisco, and Downtown Campbell. In order to do so, I developed a set of research questions in collaboration with Dr. Melissa Cefkin. The following are the research questions that this study answers:

1) What are the cultural markers of a neighborhood?

Cultural markers are the physical and behavioral characteristics that its inhabitants (permanent and temporary) recognize as a neighborhood's make-up. Outsiders too, define space using their own preconceptions and values. Cultural markers entail different things. This study narrows down cultural markers to three types of phenomena that are indicative of cultural markers as seen from different perspectives. First, from an urban design perspective, I classified important urban design features that shape cities as *streetscape design elements*. Streetscape design elements consist of urban design features such as urban street trees, streetlights, sidewalks, etc. Next, I observed *mobility behaviors* people practice and interpreted them from an anthropological and sociological viewpoint. For example, I looked at mobility patterns of different types of space users such as pedestrians, bicyclists, and other vehicular users. Last, I looked at *vernacular landscapes* as managed landscapes of everyday space-use as seen by historians and archeologists. Examples of vernacular landscapes include parks, gardens, plazas, streets, and roadways, etc. These set of

cultural markers can potentially be part of the large data sets that autonomous vehicle technologies already use to get a better understanding of our urban landscapes.

2) What are the various power structures operating within our urban landscapes?

To answer this question, I looked at how streetscape design elements include or exclude different populations, by design or unintentionally. Different groups – families, homeless, elderly – experience access to everyday vernacular landscapes distinctively. Moreover, I identified organizations involved in the decision-making processes that would affect streetscapes in terms of mobility, transportation, and urban landscapes. This exercise was helpful in identifying the different types of potential stakeholders that autonomous vehicle companies must consider in order to transition autonomous vehicles in our everyday landscapes. For example, collaborating with urban planners, urban designers, and local governments can help autonomous vehicle companies understand the nature of urban landscapes, and the differentially enforced laws and policies related to roadways and land-use. Moreover, by collaborating with stakeholders from different fields, autonomous vehicle companies can anticipate and mitigate unintended consequences they might have overlooked.

My deliverable to the Nissan Research Center included data generated from this research that was disseminated in the form of a presentation. The research findings were presented to Dr. Melissa Cefkin and her colleagues at the Nissan Research Center on August 2, 2018. I also provided a copy of this project report to Dr. Melissa Cefkin for further reference. An important part of the deliverable was to explore use cases for the integration of autonomous vehicle technologies in our ecosystem. Use cases are a form of design fiction. Within design ethnography, it is common to create design fictions that help envision potential future scenarios (Lindley, Sharma, and Potts 2014). Design fiction is a speculative design approach that helps

situate people in potential future scenarios (Lindley, Sharma, and Potts 2014, 241). The goal of design fiction is to challenge assumptions, encourage meaningful discourses about insights, and make insights actionable (Dunne and Raby 2013; Lindley, Sharma, and Potts 2014; Lindley, Sharma, and Potts 2015). The use cases I identify for this study employ design fiction to help the client understand how product design and urban planning might connect tacitly. Implications for particular audiences, in this case scientists exploring the impacts of autonomous vehicles. Design fiction highlights examples of these use cases include using autonomous vehicles as transit connectors, helping the Vision Zero Project, a non-profit campaign that aims to make roadways safer, repurposing land-use by reallocating parking spaces, advertising public spaces to people riding in autonomous vehicles, and collaborating with local governments for data collection and data sharing purposes. In chapter six, I further discuss how Nissan, and other creators of autonomous vehicles, could implement these use cases.

This study evolved from a previous group project called 'The Social Life of Streets' from a graduate course at San José State University's Applied Anthropology program, called Applications Core. My group included classmates Marissa Massaro, Shauna Mundt, and Isra Wazna. This group project acted as a pilot study for the current research study. I used the data and insights from the previous study as preliminary data. In this pilot study, my collaborators and I observed street-side activities, events, people's interactions with streets, and interviewed people about street etiquette, navigating traffic, and the modes of transportation they used. Important insights from the pilot study highlight the unpredictability of street adjacent life and its effects on navigating streetscapes, a potential area of difficulty for autonomous vehicles.

In the pilot study, we identified the importance of social spaces and the role they play in community bonding, and the need for autonomous vehicles to be adaptive of ad-hoc events and

ad-hoc takeover of space. Some examples of these ad-hoc events include farmers markets and street festivals where streets are temporarily closed off to vehicular traffic. Protests are another form of an ad-hoc/impromptu takeover of space. Within the pilot study, we discussed how autonomous transportation could provide certain demographics, such as the elderly, access to social spaces. At the end of the project, we arrived at a consensus that future research should focus on interactions between autonomous vehicles and different types of space users such as pedestrians, cars, and other non-car using persons, and investigate how autonomous vehicles can navigate the apparent chaotic behavior manifested by various space users. We also recommended creating strong alliances between autonomous vehicle companies, urban planners, local and regional transportation organizations, as these alliances would ensure a less chaotic transition of autonomous vehicles in our society. This current project is a follow-up study to explore how autonomous vehicles could adapt and operate efficiently in different types of vehicular environments. Dr, Melissa Cefkin helped shape the preliminary insights of the pilot project into research questions that their transdisciplinary working team could leverage. This interdisciplinary research employs frameworks from urban planning, political science, sociology, and anthropology to answer the research questions.

Overview of Project Report

The 'Introduction' provided an overview of the research topic along with the research questions. In chapter two, 'Contextual Information,' I describe the significance of the research project and provide background information on changes in the urban landscape associated with the onset of the automobile. I further explain how anthropological concepts such as spatial analysis, habitus, place-attachment, and urban consumption, might help us frame and address the

research questions. The 'Methodological toolkit' chapter describes the fieldwork methods used in the study and discusses how the data generated addresses some of the research questions.

In 'Marking Community and Streetscape Design Elements,' I present community profiles of the chosen field sites, where I discuss socio-economic, wellness, and commuter data from the U.S. Census Bureau and the U.S. Bureau of Transportation Statistics. This data gives us a better understanding of how these chosen communities are distinctive in nature when compared to other communities in California and the United States. Within this chapter, I further discuss how one of the forms of cultural markers – streetscape design elements (built form of the neighborhood) – displays community identity and acts as cultural markers of space. Moreover, streetscape design elements also display how power and access operate within urban spaces.

Next, in the chapter 'Moving through Landscapes and Power', I discuss the other two forms of cultural markers – mobility behaviors and vernacular landscapes. The sub-section 'Mobility Behaviors' describes different mobility patterns of different space users, their use of mixed modes of transportation, and the contestation of space-use on roadways and sidewalks. The sub-section 'Vernacular Landscapes' describes the dynamic nature of vernacular landscapes and the role they play in creating community identity. Vernacular landscapes are everyday common landscapes (Alanen 2000) that human activities shape (Birnbaum 1994). Vernacular landscapes reflect cultural character (Birnbaum 1994) and display local identity (Krase and Shortell 2011). I further explain how power operates within these cultural markers and identify the different organizations involved in the decisions making processes in terms of mobility and our urban environment. Working with different stakeholders can be essential to mitigating future obstacles when autonomous vehicles transition into our mobility ecosystem. Next, the chapter 'Use Cases' present various use cases and consequences that autonomous vehicle technologies

might bring with them. The 'Conclusion' chapter consists of an overview of insights from this project, the client's response to the deliverable, and reflection on my fieldwork process. First, I recap the importance of cultural markers (physical and behavioral characteristics) in understanding our urban landscapes and communities. Then I discuss the reactions of the client in response to my presentation. Last, reflecting on my fieldwork, I discuss my experience with taking a mixed-methods approach, and discuss the advantages and challenges that accompanied this approach. This area was particularly interesting to the Nissan Research Center team during the question – answer portion of my presentation and has implications for future research collaborations between San José State University and industrial transdisciplinary corporate partners.

Chapter 2. Contextual Information

Project Significance

Currently, various corporations and start-ups, especially in the Silicon Valley, are either investing in autonomous vehicle technology or are in the process of designing autonomous vehicles. Some of these companies include Apple, Google, BMW, Nissan Research Center, General Motors, and Tesla, etc. One of the overlapping goals of these companies is to better facilitate the transition of autonomous vehicles into our society, while anticipating the challenges that autonomous vehicles might bring. Interactions between cars, pedestrians, and non-car-using persons are social phenomena that can be quite unpredictable, each acting with multiple and diverse rules and expectations. Additionally, if these companies introduce artificial intelligence to an environment that consists of unpredictable human behavior, conflict is probable. It is important to explore how autonomous vehicles can transition more smoothly into our cities.

Nissan has made some progress in their research by developing basic foundational technological concepts that help autonomous vehicles detect different road users around it and build effective communications with them. One of the technological concepts they use is the intention indicator, a signaling system that helps an autonomous vehicle communicate effectively and express its intentions to other road consumers (Vinkhyuyzen and Cefkin 2016). However, Dr. Melissa Cefkin's team at the Nissan Research Center wants to go beyond the technical solutions to understand the social operations that take place within a landscape and inform a better design for autonomous vehicles that are adaptable to different landscapes. This ethnographically-informed research could provide a deeper understanding of the different characteristics that urban landscapes embody.

Additionally, in this research project I take an interdisciplinary approach by drawing from various fields such as urban planning, sociology, behavioral science, and anthropology providing multiple perspectives and richer insights. This study gives us a deeper understanding of how autonomous vehicle designers and their anthropological consultants can employ concepts such as habitus, distinction, place making, and urban consumption to understand the nature of urban landscapes and provoke thinking about how space is used. This information may eventually inform practitioners in the field as well. The following section describes the historical narrative of how the rise of automobiles shaped urban landscapes. I situate literature on theoretical concepts such as spatial analysis (Lefebvre 1991), habitus (Bourdieu 1990), distinction (Bourdieu 1979), place-making (Lawrence-Zúñiga 2010; Altman and Low 1992) and urban consumption (Jaffe and Koning 2016).

The automobile played a role in shaping urban landscapes in the United States. One of the main factors for the 1920s economic boom was the automobile industry (Kunstler 1994, 92). To accommodate cars in our environments, humans had to re-adjust to their habitats (Kunstler 1994, 92). James Kunstler (1994) discusses the impacts of how the rise of automobiles shaped the American landscape. Urban development designed to accommodate cars dictated the public space, and slowly degraded it (Kunstler 1994, 168). The rise of automobiles, along with modernization, contributed to the vast sprawl of the suburbs (Kunstler 1994). Moreover, both local and national transportation policy makers enabled suburban sprawl, which eventually led to the decline of city life (Smithsonian, n.d.). Cities experienced a decline in mass transit ridership and faced economic repercussions as middle and working class people moved to the suburbs (Smithsonian, n.d.). Furthermore, an automobile-centered landscape entailed building highways and parking lots to accommodate cars. As an example, after highways were constructed in Long

Island, the surrounding farms and estates were converted into parking lots (Kunstler 1994, 97).

Kunstler mentions that after the 1950s, most planners designed communities so that it became

impossible to live without a car. This urban plan resulted in a divide between citizens where one

part of the population could drive and make full use of their environment, whereas others (such

as children under the legal age of driving, elderly people, and people who cannot afford cars)

were not able to use this new technology (Kunstler 1994, 115).

Echoing how automobiles affected urban landscapes in the U.S., French postwar

modernization led to what Henri Lefebvre calls the *colonization of everyday life.* Merrifield

(2006, 9) explains that by *colonization of everyday life*, Lefebvre meant that everyday life was

being taken over by postwar capitalism and consumerism. Kristin Ross (1995, 113) reiterates

Lefebvre's phrase of "colonization of everyday life" when arguing that France colonized inwards

through urbanization, space management, and technological advancement. Postwar

modernization restructured everyday life in France via rapid transformations from a rural to an

industrial society (Ross 1995, 113). These transformations were prominently seen in homes and

transportation. For example, architects planned and contractors built new housing, and people

filled their houses with new appliances and technologies, while in the streets, the automobiles

took over the roadways. Postwar modernization also dismantled earlier spatial arrangements

(Ross 1995, 112); and the automobile industry played a role in it. In the near future, with the

advent of autonomous vehicles, city planners, local governments, and people working with

autonomous vehicle technology have to be more conscious of the consequences that autonomous

vehicle might bring with them. Echoing what happened in the U.S. and France, local and

regional governments and constituencies, and companies designing autonomous vehicles have to

be conscious of changes wrought by autonomous vehicle technology so that people can choose how they disrupt the spatial arrangement of our everyday urban landscapes.

Conceptual Frameworks

My conceptual frameworks for this study consisted of concepts that provided a lens into the spatial arrangements of urban landscapes, collective behaviors of people, people's place-making strategies, and their urban consumption. Below, I give a brief overview of the concepts that were helpful in addressing the research objectives, and further explain how I applied them to this study.

To understand the spatial arrangements of our urban landscapes, and understand how social space is constructed and produced, I used concepts from Henri Lefebvre (1991) and Michel De Certeau (1984). These concepts were helpful in classifying the cultural markers. The classification into the three different but overlapping phenomena – *streetscape design elements*, *mobility behaviors*, and *vernacular landscapes* – provided a lens into how people use and experience space. Focusing on collective behaviors, I used Pierre Bourdieu's (1990) concept of *habitus* to identify patterns of collective behaviors of different space users such as pedestrians, bicyclists, car users, and other vehicle users as they navigate streetscapes. I further use *habitus* to understand how structures/built form of neighborhood and the practices within the neighborhood might reinforce each other. For example, the built design of neighborhood affects people's mobility patterns in space. However, when the built design of a neighborhood cannot accommodate its space users, people appropriate the landscape in their own way.

The concept of *distinction* (Bourdieu 1979) showcases that people's aesthetic judgements highlight their socio-economic class and background. These judgments of tastes create

distinction between social classes. I borrow this concept to show how aesthetics of the built form of a neighborhood highlights the socio-economic ranking, and the levels of inclusivity or exclusivity within the neighborhood. People experience such distinctions mostly in the details of the streetscape – greenery, the quality of sidewalks, and seating structures. The concept of place-making was taken from various ethnographic studies (Sorenson 2009; Lawrence-Zúñiga 2010; and Low 1992) to identify the different ways people create shared and meaningful spaces. The concept of place-making was helpful in identifying the different place-attachment behaviors people have with landscapes. People often engage in events and activities, which is one of the ways how people form attachments with landscapes. For that reason, my fieldwork methodology included conducting observations at neighborhood events and interviewing people present at these events. I would like to note that in urban planning, place-making has also become a trendy urban revitalization practice that uses art to revitalize streets and public spaces (Douglas 2018, 131). Cities have adopted place-making as a tool to transform places, attract more users to the area, and revitalize these places socially and economically (Douglas 2018, 131). For example, street art and murals would be one way cities employ place-making as an urban strategy.

Lastly, different forms of urban consumption provided a better understanding of the various ways people use space. The way people use space was helpful to identify the different ways neighborhood identity is formed. For example, my fieldwork revealed that events and activities such as farmer's markets and street festivals were important consumption practices that helped form a neighborhood's identity. Events and activities were also a neighborhood's strategy for place-making, sometimes through urban design, at times unofficial. Branding strategies such as banners, advertisements, and murals also played a role in place-making and the formation of neighborhood identities. For example, during fieldwork in Downtown Campbell, I observed that

the City used banners and advertisements as a branding strategy that communicated to visitors that it was a community-based and family friendly neighborhood.

Spatial Analysis

To understand social spaces and how they might be constructed and produced, I use Henri Lefebvre's (1991) concepts of *representations of space* and *representational spaces* to comprehend the nuances of the built form of a neighborhood and the spatial activities that accompany it. Lefebvre (1991, 38) describes *representations of space* as space that is conceptualized by scientists, urbanists, and planners. Such space is the produce of expert imaginations. By *representational space*, Lefebvre (1991, 39) refers to the actual lived space by the users, where they are indifferent to the formal layout of the space as conceived by the planners and engineers. These notions are similar to Michel De Certeau's (1984) framework of the *concept city* in which urban planners, architects, and engineers, etc. construct the built form of a city/concept city (Tonkiss 2005, 127); this is similar to what Lefebvre calls the *representations of space*. Tonkiss (2005, 127) references De Certeau's argument that people negotiate urban spaces that are overdrawn by maps, plans, codes, rules, etc. in their own way.

De Certeau's *concept city* is a site of practice through which people trace their own personal maps and make room for themselves (Tonkiss 2005, 127). According to De Certeau, people have illegible and unpredictable movements in the rational order of a city. Hence, De Certeau argues that people are not just mere consumers of space, but follow their own spatial scripts. Lefebvre (1991) and De Certeau's (1984) concepts lay a foundation for understanding the built form of space and the various ways in which people might appropriate these spaces. These concepts were helpful in narrowing down the cultural markers into the three categories.

Most streetscape design elements embody ideas such as the *concept city* and *representations of space*, while Mobility Behaviors and Vernacular Landscapes illustrate how people appropriate the built space around them, and displays how landscapes can be dynamic in nature.

Habitus and Distinction

Pierre Bourdieu (1990) describes the concept of *habitus* as a set of "structured structures predisposed to function as structuring structures" that play a role in creating and organizing practices (Bourdieu 1990, 53). In simpler terms, *habitus* is a system of acquired knowledge and habits; people know how to act and what to like based on their everyday experiences and the culture exposed to them. Bourdieu (1990, 54-56) argues that *habitus* is a product of history and is second nature to us. The practices that *habitus* generates can be observed in individual and collective behaviors (Bourdieu 1990, 54). Within the framework of *habitus*, Bourdieu further describes the relationship between structures - *habitus* - practices. Habitus and structures, both products of history, develop practices that are "mutually intelligible" and instantly conform to the structures (Bourdieu 1990, 58). As these practices appropriate the structures, the structures reproduce dispositions/practices to keep themselves functioning (Bourdieu 1990, 57). Bourdieu notes that a property conforms to its owner and manifests itself in a structure that generates "practices perfectly conforming with its logic and its demands" (Bourdieu 1990, 57). The concept of *habitus* provides a lens into the interplay between structures and practices within a neighborhood, and study how they might reinforce each other.

I employed the concept of habitus to observe how practices might operate in collective behaviors among various space users. Insights from fieldwork revealed how urban infrastructure shapes collective mobility patterns of different types of space users such as pedestrians,

19

bicyclists, and skateboarders, etc. When urban infrastructure is unable to accommodate all the space users, these actors carve their own patterns of using space to navigate the urban landscape. For example, bicycling interviewees told me that due to the lack of bike lanes and/or the narrowness of streets, they felt safer to use sidewalks.

Bourdieu (1979, 57) further explored the concept of habitus in his work on 'Distinction.' Bourdieu (1979, 57) mentions that aesthetic tastes are "opportunities to experience or assert ones' position in social space, as a rank to be upheld, or a distance to be kept." Reed-Danahay (2005, 110) translates this as Bourdieu's argument that judgements of tastes reflect an individual's higher or lower social status. Reed-Danahay (2005, 110) explains that Bourdieu refers to tastes as systems of classification among social classes, and that tastes are also a form of developed habitus of the upper social class.

I apply these ideas around distinction and tastes to the aesthetic tastes relating to the built form of a neighborhood. For example, certain communities have and/or lack urban design features based on the socio-economic status of the neighborhood. Moreover, not all communities have access to greenspaces. Studies show that wealthy neighborhoods tend to have more green spaces than lower income neighborhoods (Loukaitou-Sideris and Ehrenfeucht 2009; Wolch et al. 2014). The built form of the neighborhood also displays the different levels of inclusion and exclusion in the area. One way the built form shows forms of exclusion is through defensive architecture that drives vulnerable populations such as the homeless away from the area. Another example of how the concept of distinction displays forms of inclusion and exclusion can be seen in how urban renewal results in varied impacts for different socio-economic groups.

Throughout his book, Moskowitz (2017) discusses how urban renewal, a form of capital creation, often results in the displacement of communities. During peak urban renewal in the

U.S., the building of highways on top of low-income neighborhoods displaced thousands of people (Logon and Molotch 2007). Urban renewal also attracts affluent crowds, and in the process, dismantles low-income communities (Moskowitz 2017; Logan and Molotch 2007). Through these examples, we can see how the concept of distinction sheds light on the different layers of control present within the space.

Place-Making and Place Attachment

Ethnographic neighborhood studies are a way to understand the concept of place-making as they touch upon topics such as neighborhood identity. Anthropologists who have conducted ethnographic research in various neighborhood/cities include Andre Sorenson (2009), Denise Lawrence-Zúñiga (2010), and Setha M. Low (1992) in Tokyo, Southern California, and Costa Rica, respectively.

Andre Sorenson (2009) looks at street life in Tokyo and how occupants of the Yanaka neighborhood engaged strategically in place-making to address urban redevelopment in the area. To do so, Sorenson (2009) describes how community members from the Yanaka neighborhood created meaning for shared spaces by engaging in various activities. The residents created magazines that highlighted local history, made a catalog that highlighted community resources, and hosted festivals and art events (Sorenson 2009, 219-20). By engaging in these activities and creating meaningful spaces within the neighborhood, community members were collectively claiming ownership to these shared spaces (Sorenson 2009, 220). The community residents were essentially engaged in place-making. Lawrence-Zúñiga (2010) discusses remodeling practices among homeowners in Southern California, and how those practices inform factors such as identity and lifestyle. Following the above examples, I researched the different ways in which community members create shared and meaningful spaces, which consisted of looking at

community events and activities, the presence neighborhood associations, and/or community newsletters. These strategies were helpful in providing insights into place-making strategies employed by neighborhoods.

According to Setha Low (1992, 165), place attachment is a cognitive and emotional experience that consists of cultural practices that create a symbolic relationship between people and places. In her ethnographic work on the plaza (parquet central) in San José, Costa Rica, Low describes six symbolic linkages of place-attachment seen among people and landscapes. The linkages include attachment based on genealogy, loss/destruction, economics/ownership, cosmology, celebratory events, and narratives (Low 1992, 178-81). Low (1992, 179) explains that behaviors of place-attachment based on genealogy were created by identifying a place and person over time. For example, she notices how some plaza visitors and vendors occupied certain benches, developing a strong relationship with them. In one of the instances, when Low (1992, 178) occupied one of the benches of an occupant that had not arrived on time, she was told that it was "Rodrigo's spot." The relationship between bench occupants and their benches also changed over time.

On loss/destruction, Low (1992, 179) mentions how the cutting down of trees in the plaza elicited an emotional response from daily visitors and locals – people expressed grief and shared stories about their relationship with the trees. On place attachment through economics, Low discusses how even though the vendors did not own the space within the plaza, they called it their own since they had been in that place for most of their lives. Low (1992, 180) mentions how the vendors seemed to be attached to the plaza, displaying a form of economic attachment. Furthermore, Low displays how the presence of the Catholic cathedral in the Plaza is a cosmological place attachment. Celebratory events create attachment as people experience

weekly band music, family Paseo, and holiday festivities in the, which reinforce people's ties to

the place (Low 1992, 181). Lastly, Low highlights how the use of narratives regarding spaces

can reveal the formation of place-attachment. The case study used these examples as a lens to

explore the different ways people formed place-attachment with landscapes. For example, while

conducting fieldwork, I attended neighborhood events to see how community members and the

city used place-making strategies to form an attachment with their immediate landscape.

Urban Consumption

Jaffe and Koning (2016, 88) state that anthropologist find consumption amusing as a

"social practice in which the private and the public, the individual and the social, and the

personal and the political intersect". Social practices such as events, leisure activities, and city

branding within a space helps us understand behavioral use patterns of space. Additionally, Jaffe

and Koning argue that people's leisure activities and their consumption of things reveal their

social identities. Similarly, the use of space and the activities that take place within it can

highlight a neighborhood's identity and its unique characteristics. Furthermore, Jaffe and Koning

explain that cities construct images and narratives via branding strategies that attract non-locals

to the area. Branding campaigns are one of the many ways that urban spaces can be transformed

into sites of consumption (Jaffe and Koning 2016, 94). Based on observations conducted in

Downtown San José, the City has its own branding strategy where streetlights have banners that

read "Belong," "Create," and "Enjoy," etc. Even in SOMA, San Francisco, streetlight banners

advertise events and activities taking place in the neighborhood.

Jaffe and Koning (2016, 94) provide an example of how the cities of Amsterdam and San

Francisco promote themselves as gay capitals via events and parades, and some neighborhoods

even utilize signposts and rainbow flags. Similarly, the city of Chicago installed rainbow-ringed

pylons in their Lakeview neighborhood to brand visually the district as a gay neighborhood (Reed 2002, 425). These activities are essentially a branding strategy to attract non-locals and to highlight a city/neighborhood's identity. Jaffe and Koning's examples identify consumption practices within neighborhoods to understand how neighborhoods portray their identity.

Since neighborhood events and activities are important social practices, I conducted observations at various neighborhood events to understand how people use their space around them. Moreover, these events and activities took place in and around vernacular spaces such as streets and street-adjacent spaces. I conducted observations at farmer's market and various street festivals in Downtown San José and Downtown Campbell. Most of these events were street closure events where streets were closed off to vehicular traffic. Street closure events were interesting to observe because they displayed the various ways people use and negotiate space around them. At Campbell's farmers market, some interviewees who drove to the event strategized their parking by either arriving early to the event or finding secret parking spots. Some pedestrians also brought their pets to the market, despite policy to the contrary. These events and activities bring a diverse group of people together. These events and activities bring diverse groups of people together, and therefore, make these vernacular spaces sites of conflict when utilizing the same space. For example, pedestrians and people who ride scooters have different needs and expectations when using common spaces such as sidewalks. This creates tension and conflict over space-use among these different types of space users.

Chapter 3. Methodological Toolkit

Methodology Overview

I began my fieldwork by selecting certain neighborhoods in San José, Campbell, and San Francisco. I chose certain streets within Downtown San José, Downtown Campbell, and South of Market (SOMA) in San Francisco. I chose these streets, based on their high levels of activity and diverse modes of mobility in the area. Like many urban streets, these are also vernacular spaces. After selecting the sites, I created a set of fieldwork methods to use across all three sites. This project took a mixed methods approach where the primary methods included observations of people's movements and the built environment, semi-structured interviews with different categories of space users, social media research, and conducting interviews with specialists with key knowledge in the urban planning and transportation fields. Research insights from these methodologies provided a lens into the cultural markers that make up a neighborhood. Specifically, they helped to identify the elements that go into the built form a neighborhood, the various ways people appropriate space, mobility experiences of different space users, people's differential access to space, and potential use cases for autonomous vehicle technologies. The different categories of space users in this research consisted of locals, tourists, and different types of road users such as bicyclists, car users, and pedestrians. Interviewing these different categories of space users enabled for a diverse sample that captured people's attachment place and their varied mobility experiences. The addition of demographic and commuter data makes this a mixed methods study.

Sampling Strategy

I used a cluster sampling strategy for conducting observations. In cluster sampling, the population is divided into clusters designated by certain characteristics (Salkind 2007). In this

scenario, a cluster sampling strategy was appropriate for conducting observations because I chose clusters of sites based on three characteristics – 1) location of site within the chosen cities, 2) the site's high activity levels, and 3) the site's close proximity to diverse modes of mobility options. Hence, I chose busy sites such as South of Market in San Francisco, Downtown San José, and Downtown Campbell. For SOMA, I selected 2nd Street (from Market St. to Folsom St.), a strip of Market St. (from 2nd street to 6th street), 3rd Street (from Market St. to Howard St.), and Mission Street (from 2nd street to 4th street).
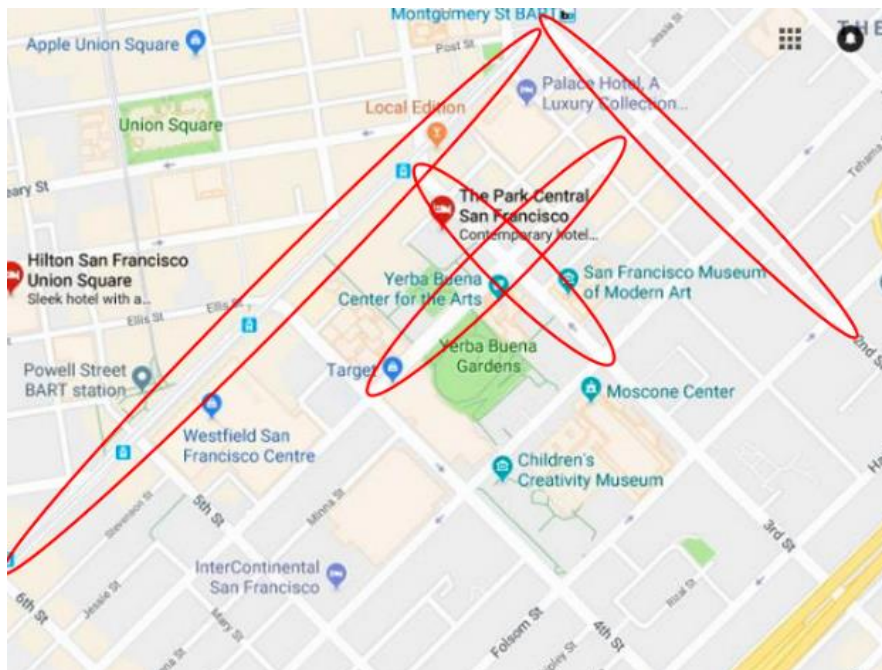
Figure 3: SOMA Fieldwork Map

For Downtown San José, I chose 1st street (from San Fernando to St. John Street), 2nd street (from San Fernando to St. John Street), E Santa Clara Street (from San Pedro street to 3rd street), and San Pedro Street (from St John Street to Santa Clara Street).
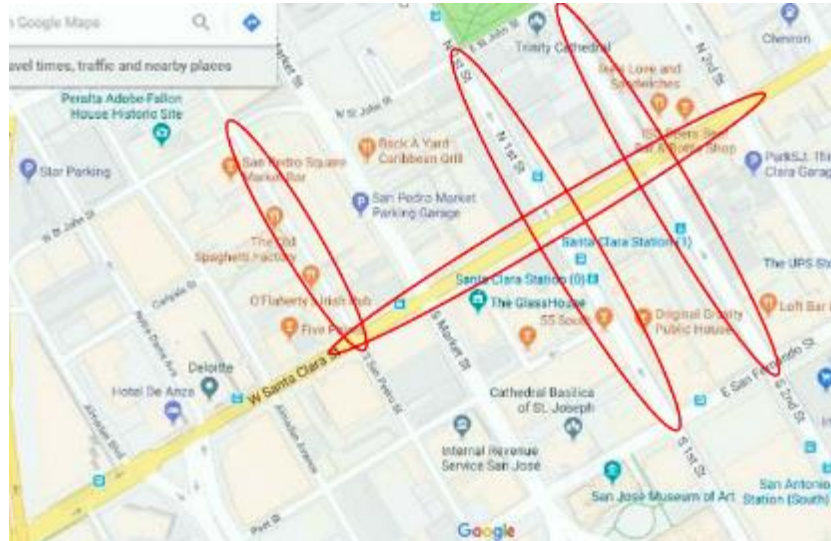
Figure 4: Downtown San José Fieldwork Map

In Downtown Campbell, I chose the downtown area bordered by Civic Center Drive and Orchard City Drive.
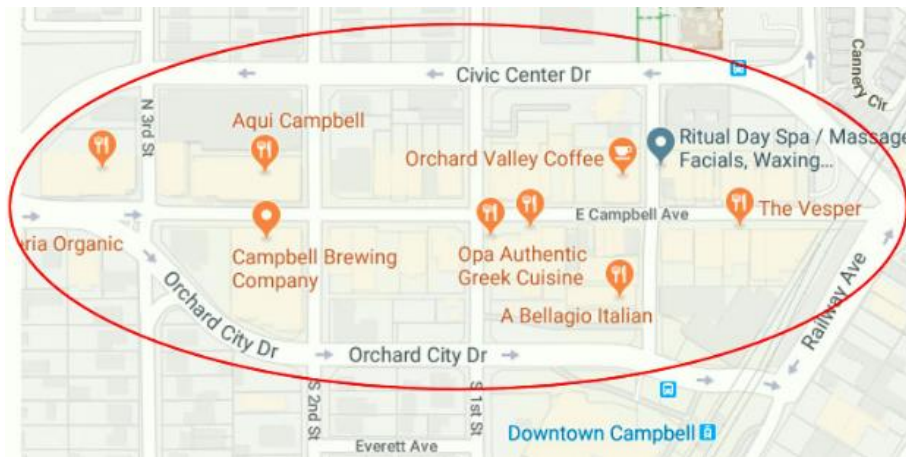
Figure 5: Downtown Campbell Fieldwork Map

The neighborhoods of SOMA and Downtown San José are both business and commercial districts in large cities, whereas Downtown Campbell is a walkable shopping and residential district in a suburban town, which includes different zoning types that would increase the diversity of the sample. At these locations, I observed different types of space users such as

27

pedestrians, bicyclists, skateboarders, and car users, etc. This sample helps us identify different behaviors of different space users in these neighborhoods.

I used a cluster sampling strategy for conducting semi-structured interviews, as these interviews were place and event based. I conducted semi-structured interviews with people that were present at the above-mentioned street locations, at neighborhood events, and other places of public gathering such as plazas, farmer's markets, and art walks. To minimize selection bias, I chose people to interview based on varied ages, genders, and ethnicities. The interviewee sample consisted of different groups of people such as commuters, residents, tourists, and other non-locals present at the site locations. I conducted approximately fifteen semi-structured interviews at each site. In the report, I use pseudonyms for these interviewees. I conducted the interviews between October and November.

By employing this sampling strategy, I was able to capture data relevant to different characteristics of neighborhoods as perceived by different categories of people, how they viewed their relationship to the place, and the different types of mobility experiences they've had within that space. Within these categories of people, I tried to capture a diverse sample of people who use different modes of mobility (for example, pedestrians, bicyclists, and other vehicle users). In SOMA, I conducted fifteen semi-structured interviews where four interviewees were bicyclists (three local residents and one local worker), two were skateboarders (local residents), and nine pedestrians (all local workers). I conducted the interviews on weekdays, weekends, and public places of gathering such as Mint Plaza and Yerba-Buena Gardens. In Downtown San José, I interviewed eleven locals, out which nine were pedestrians and two were bicyclists; the remaining four were non-locals/visitors who were car users. I conducted interviews during weekdays, weekends, and at a farmer's market in San Pedro Square. In Downtown Campbell, out

of the fifteen interviewees, four were non-locals and eleven were locals. Non-local interviewees were all car users, while local interviewees consisted of eight pedestrians, who were also car users, and three bicyclists. Once again, I conducted interviews during the weekdays, weekends, and at events such as farmer's market, the Campbell Art Walk, and Oktoberfest.

Additionally, I conducted semi-structured interviews with specialists in the fields of urban planning and transportation. I was able to gain access to city officials in the above mentioned fields through connections with Dr. Gordon Douglas, and students in the fall 2017 Introduction to Urban Design Course. When referring to specialists, I use pseudonyms and refer to their primary areas of expertise in their professional credentials. In Downtown San José, I conducted an interview with Michael who works for the San Jose Downtown Association. Michael has a background in urban design, urban planning, and is a San José State University alumnus from the Urban and Regional Planning Department. From the City of San José's Department of Transportation, I interviewed Jennifer, who deals with new emerging transportation technologies. Jennifer also has experience working with transportation technologies in the private sector. After conducting these interviews, Jennifer was kind enough to link me to other key figures in the field. With Jennifer's help, I was able to interview two officials, Alison and Andrew from the San Francisco Transportation Authority. Alison is one of the Principal Planners and has a background in sociology and the field of urban and regional planning. Andrew is one of the senior planners, who also has a background in urban design. The goal of conducting interviews with specialists from urban planning and transportation fields was to understand the formal version of what neighborhood identity looks like, and to get an overview for how officials plan for cities. Some specialists also discussed the process by which

street-level policy is enacted and enforced. Such processes would affect how autonomous vehicle technology might be integrated or be in conflict with local policies and practices.

Data Collection Methods

For this research project, I decided to take a mixed-methods approach consisting of five primary methods. While most methods are qualitative in nature, demographics and commuter data are quantitative. Below, I describe each method and state the reason for choosing the specific method.

Observations: In qualitative research, conducting observations is one the many common data collection methods (LeCompte and Schensul 2010, 143-144). The purpose of conducting observations is to record situations and meanings behind them (LeCompte and Schensul 2010, 144); observations can be focused on physical settings, events and activities, interactions between people, and behavioral patterns of groups of people (LeCompte and Schensul 2010, 144). I conducted observations in the above-mentioned neighborhoods and streets and focused on neighborhood events, public spaces of gatherings, and neighborhood streets. I based the observation criteria for these places on examples from previously mentioned ethnographic studies (Sorenson 2009; Lawrence-Zúñiga 2010; and Low 1992). I also focused my observations on urban design features (streetscape design elements) that urban planners think are important to the built form of the neighborhood. I captured observations of neighborhood events and streetscape design features within neighborhood via a DSLR camera and a field diary for analysis. The visual data and diary notes were helpful for identifying the various street characteristics.

Semi-Structured Interviews: Semi-structured interviews consist of structured open-ended questions that are asked to every individual in the interviewee sample (Schensul and LeCompte

2012, 171). One of the reasons why semi-structured interviews are conducted is to explore

themes and patterns of data from the interviewees (Schensul and LeCompte 2012, 172). I

conducted semi-structured interviews with different categories of people – locals, tourists,

vendors, and different types of road users (pedestrians, car users, and bicyclists). The goal of

these interviews was to explore people's attachment to place, their mobility experiences in the

area, and if/how, those people participate in place making practices. I conducted approximately

fifteen interviews in each neighborhood. Interviews were coded based on topics such as 1)

characteristics of space as expressed by the interviewee, 2) their familiarity/attachment to space,

and 3) preference for modes of mobility used within the space. I used a digital audio recorder to

capture people's responses, and interviews were manually coded. See Appendix A for interview

questions.

Interviews with Specialists: Key informants (also called expert witnesses) are people that have

specialized and extensive knowledge about certain topics and/or settings (G. Payne and J. Payne

2004). I refer to them as specialists. I conducted semi-structured interviews with specialists such

as city planners and transportation authorities of San José and San Francisco. The goals of the

interviews were to gain insight into local identifiers of a neighborhood, the mobility ecosystem

of the cities, and to understand the transportation needs of cities, and how cities might plan for

new emerging mobility options such as autonomous vehicles. Interviews with city officials and

planners gave an understanding of the various design elements that contribute to shaping what

De Certeau (1984) calls the *concept city* and Lefebvre's (1991) *representations of space*. The

interviews also lend a lens into potential use cases for autonomous vehicle technologies.

Interviews with specialists also proved to be beneficial since they helped triangulate findings on

the importance of urban design features such as streetlights, trees, and pavement, etc., and how these elements affect people's use of space.

Social Media Research: Social media research was inspired by digital ethnographic studies (Postill and Pink 2012; Murthy 2008) where researchers studied and gathered data from social networking sites to study social movements (Postill and Pink 2012) and online communities (Murthy 2008). For example, Postill and Pink (2012, 123-25) followed/tracked social media platforms (Facebook, Twitter, and YouTube) and microblogging sites, and gathered online content from these sites to research the use of social media in social movements and activism in Barcelona. For this particular research, I conducted social media research by looking at visual data from Facebook, Instagram, and Twitter. Data was tracked via "hashtags," @mentions, and geolocation tags from these social media websites. Hashtags (# symbol) and mentions are tags that accompany certain words and phrases in social media posts. These symbols categorize content based on the words and phrases that are self-tagged, making it easier for people to find specific content, and revealing their logic. Hashtags and mentions consisted of keywords that people might tag along with their social media posts that highlight street life and people's activities. An initial attempt to track this data was made via Keyhole, a hashtag tracking tool, and Brand24, which is a social media monitoring tool. These services did not provide the data I was looking for. Therefore, I made a list of "hashtags" and "@mentions" and manually entered them into the social media sites and tracked them individually. For Downtown San José, I used the following hashtags: #downtownsanjose, #downtownsj, #downtownsanjosestreets, #downtownsjstreets, and #downtownsanjoseactivites. For SOMA, I used #somasf, #sfsomastreets, #somastreets, and #sfsomaactivities. For downtown Campbell, I used #downtowncampbell, #donwtowncampbellstreets, and #downtowncampbellactivities. Data

collected from these hashtags was data that was publicly available. This data was helpful in identifying street users' various activities and how those activities create a sense of neighborhood identity. Examples of activities people engaged in included participating in street events, hanging out at parks, and taking pictures by murals and graffiti art.

SOMA walking tour: While conducting observations and interviews with participants in the SOMA neighborhood, I came across the SOMA walking tour hosted by Yerba Buena Community Benefit District and San Francisco City Guide. This turned out to be a great way to getting to know the neighborhood.

Photographs: While conducting observations, I took pictures of material cultural objects such as streetlights, benches, trees, and banners, etc. After conducting interviews with specialists and getting confirmation on how the above were indeed characteristics that make a neighborhood standout, I went back in the field to take more pictures.

Table 1 Method and sample population used to investigate specific research questions

Research Question	Sample Population	Methods
What are the Cultural Markers of a neighborhood? - Streetscape design elements, people's use of space/mobility behaviors, and vernacular landscapes.	Different categories of people using the neighborhood space (not including vulnerable populations such as children, elderly, and the homeless population) –commuters, residents, tourists, and people staying in the neighborhood for a short period.	• Walking around the neighborhood looking at street characteristics and urban infrastructure (gathering data on the artifacts and streetscape design elements). • Using observations and basic spatial analysis to track people's spatial movement through space and how it may be different throughout

		time (daytime vs. evening time).
		• Observing people's activities and their interactions with streets.
		• Social media research into people's activities in the neighborhood. Using geo-locational tags to see what people do at said locations.
		• Semi-structured interviews are conducted with people present at events/places of gathering within the three neighborhoods.
What are the powers of structures that define mobility? Identifying the different organizations that may be involved in the decision-making processes in terms of mobility.	Local government and transportation authorities Specialists in fields of urban planning and transportation.	• Semi-structured interviews with specialists.

Chapter 4. Marking Community and Streetscape Design Elements

This chapter consists of the subsections 'Community Profiles' and 'Streetscape Design Elements.' In 'Community Profile,' I shed light on how the chosen communities of Downtown San José, Downtown Campbell, and SOMA are distinctive in comparison with other communities in California and the United States in terms of socio-economic rankings and commuter data. These communities are wealthy and rank higher on the socio-economic scale. This data correlates to the streetscape design elements seen within neighborhoods. Through streetscape design, we are able to see various urban infrastructural elements that go into the built form of a neighborhood. In addition, the built form of the neighborhood displays the differing power structures that display democratic access to urban spaces. In the subsection 'Streetscape Design Elements,' I discuss the various urban design features that shape and characterize neighborhoods/cities; I also explain the layers of control and access that operate through these markers of space.

Community Profiles

The neighborhoods chosen for this research project – Downtown San José, SOMA San Francisco, and Downtown Campbell - are all in or near major city hubs in the Bay Area. Moreover, these neighborhoods have certain distinctive elements that set them apart from other neighborhoods in the Bay Area. For example, these neighborhoods rank higher on the socio-economic scale and have a high wellness score compared to other neighborhoods in the Bay Area. Below, I compare socio-economic demographics of the chosen sites to the socio-economic data from the State of California and the United States. Furthermore, it was helpful to look at the commuter data as it provides a lens into people's transportation choices. Similar to the socio-

economic demographics, I compare commuter data of Downtown San José, SOMA San Francisco, and Downtown Campbell to the overall commuter data of the United States.

For socioeconomic demographics and commuting data, I referred to the U.S. Census Bureau and looked at the census data by zip code for all fieldwork locations. The census data is based on the 5-year estimates from the American Community Survey (United States Census Bureau, n.d.) ranging from the year 2012 to 2016. For the United States, and California, the census data is from the year 2016.

Socio-Economic Demographics

Table 2 Median Household Income of Target Areas

Location	Median Household Income
United States	$55,322
California	$63,783
Downtown San José (zip code 95113)	$96,711
SOMA, SF (zip codes 94105, 94103)	$195,165 ; $46,140
Downtown Campbell (zip code 95008)	$102,556

Source: US Census Bureau Data: American Community Survey (2012-2016)

Table 3 Comparative Ethnic Composition of Target Areas

	Anglo American	African American	American Indian and Alaska Native	Asian	Pacific Islander	Other
U.S.	76.9%	13.3%	1.3%	5.7%	0.2%	2.6%
California	72.7%	6.5%	1.7%	14.8%	0.5%	3.8%
Downtown San José (95113)	49.8%	16.1%	0.0%	32.2%	0.0%	2.5%
SOMA SF (94105)	55.6%	0.0%	0.8%	44.1%	0.0%	2.3%

SOMA SF (94103)	49.8%	10.1%	2.6%	32.8%	0.7%	10.4%
Downtown Campbell (95008)	71.2%	4%	1.6%	22.3%	1.2%	5.7%

Source: US Census Bureau Data

From the census data, we can infer that Downtown San José, SOMA San Francisco, and Downtown Campbell rank higher on the socio-economic scale than other neighborhoods in California and the United States. These neighborhoods also have high concentrations of Anglo American and Asian ethnicities. Moreover, these neighborhoods did well on the well-being index from the Gallup-Healthways State of American Well-Being report (Gallup-Healthways 2017). To measure well-being, Gallup-Healthways (2017) used five domains - purpose, social, financial, physical, and community - to capture everyday experiences of people. The Gallup-Healthways report analyzed well-being across 189 communities in the country. San Francisco ranked in the highest quintile on the well-being index, and the City of San José fell in the second highest quintile for well-being. While the authors of well-being report did not mention the City of Campbell, we can infer from census data that this neighborhood would be potentially similar to San Francisco and San José regarding the well-being index based on its access to resources.

Commuter Data

For commuting data, I referred to the U.S. Census Bureau, the U.S. Bureau of Transportation Statistics, and the American Community survey (Unites States Census Bureau, n.d.).

Table 4 Comparison of Mobility Strategies in Target Areas

	Drive Alone	Public Transportation	Carpool	Walk	Work from Home	Other
United States	76.3%	5.1%	8.3%	2.7%	5%	2.6%
Downtown San José (95113)	62.6%	13.9%	1.4%	12.6%	4.7%	4.8%
SOMA, SF (94105)	25.1%	18.3%	3.8%	44.1%	4.8%	3.9%
SOMA, SF (94103)	20.2%	35.6%	4.1%	23.1%	5.7%	11.3%
Downtown Campbell (95008)	80.8%	3.1%	7.3%	1.6%	4.6%	2.6%

Source: American Community Survey (2012-2016); U.S. Bureau of Transportation Statistics

The table above shows some commonalities and differences in commuter data among the selected neighborhoods and the United States. For example, in SOMA (94103), the percentages of people that use public transportation and walk to work are higher than the percentages of people who drive alone. By way of contrast, Downtown San José, Downtown Campbell, and overall in the U.S., the percentage of people that drive alone is the highest. In a different part of SOMA (94105), the percentage of people who walk to work is the highest, followed by people who drive alone to work. While car usage is highest across the board, people in the SOMA neighborhood seem to use transit that is more public. It is also important to note that these statistics only apply to how people commute to work. Other data that I collected during

fieldwork indicated that people often used a mix of different modes of transportation depending on when and where they were travelling.

To conclude, socio-economic data and commuter data act as markers/characteristics of locality. Socio-economic data shows us how the chosen field sites are distinctive from other communities in the Bay Area based on socio-economic ranking; commuter data sheds light on part of the mobility ecosystem of the three neighborhoods and how they compare to commuter data in the United States.

Streetscape Design Elements

Streetscape design consists of various forms of urban infastructural elements present within a neighborhood. Some examples of streetscape design elements include trees, murals, streetlights, signage, and seating structures. These features contribute to making a community and promoting neighborhood identity and are part of the planning criteria in urban planning (Jacobs 2014; Gehl 2011; and interviews with specialists). In additions to these features, I identify mixed-used spaces within neighborhoods. Mixed-use spaces are a hybrid of residential, commercial, and business developments (Coupland 1997). Mixed usage is an important characteristic of a neighborhood because they are indicative of diversity of space and the different types of space users present within the space. A street with mixed-use spaces attracts more presence to the area, and therefore, helps toward building a community (Jacobs 2014, 207). Planners think that mixed-use spaces promote sustainable transportation by making neighborhoods walkable, public transit friendly, and reducing the need to use cars (Coupland 1997; EPA 2017). Moreover, mixed-use spaces can be indicative of how people might change their patterns of space-use as the type of land-use changes. For example, due to the concentration

and diversity of activities in a mixed-use development, there is a lesser need to travel, and thus, people rely less on the automobile (Coupland 1997, 3-4); this could enable increased pedestrian activity in the area. Due to the nature of mixed-use spaces, it is integral to identify such spaces in the study. Below, I discuss why certain form of streetscape design elements act as cultural markers of neighborhood and how they're indicative of democratic access to public spaces, followed by the representations of these markers as seen in each neighborhood.

Trees

Trees are an important urban design feature that are incorporated by planners and policy into cities and neighborhoods. According to Allan Jacobs (1995), a specialist in urban design theory, trees play an important role in separating the pedestrian realm from vehicles. By separating the pedestrian and vehicular realms, trees play a role in increasing safety for both users. Providing definition and framing the streets, trees also guide motorists in assessing the environment and affecting speed limits (Burden and Jackson 2006, 4). Other important qualities of trees include keeping the eyes engaged, providing shade for comfort, modulating the light, and most importantly, providing psychological comfort (Jacobs 1995, 284-91). These features are supposed to enhance walkability for pedestrians. While conducting observations, I often saw people spending time and hanging out around urban street trees.

While street trees have their benefits, they can still result in conflict among different space users (Loukaitou-Sideris and Ehrenfeucht 2009). For example, property owners of adjoining establishments have to pay for property damages caused by trees, and business owners might resent street trees that block their signage or reduce parking (Loukaitou-Sideris and Ehrenfeucht 2009, 193-194). Moreover, street trees also display systemic inequality (Loukaitou-

Sideris and Ehrenfeucht 2009; Wolch et al. 2014). Urban green spaces are usually located in wealthy neighborhoods, and people in these affluent/wealthy neighborhoods have more access to urban green spaces than others (Wolch et al. 2014). Socio-economic data shows that SOMA, Downtown San José, and Downtown Campbell are some of the wealthier neighborhoods in the Bay Area; and these neighborhoods have a few green urban spaces in their communities. Based on the observations that I conducted during fieldwork, while there was some homeless population in certain green spaces in Downtown San José and SOMA, it was rare to see homeless population in Downtown Campbell.

Murals

Murals are another form of streetscape design elements that affect the way people experience space. Michael, who works for the San Jose Downtown Association, explained that murals help to break the monotony of a person's routine. They also play a role in promoting civic engagement and neighborhood identity. For example, Michael mentions that when people stop by murals, and engage with the artists and other people around, actions such as observing, talking about the art, and taking pictures are a form of civic engagement that brings about civic pride. In SOMA and Downtown San José, I saw pedestrians spending time around murals and other wall art, and often taking pictures of the art. Additionally, Michael states that murals can also be used as navigational markers. Michael gives an example of how murals can be used to give directions to non-locals. Murals play a role in bringing more people and diversity to the space, and these forms of art expressions are more formal and of the sanctioned type. However, planners and policy makers consider other forms of art expressions such as graffiti and tags out of place and deviant (McAuliffe 2016, 451). Nonetheless, graffiti can be a spatial and political

practice about reclaiming and appropriating public spaces (Zieleniec 2016; McAuliffe 2016).

Graffiti is becoming a popular urban phenomenon that cities do recognize (Zieleniec 2016).

However, it is important to note that there are forms of graffiti that cities commission, and then

there are others ones that are unsanctioned and considered illegal (Zieleniec 2016; Vanderveen

and Eijk 2016). With the commodification and privatization of urban spaces, many have raised

questions about who can participate in the public realm, and who has the spatial rights to public

spaces (see Zieleniec 2016; McAuliffe 2016; Harvey 2012).

Streetlights

Streetlight features vary depending on the type of street. In my observations, I found that

walkable streets and streets with pedestrian traffic had streetlights that were shorter in length

compared to streetlights on main streets with heavy vehicular traffic, which had taller

streetlights. Taller streetlights were indicative of vehicle-dominated streets. Streetlights on

walkable streets and on main streets had varying design features. Further research showed that

San José, Campbell, and SOMA had a different type of design code for streetlights designed for

pedestrians – these are indicative of pedestrian pathways. On many occasions, I observed

streetlights that had signage and banners hanging on them; the signage and advertisements

displayed community events or messages about the community. These types of signage are a

branding and place-making strategy used by the city to promote neighborhood identity.

However, the identity projected is based on what the city deems to be the neighborhood's

identity. Not everyone gets a say in what banners and signage are installed in our everyday

landscapes. Hence, here is an aesthetic bias that is present within the urban infrastructure.

Sidewalks

Interviews with specialists revealed that different types of pavement are indicative of different types of spaces. One of the specialists, Michael, discussed how the type of pavement affects the way people consume space. For example, when a pavement type changes, one can subconsciously realize that they are stepping into a different space. Michael also mentioned that pavement patterns also allow one to notice when a property line goes from public to private. As for the width of sidewalks, wider sidewalks are indicative of pedestrian traffic in the area. Sidewalk and pavement are important markers because different types of mobility patterns can be observed among different space users. Additionally, different types of space users have different expectations from space. Therefore, the diversity of people using sidewalks have varying needs that makes sidewalks sites of conflict (Loukaitou-Sideris and Ehrenfeucht 2009). For example, fieldwork data showed that different space users such as pedestrians and skateboarders have competing needs when using sidewalks, which produces conflict. I further discuss sidewalks as sites of contested spaces in the 'Moving through Landscapes and Power' section. Lastly, I would like to note that while sidewalks are part of streetscape design elements, they are also a form of everyday functional vernacular landscape.

Seating Structures

Streetscape design elements also encompass seating structures such as benches or elevated concrete structures because they contribute to making a community. Seating structures help people stay on the streets, whether it is having a conversation with people, waiting for someone, or just hanging around – benches simply invite more presence to the area (Jacobs 2014, 300) and are another indicator of pedestrian activities. However, these seating structures

may not be welcoming to vulnerable populations such as the homeless. Sometimes, designers and might design benches to have multiple armrests that prevent the homeless from sleeping on them, or businesses might install studs or spikes on the outside pavement that prevent the homeless from occupying the space. Sometimes studs and spikes are also used as anti-skateboarding architecture to deter skateboarders from skateboarding (Licht 2017; The Guardian 2014). According to Mike Davis (1990), these forms of defensive architecture exclude certain space users from the public and are a strategy to reproduce social and economic divisions.

Features such as urban street trees, murals, streetlights, sidewalks, and seating structures are based on a City's design code. Local governments, urban planners, and architects make decisions regarding these design codes. Construction of the city through design codes and rules is an example of Lefebvre's (1991) *representations of space.* While these forms of streetscape design elements characterize a neighborhood and help build neighborhood identity, they display multiple layers of control that operate within the space, and showcase how they favor certain space user over others. Bourdieu's (1979) concept of *distinction* shows how tastes and aesthetics reflect higher or lower social status. The forms of streetscape design elements discussed in this study reflect social status and people's varied access to spaces. Sharon Zukin (1993) also states that urban architecture provides a lens into the various landscapes of power. The streetscape design elements observed in neighborhoods, while acting as cultural markers, also display forms of social inclusion and exclusion. In the following sections, I present the different forms of streetscape design elements observed at each field site.

Figure 6: Streets of Downtown San José

Figure 7: San Pedro Street

The streets of Downtown San José include many street trees and according to Michael,

they are one of downtown's biggest infrastructural assets. Michael mentioned that the purpose of

having street trees were to provide people visual comfort, shelter, and a sense of enclosure rather

45

than feeling exposed. Michael explained that the street trees helped to break wind, and the rows

of trees created a bubble that encourage people to meander and hang out, thus, creating a people

place. During fieldwork, I often saw pedestrians and bicyclists hanging out under the tree shades.

Michael mentioned that without the trees, downtown streets would feel very different. These

street trees add character to downtown streets such as First Street and Second Street, and are

some of the biggest assets of those streets. According to Michael, other parts of San José have

specimen trees that act as markers/identifiers of that area. First Street and parts of St. James Park

possess unique heritage trees. The purpose of planting certain types of heritage trees, according

to the City, is because it highlights community significance based on the history and uniqueness

of the tree (City of San José, n.d.).

Main streets such as E Santa Clara have taller streetlights, whereas walkable parts of

downtown such as First and Second Street have shorter streetlights. During fieldwork, I observed

taller streetlights on main streets with vehicular traffic, and the shorter streetlights displayed

pedestrian pathways. The streetlights on First and Second Street are officially called twin

pedestrian light fixtures (City of San José, 2017). These streetlights also have banners that

display events and/or attempt to project a "feel" of the neighborhood. For example, streetlights in

Downtown San José have banners such as "Love," "Create," and "Belong," followed by other

phrases. For example, the "Belong" banner has the phrase "I Belong in this Place."

Figure 8: Twin Pedestrian Light Fixture. Such streetlights also invoke a nostalgia for an imagined past and imagined space (personal conversation with Dr. Marco Meniketti, 2018).

Certain parts of Downtown San José consist of different types of pavement. For example, on First Street and Second Street, the pavement is granite. Michael from San Jose Downtown Association revealed that the goal of the expansive granite pavement was to highlight the influence of the street, which is very walkable. Observations conducted also revealed that First Street was one of the main pedestrian active streets compared to other streets such as Second Street and W Santa Clara Street. Another example of pavements displaying character of place is the pavement by the entrance of San Pedro Street. According to Michael, the pavement pattern and design, which I noted during fieldwork observations, are supposed to echo the nightlife in San Pedro Square Market.

Figure 9: Pavement Design at the entrance of San Pedro Square Market

Parts of downtown also consist of street art in the form of decorations and murals. Fountain Alley has a well-known mural called Phylum of the Free that depict a blend of nature and the technology of Silicon Valley (Herhold 2015). Fountain Alley also has street decorations that designers intend to invite more presence to the space. Further down First Street is a mural called the Panda Cafe and Bakery that highlights the restaurants and eateries across the street.

Figure 10: Panda Café and Bakery   Figure 11: Phylum of the Free

Parts of downtown, especially San Pedro Square Market has urban infrastructure that reflect the area's history. The entrance arch of San Pedro Square includes historical markers that are pictures of well-known people like Louis Pellier Carmel Castro Fallon. Louis Pellier, also known as the Prune King, introduced the French prune to the area, which later became a

dominant crop in Santa Clara Valley. Carmel Castro Fallon was an entrepreneur and wife of Thomas Fallon who was one of the earlier mayors of San José.

Figure 12: Louis Pellier

Figure 13: Carmel Castro Fallon

SOMA, SF

SOMA is a mixed-use district because it is a hybrid of residential, commercial, and business office spaces. Mixed-use spaces also include museums, parks, and alleyways. An interview with Alison, a Principal Planner at the San Francisco Transportation Authority, revealed that the community in West SOMA was interested in transforming alleys into mixed-use spaces. There have also been efforts in SOMA to make alleyways people-oriented spaces, and potentially transform certain alleys into non-motorized environment.

Another urban feature of SOMA that differentiates it from other neighborhoods in San Francisco is the block size. SOMA's block sizes are longer in length. Andrew, from the San Francisco Transportation Authority, explains that the length of the block contributes many details in the way people move around in that space. Andrew mentions that the right of way in SOMA is also very different from many streets in San Francisco - they are much wider. From a design and transportation standpoint, this provides a wealth of opportunities that are afforded in SOMA streets that are not necessarily afforded in other parts of the city. For example, the wider

streets allow the opportunity to have transit islands and bike lanes. In other parts of the city, this is not possible due to the lack of space.

Streets of SOMA were also lined with trees that bring character to streets bordered by tall buildings. I noticed the same trend in streetlights in SOMA as well - main streets with vehicular traffic had taller streetlights than the ones in pedestrian areas. These streetlights also boasted banners advertising museums in the area and various community events.

The history of the SOMA neighborhood is also reflected in some of its urban infrastructure. In the earlier days, the Irish and Filipino population social defined SOMA. However, after the 1906 earthquake and fire, urban renewal in the area pushed out these populations (SOMA walking tour, 2017). Urban renewal continued throughout the 1960s, and urban infrastructure in SOMA still contains the remnants of history. For example, commemorative plaques and historical sites in the neighborhood recognize the Filipino and Irish populations. Some neighborhood streets are also named after popular historical figures that were local to the area in the past. To summarize, the built form of SOMA – whether its streets, trees, or other urban infrastructure - characterizes the neighborhood and reflects the neighborhood's cultural identity. On the next page, there are pictures taken during fieldwork.

Mural by the new Mexican Museum construction site. The mural is also part of the one percent for art project. I saw people often spending time at this mural.

Figure 14: Mexican Museum Mural

The commemorative plaque of Dr. Jose P. Rizal is a historical marker that represents the Filipino population in the area.

Figure 15: Commemorative plaque of Dr. Jose P. Rizal

SOMA alley named after Ambrose Bierce, a popular journalist that resided in San Francisco in the 1800s.

Figure 16: Ambrose Bierce Alley

Urban street trees separating the pedestrian and vehicular realms. The building in the background also has an art sculpture on top – part of the one percent art program – that highlights the art culture in SOMA.

Figure 17: Urban street trees in SOMA

Downtown Campbell

Downtown Campbell is also characterized as a mixed-use space due to the presence of retail, residential buildings, and historic landmarks. It is a relatively dense area and attracts more presence and different types of space users. Pedestrians have a prominent presence in the area. Downtown Campbell also has many outdoor seating structures that invite more presence. Businesses and vendors own some seating structures while others are public benches with historical style of furnishing (City of Campbell, 2007). People also utilize other concrete structures for sitting.

Downtown Campbell is characterized by the presence of trees that are uniformly placed. Tree hang over most streets on both sides, effectively separating the pedestrian and vehicular realms. Other physical elements that stand out in Downtown Campbell are the uniform streetlights that are indicative of pedestrian pathways. Hanging banners adorn downtown Campbell's streetlights. These banners often advertised events and/or communicated to visitors that it was a community-based and family friendly neighborhood. During the festive season, the city decorates streetlights and trees. Decorative streetlights and trees are also indicative of a walkable neighborhood with pedestrian traffic. Street-side realtors in Downtown Campbell also participated in this ritual by installing color-coordinated balloons on their storefronts. These are essentially a form of branding and place-making strategy employed by members of the community.

Figure 18: Campbell street trees separating the vehicular and pedestrian realms

Figure 19: Pedestrian streetlight with banner

Figure 20: Streets closed to vehicular traffic for farmer's market

To summarize, various forms of streetscape design elements like street trees, streetlights, sidewalks, etc. affect people's urban consumption of space, invite presence, and help form community identity. During my interview with Michael, who works as a street life manager in Downtown San José and has specialized knowledge in urban planning explains that the goal of urban design is to influence people's behaviors and maximize their experiences. Therefore, urban design features, especially the ones discussed above, are important because they affect how people perceive and move around in the area. Michael mentioned that streets are corridors between destinations, and their design affects mobility behaviors such as a person's walking pace, the routes they take, and the modes of transportation they prefer to take. Therefore, I categorized streetscape design/urban infrastructural elements as cultural markers because they shape people's experiences and help form community identity. These markers also highlight forms of inclusion and exclusion through the built form of the neighborhood and display how conflict and control play out in urban spaces.

Chapter 5. Moving through Landscapes and Power

In this chapter, I describe the other two forms of cultural markers of space – mobility behaviors and vernacular landscapes. Mobility behaviors provide insights into the actual lived space of different space users. The behaviors illustrate how they appropriate space around the built form. Fieldwork data on mobility behaviors displayed patterns of behaviors such as people using mixed modes of transportation and the contestation over space-use among different space users. Vernacular landscapes reflect community identity and help us understand the sporadic use of space in our everyday landscapes. Insights on vernacular landscapes displayed the various layers of control that various space users have over ordinary spaces. Below, I discuss these cultural markers in detail, and describe how power and control operate within these markers. Lastly, I identify other formal power structures that are responsible for making decisions related to urban space and mobility; these would be potential collaboration partners or stakeholders for autonomous vehicle companies.

Mobility Behaviors

One way people mark cultural space is through their behaviors. This section delves into the patterns of consumption practices regarding the various modes of transportation and the contestation over space-use among various space users. These are important because 1) they help explain why people choose certain modes of transportation, and 2) the ways people use space displays the layers of control and conflict that operate within the space. Additionally, I describe how people negotiate their spatial rights on streets, sidewalks, and roadways. Fran Tonkiss (2005) explains that politics often unfold in space, and urban spaces are sites of conflict and control. Public spaces such as plazas, streets, sidewalks, etc. are sites where people exercise their

spatial rights and negotiate other's spatial claims (Tonkiss 2005, 59). Data collected during fieldwork reflected different types of conflict of space-use between different types of vehicles on roadways, as well as between different types of space users using sidewalks. Below, I discuss the patterns of mobility behaviors observed at each field site, and present how contestation over space-use can create unpredictability; and give way to the illegible patterns of movement in the rational order of the city, as De Certeau (1984) describes it.

Downtown San José

Downtown San José has a diverse mobility ecosystem. This ecosystem consists of various forms of public transportation, taxi and ride-sharing services, car users, bicyclists, bike-sharing services, and other vehicular users. From interviewee data, it was clear that while most interviewees had one preference, most of them often used multiple forms of transportation. This was a similar theme in SOMA and Downtown Campbell.

Mixed Modes of Transportation:

Locals that used public transit for travelling within the city switched to ride-sharing services such as Uber or Lyft for travelling outside the city or going to the airport. One of the bicyclists, Ben, made use of public transportation in conjunction with their bike to get around. Another bicyclist, Jay, mentioned how he uses his friend's car while travelling after dark because he felt unsafe. Jay says, "I mostly ride my bike around town. But if it is later in the evening, I will borrow my buddy's car to get around or do chores… there is so much crime in the area, I do not feel safe, so I have to borrow my buddy's car." Another interviewee, Lisa, states, "I live close by, so I walk and use the light rail if I want to go somewhere in the area. Otherwise, I use

my car to drive to work… The light rail is not practical, but public transportation is needed. It is an important service to have. At least for me."

Overall, at least half of the interviewees liked the availability of multiple modes of transportation, whether it was public transit such as the VTA, Caltrain or ridesharing services available to them. However, three interviewees exclusively preferred to use their cars to get around. Driving their car was a way for them to relax and wind down. Some stated their preference for driving their own cars because it gave them a sense of freedom and agency. When autonomous vehicles are deployed on a large scale, there will always be a mix of people who drive cars as hobbies. From this data, we can infer that while some people might prefer and use a single mode of transportation, more people are starting to use a combination of multiple modes of transportation to meet their needs. This theme was constant across all of the fieldwork sites.

Contested Space-Use:

On conflict over space-use, one of the main concerns of some locals was the lack of safety on sidewalks. Five San José locals complained how people would use sidewalk space to ride their bikes, skateboards, and scooters. Emily, states, "All these youngsters keep riding their bikes on the sidewalks. Then there are the skateboarders. Our sidewalks have become roadways." For one bicycle user, he mentioned that he did not like sharing bike lanes with skateboarders and people using scooters. According to two bicyclists, some factors that added to this concern were the presence of narrow bike lanes, and the lack of bike lanes in some areas altogether.

SOMA

Mixed Modes of Transportation:

Similar to San José, nine interviewees in SOMA used a mix of transportation options – and public transportation services such as the MUNI Metro System and the BART trains were a main part of it. Although three of the interviewees described public transportation such as MUNI unreliable, they still relied on it as a mode of transportation to get around the city. Jake mentioned, "I use the MUNI, and sometimes BART. The MUNI is never on time. There is so much traffic here. But what can one do. I have to use it… Driving around here is stressful." Seven interviewees in SOMA liked the low cost of public transportation and favored the tradeoff between time and money. Overall, the use of public transportation was high among the interviewees and this correlates with the commuter data that shows high percentage of public transportation use when compared to transit use in San José, Campbell, California, and the United States.

Residents who were bike owners stated that they preferred to use BART, MUNI, and ride sharing services such as Uber and Lyft during the evening times due to rush hour traffic and road safety. One of the bike users also admitted to using the wider sidewalks to ride their bike because they felt vulnerable on busy streets such as Market Street and 3rd Street. Some residents who used skateboards as their main mode of transportation complained that there were too many restrictions for skateboarders in the city. Thus, they opted for public transportation at certain times and/or used ridesharing services when they needed travel long distances in the city. Moreover, when wanting to travel outside the city for vacation or road trips, some residents preferred using Zip Car, which is a car-sharing service. Lastly, some interviewees mentioned that they would prefer not to own and/or drive a car in SOMA due to its heavy traffic. Data on traffic

congestion from INRX, a transportation analytics company, San Francisco ranks as the third

most congested city in the United States, and the fifth most congested city in the world (INRX,

2017). One of the interviewees mentioned how constant construction and detours also add onto

the already existing traffic in the neighborhood. Similar to scenarios we saw in Downtown San

José, people in SOMA also used mixed modes of transportation depending on occasion, location,

and time of travel.

Contested Space-Use:

SOMA experiences different forms of conflict – there is competition between local and

regional traffic, there is contestation for space at street crossings between pedestrians and

vehicles, and between multiple space users on sidewalks. Alison, from SFCTA, explained that

SOMA consisted of many freeway on and off-ramps in the neighborhood, and so, SOMA bared

the brunt of a lot of freeway traffic. In addition to coming off the ramp and going onto the

freeway ramps, there is also traffic that's not usually destined for SOMA - there is a lot of pass-

through traffic heading downtown or to the west side of the city. Hence, according to Alison,

there is always local and regional traffic that is competing.

SOMA streets have heavy pedestrian and vehicular traffic during most times of the day,

and especially during peak rush hour times. While pedestrians dominate sidewalks, vehicular

traffic defines main roads. There is tension between both space users, and both try to negotiate

their spatial rights, especially, when they meet at street crossings. For example, vehicle users try

to speed through yellow lights and often end up blocking the pedestrian crossing. Many vehicles

also try making quick turns before pedestrian start walking to avoid delays. However,

pedestrians get frustrated, end up breaking rules and can be seen jaywalking.

I observed another example of conflict between space users on the roads and sidewalks Mission Street. Mission Street was quite chaotic in terms of pedestrian and vehicular traffic. Unlike other major streets that were wide, Mission Street is quite narrow. Due to lack of space on streets and sidewalks, often times, I saw cars using bus lanes, and bike users and skateboarders using the sidewalks. A person using roller skates bumped into a pole to avoid running into a pedestrian. What we can learn from these examples is that when different space users try to negotiate each other's spatial rights, it can create unpredictability and chaos.

Downtown Campbell

Downtown Campbell is a pedestrian dominated area. The built form of the neighborhood also reinforces pedestrian activity. Prominent pedestrian space users seen in Downtown Campbell consist of families with children, young adults, the elderly, and many pet owners. In addition to pedestrians, other vehicular users consisted of car drivers, bicyclist, and people utilizing strollers for their children.

Mixed Modes of Transportation:

Interviewee data showed that many people were car owners, and some exclusively used their cars and/or used ridesharing services like Uber. Dave states, "We [he and his wife] both use cars a lot around here. It feels like the only choice we have getting around. I know there is light rail here, but it is either a car or Uber." Specifically, in Downtown Campbell, many interviewees walked everywhere. Downtown Campbell is small, which makes it easy to walk everywhere. Other interviewees, who owned cars and bikes, utilized their bikes on weekends, especially during road closure events. As for public transportation, many locals and non-locals brought up

how inefficient public transportation was in Downtown Campbell. Non-locals, who visited the area often, mentioned that Campbell could use better and more accessible public transportation. Margaret states: "Public transportation in Downtown Campbell is not as accessible as San José or San Francisco. When I travel alone, I use public transportation, but when I visit my family here in Campbell, I travel by car… Downtown Campbell could use more public transportation." There is a connection between location and convenient access to public transit and the commuter data that shows how public transportation is used less in Campbell.

Contested Space-Use:

I observed tension between cars and pedestrians. Four pedestrians that I interviewed were parents, and they cited that the city should lower speed limits for cars to make downtown safer and more walkable. Pedestrians thought sidewalks were unsafe at times because of the bicyclists riding on them. Bicyclists I interviewed often mentioned the lack of bike lanes in the area. They also discussed how they felt unsafe riding bikes in the narrow, and at times, congested streets alongside other vehicles. As for car owners, a couple of them complained about the lack of parking, especially during road closure events. Chris mentioned how he has secret parking spots, and another interviewee, Josh explained how he coordinates his visit to Downtown Campbell only when he thinks he is going to get parking, or when he can park at the library after it is closed. Different space users utilize downtown Campbell, however, it does not appear to accommodate all types of space users.

To summarize, we have a diversity of space users that occupy everyday roadways and streets. Different space users have different needs, and when their needs are not met, they find different ways to appropriate space according to their specific needs. One of the ways people

negotiate their spatial claims and communicate with other space users is through bodily gestures such as head nods and hand gestures. Thus, it is important for autonomous vehicle companies to anticipate the various factors that make mobility patterns unpredictable, and understand how people negotiate their spatial claims.

Vernacular Landscapes and Power Structures

Earlier, we saw how city planners and urban designers design various elements of a neighborhood that determine its make-up and how different types of space users appropriate the space. However, not everyone gets a say in how their space is built, and not everyone has the same democratic access to space. We can see how groups of people might appropriate the space around them by noting how access to space is differential, and identifying how space users might be excluded in the construction of their neighborhood. Space users who are not represented in the decision-making processes may include members of marginalized populations, street vendors, renters, and non-locals such as tourists or workers who frequently visit the area.

Lawrence-Zúñiga (2010) looks at consumption practices among homeowners in southern California who display their identity and lifestyle. One of the insights from that study was that homeowner preservationists practice exclusionary aesthetic tactics. Locals, such as low-income ethnic resident, were concerned that the design guidelines and codes favored the aesthetic tastes of community members that had "differential access to cultural capital" (Lawrence-Zúñiga 2010). A similar concern applies to the built neighborhood – different people have different levels of access to spaces. However, according to David Harvey (2012), the right to the city is not just about access, but the right to transform it, and being able to live in it. He describes urbanization as a class phenomenon where certain space users are left out from having the power

63

to decide how their neighborhood is constructed. So, who has the rights to the city, and what kinds of rights do different people have?

Access to the ordinary spaces of everyday life illuminate the differential access to power. Vernacular landscapes are a good place to explore these multiple layers of control that people have over spaces. Vernacular landscapes are important to this study because they act as cultural markers of a neighborhood. Below, I discuss in detail why vernacular landscapes act as cultural markers and how the dynamic nature of vernacular landscapes makes them important for this study. Moreover, I explore how various forms of tactical urbanism make vernacular landscapes dynamic and display the layers of control that people have over space. *Tactical Urbanism* consists of short-term and scalable interventions aimed at improving the built form of a neighborhood or a city (Lydon, Garcia, and Duany 2015). Examples of tactical urbanism include parklets, open streets, and guerrilla gardening, to name a few. These forms of tactical urbanism take place within and/or around typical vernacular landscapes.

Vernacular landscapes consist of a variety of ordinary and everyday landscapes (Alanen 2000). They are evolved through human activities (Birnbaum 1994); and represent the built and social environment (Krase and Shortell 2011). Some examples of these ordinary and functional landscapes include parks, streets, roadways, and sidewalks. Vernacular landscapes also highlight place-making strategies that take place within these landscapes, and how neighborhood display their identities. They are an important form of the public realm that allow people to congregate in a space and interact with each other, and as a result, build a community. Vernacular landscapes also encompass historical landscapes and ethnic centers. Here, ethnic center refers to a cultural district. Historical landscapes and ethnic centers play an important role in reflecting community character and displaying the different activities that take place in the community.

Both Downtown Campbell and SOMA are sites of vernacular historical landscapes that highlight their respective community character. An example of a historical vernacular site in SOMA includes St. Patrick's Church, which was built by previous Irish residents who were pushed out by urban renewal. In Downtown Campbell, there are historic buildings and historic furnishings throughout the neighborhood. Some of the historic buildings include the Farley Building, the Campbell Chamber of Commerce, the Ainsley House, and the water tower. Downtown Campbell's sidewalks also have commemorative plaques reflecting the neighborhood's history and identity. As for ethnic centers, SOMA consists of a Filipino cultural district, and through community events and efforts, they try to preserve the cultural identity of the neighborhood, and prevent displacement of Filipino locals (Soma Pilipinas, n.d.). They do this via community events such as the night market, community story workshops, and other community events. SOMA identifies as an art district. Section 429 from the planning code requires new private development projects in parts of Downtown San Francisco, including SOMA, to delegate one percent of their construction costs to public art. Hence, many businesses and hotels in the neighborhood consist of a wide variety of public art. This planning department oversees this program. The above examples demonstrate the role vernacular landscapes play in highlighting historical stories and displaying community character and identity. Hence, I classify them as cultural markers of space.

Some vernacular landscapes have predictable land-use, while some have unpredictable land-use. Examples of vernacular landscapes with predictable use of space include parks, plazas, museums, historical landmarks, and mixed-use spaces. Other forms of vernacular landscapes, especially streets and street adjacent spaces, can be dynamic in nature. Events and activities appear sporadically, and their land use is less predictable and less amenable to overt design

practices. Example of events and activities that make vernacular landscapes such as streets and street-adjacent spaces intermittent include open streets, parking day, and parklets. Open streets refer to programs that temporarily close roads to automobiles, and open the streets to the public to use for a variety of activities such as walking, biking, jogging, and socializing etc. (Lydon et al. 2012).

The goal of open streets is to encourage social interactions and let people experience the public realm; they are tools for building social and political capital (Lydon et al. 2012, 11), which builds onto to a neighborhood's identity. City departments, politicians, advocates, and non-profits initiate open streets, a sanctioned type of tactical urbanism (Lydon 2012). Parking day, also a form of tactical urbanism, consists of converting street parking into park like places (Lydon 2012, 12), and has the same goal of building an environment where people can socialize. Non-profits, community groups, and/or residents could initiate and promote parking days. However, parking days could also be sporadic if a group of people decides to take over parking space by filling up meters. Events such as parking day can be both predictable and unpredictable, while open street events fall more on the predictable side.

Parklets consist of converting curbside parking into public seating and vibrant community spaces where people can hang out (NACTO, 2013). In San Francisco, parklets are a collaborative initiative between the Mayor's office, SFMTA, the Planning Department, and the Department of Public Works (Lydon 2012, 20). At times, businesses sponsor parklets but they are meant for public use. However, parklets may not always be inviting to vulnerable populations such as the homeless. Students from San José State University's anthropology department researched how street parking alternatives such as parklets influenced the surrounding community in Downtown San José. Their research on parklets revealed that a few business

owners that had the parklets in front of their business preferred the parklets to be used by paying customers only. One of the business owners also mentioned that the parklets were "designed to be comfortable, but not too comfortable" (Greger et al. 2017). Again, this brings up the question of who has the rights to be in a public space. Open streets, parking day, and parklets are forms of tactical urbanism that are indicative of contestation over public space and act as place-making strategies. One of the goal of these place-making strategies is to create, sustain, and preserve the public realms from automobiles. Other pop-up events and activities that may interfere with vehicular road use include farmer's market, art walks, and marches/protests. I observed all of these sporadic events in all of the three field sites. All these examples show us how vernacular landscapes such as streets and street adjacent spaces can be non-enduring. Therefore, when designing autonomous vehicle technology, companies have to take factor in the nature of these non-enduring and ever-changing landscapes.

Figure 19 puts into context the wide variety of events and activities that make vernacular landscapes so dynamic. I created the following diagram that categorizes activities in four quadrants - 1) Predictable Land-Use and Sanctioned Land-Use, 2) Predictable Land-Use and Un-Sanctioned Land-Use, 3) Sanctioned Land-Use and Unpredictable Land-Use, and 4) Unpredictable Land-Use and Unsanctioned-Land-Use. I collected data on events and activities that had sanctioned and unsanctioned land-use from Lydon et al. (2012). Then, I created the following quadrants by adding a dimension of predictable and unpredictable land-use, based on my interviews with specialists, and situated these events and activities accordingly.
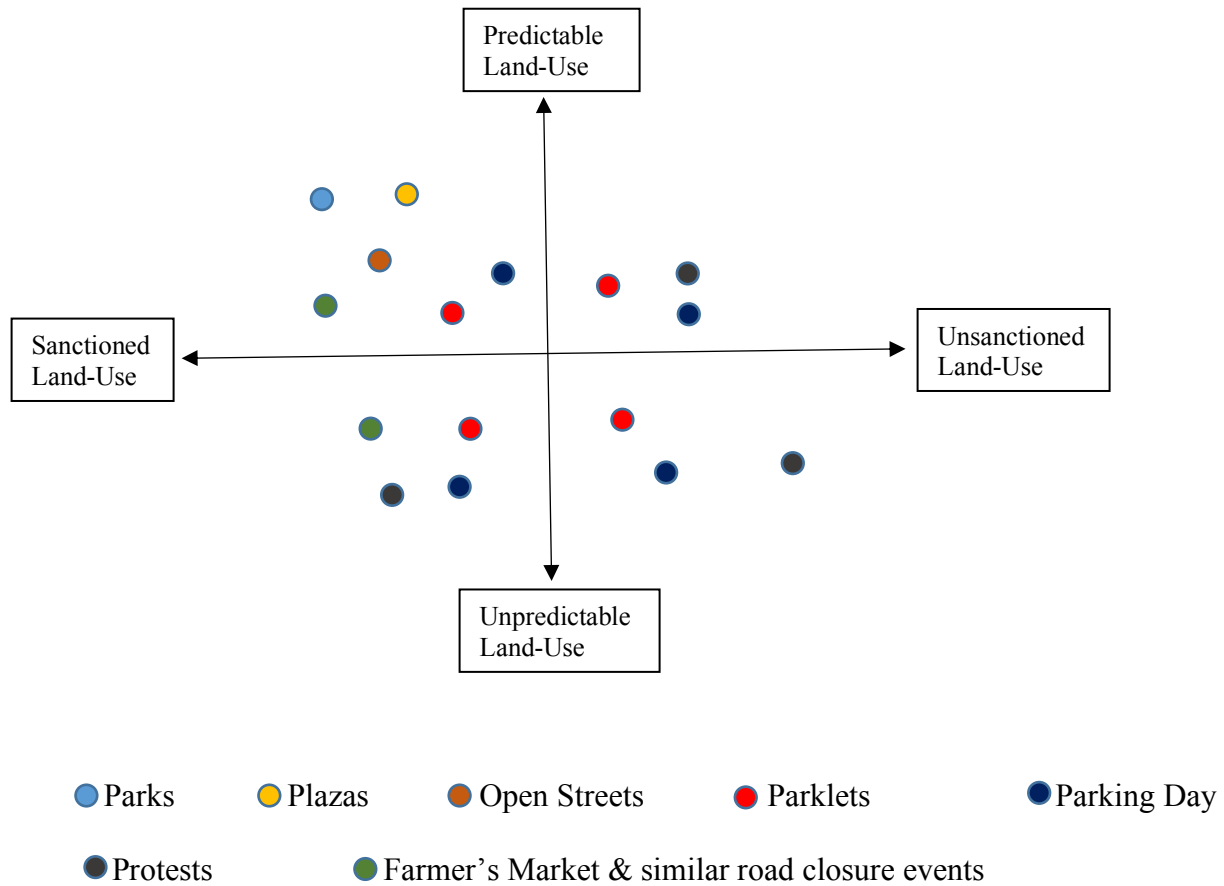
Figure 21 Events that Make Vernacular Landscapes Dynamic

One of the key conflicts Dr. Melissa Cefkin asked that I clarify is how urban planners might approach streetscapes in contrast to how users might configure that same space. To illustrate that approach, in addition to identifying the sporadic use of vernacular landscapes, I use a case study to understand how cities can sanction sporadic street events that interfere with vehicular street use. As an example, I created the following journey map that highlights how special events in San Francisco get street closure permits. In the special street events category, the city of San Francisco includes farmers market, street fairs, private, and commercial events, etc. (SFMTA, n.d.). This journey map referred to the data listed on SFMTA's website. The diagram below also highlights the different stakeholders involved during various stages.

	Phase 1	Phase 2	Phase 3	Phase 4
People	Applicant	SFMTA	ISCOTT Committee (members from SFMTA, SFPD, SFPW, SFDPH, SFFD, Entertainment Commission, Port of SF), Applicant, and the Public.	ISCOTT Committee
Actions	Apply for Temporary Street Closure Application on the SFMTA website	Review application and provide feedback. Additional permits maybe required.	Final hearing & review where applicant answers questions from the committee. The public also gets to comment on it.	Approves or denies the event.

Figure 22 Journey map of how sporadic streets events get sanctioned
Source: sfmta.com

*Abbreviations:

ISCOTT: Interdepartmental Staff Committee on Traffic and Transportation
SFMTA: San Francisco Metro Transportation Agency
SFPDA: San Francisco Police Department
SFPW: San Francisco Public Works
SFDPH: San Francisco Department of Public Health
SFFD: San Francisco Fire Department

An applicant has to apply for a Special Events Street Closure Permit on the SFMTA

website at least thirty days before the street closure event. For events such as street fairs, the

applicant has to apply for the permit at least ninety days before the street closure event takes

place. After the application has been submitted, the SFMTA reviews the application and

provides any necessary feedback, including whether the applicant requires additional permits.

After the review, a public hearing is held by the Interdepartmental Staff Committee on Traffic

and Transportation (ISCOTT). The ISCOTT committee consists of members from the San Francisco Metro Transportation Agency, San Francisco Police Department, San Francisco Public Works, San Francisco Department of Public Health, and the San Francisco Fire Department. In this public hearing, the applicant first provides a brief summary of their event, and answers any questions the ISCOTT committee may have. Later, the public gets a chance to comment on the case. After all parties have had a discussion, the ISCOTT committee votes on whether to approve the event.

While Figure 19 demonstrates the dynamic nature of these vernacular landscapes, Figure 20 shows us the process by which cities approve street closure events. Vernacular landscapes are relevant to this study because autonomous vehicles will operate within certain types of vernacular landscapes such as roadways, streets, and street-side spaces. What this means for companies designing for autonomous vehicles and cities designing spaces for autonomous vehicles is the need to account for the sporadic use of these vernacular landscapes. Insights from our pilot study also revealed the need for autonomous vehicles to adapt to these types of vernacular landscapes due to irregular activities and their inconsistent use of space. This dynamic nature of vernacular landscapes limits the more common use of streets, street adjacent spaces, and even parking. Additionally, for navigational purposes, vernacular landscapes can also act as data points when mapping neighborhood and neighborhood activities.

Identifying Stakeholders

When making decisions regarding space and mobility, different entities are involved in the process. These mainly include people from various fields and departments such as urban planning, transportation department, city local governments, regional coalitions, residents, neighborhood associations, and federal governments, to name a few. Below, I further discuss the

different types of power structures constituted within the three neighborhoods chosen for this study. By identifying these power structures, I provide insights into potential collaboration opportunities between AV companies and other stakeholders. To facilitate a smooth transition of autonomous vehicles into our ecosystem, AV technology companies and other stakeholders from various fields need to work together and engage in meaningful discourse. Later, I provide an example of a case study that shows how engaging in meaningful discourses with people from different fields can help mitigate future challenges.

In this scenario, working with transportation departments would be helpful to understand how this new form of transportation could be incorporated within the transportation infrastructure. Working with city planners and local governments can help determine how autonomous vehicle technology would affect land-use policies, zoning, and redesigning space when needed. When experts from different fields come together, it can make it easier to arrive at solutions and mitigate challenges. For each field site, I identified different types of institutions/stakeholders with which autonomous vehicle companies could potentially collaborate. Furthermore, we can gain a better understanding of the multiple layers of control that different entities have when making important decisions regarding urban space and mobility.

In SOMA, some important institutions that play a role in urban planning and transportation include the Planning Department, City Design Group, San Francisco Municipal Transportation Agency (SFMTA), and San Francisco County Transportation Authority. The planning department oversees development, land use, environmental policies, and zoning policies. The City Design Group, which is part of the planning department, is responsible for urban design that enhances the public realm. The SFMTA oversees all ground transportation in San Francisco, while the SFCTA, a transportation planning agency, is responsible for locally

regulated transportation services (for example, bike share services), street safety, and managing street congestion, etc.

Specifically, in regard to emerging technology such as autonomous vehicles, Andrew, from SFCTA, explained issues that would be regulated by different levels of government: federally, locally, and at state-level. For example, autonomous vehicles are licensing their operations/testing with the state. The federal government would be potentially involved in the future regarding policies, liabilities, funding, and decisions on the urban infrastructure, etc. Currently, the National Highway Traffic Safety Administration (NHTSA), a federal agency, regulates motor vehicle safety and highway safety (NHTSA 2018). The NHTSA also provides funds to states so they can address their safety problems (NHTSA 2018). In San Francisco, at the local level, the Transportation Authority is responsible for roadway laws that are in place and making sure these laws are translated into appropriate regulations.

When it comes to mobility services such as Uber and Lyft, the state level is involved. However, even within the state, various departments involved have their own regulations and policies. For services such as Uber, Lyft, and commercial driving in general, the department of transportation, Caltrans, and the DMV are involved. The California Public Utilities Commission also plays many different roles, but mostly on the consumer side of things. Andrew mentioned that while the SFCTA do not really have authority over companies such as Uber and Lyft, they have control over the right of way. For example, if SFCTA wanted to designate more roads to be transit only streets or transit and bike only streets that is within their authority.

In addition to the different categories of authorities involved, outreach efforts from the SFCTA helps identify the public's needs. Board members might get community requests to do research studies or design an outreach program that addresses their concerns. The SFCTA also

collaborates with various neighborhood organizations. These organizations represent the residents and the businesses in the neighborhood. Private agencies also develop large-scale studies that take input from communities. Some of the large projects have established committees such as the Citizen Advisory Committee or the Business Advisory Committee. SFCTA also conducts workshops to get feedback from the community. The SFCTA has found it helpful in collaborating with numerous agencies, companies, and businesses when working on large projects.

In Downtown San José, some of the important power structures for urban design and transportation are the Department of Transportation and the Planning Division. The Department of Transportation is responsible for transportation services related to the transportation ecosystem of San José. One of its goals is to promote safe travel in the city by mass transit, walking, and biking. For the Planning Division, some important issues they deal with are zoning, land-use policies, environmental policies, and historic preservation, among others. According to interviews with specialists, neighborhood associations also play a significant role in decision-making. Specifically, for the downtown area, some neighborhood associations include San Jose Downtown Association, a non-profit, and San Jose Downtown Residents Association.

Focusing on mobility options, Jennifer, who is the Innovation Program Manager at the Department of Transportation in San José, was helpful in listing some important organizations that have greater influence in projects and policies. For larger projects that involve large infrastructural reconfigurations/improvements, organizations involved included the Department of Transportation, the Santa Clara Valley Transit Authority who are transit operators, the City Council, the Mayor, the Silicon Valley Leadership group that represent the business stakeholders, Santa Clara County, Caltrans, and the Office of Economic Development. Jennifer

mentioned that the residents' voices are also taken into account as the plans are in development. Jennifer further mentioned that communities hosted town hall meetings with the department and council members to discuss project ideas and identify support for the ideas, and answer questions from the constituents. City Council meetings are also held where the public is invited to voice their concerns and/or show support for various initiatives.

In Downtown Campbell, further research showed the planning division, historic preservation board, and neighborhood associations were prominent groups that have authority over issues such as zoning, preserving landscapes, and advocating for community issues respectively. The planning division of Campbell deals with land use, zoning, and economic development of the city. The historic preservation board is responsible for maintaining and preserving historic landmarks and structures in downtown. Downtown Campbell also has its own neighborhood associations called the Downtown Campbell Neighborhood Association that advocates for the community's residents.

The greater San Francisco Bay Area also has regional constituencies that are responsible for transportation and urban planning decisions. The Metropolitan Transportation Commission (MTC) is an agency that is responsible for programs and services related to transportation planning, financing, and land-use for the nine counties in the San Francisco Bay Area (Metropolitan Transportation Commission, 2018). The MTC also works with a bigger coalition known as the Bay Area Regional Collaborative that helps regulate planning efforts of the MTC with other agencies such as Association of Bay Area Governments, Bay Area Air Quality Management District, and the Bay Area Conservation and Development Commission (Metropolitan Transportation Commission, 2018).

Autonomous vehicle companies working with different stakeholders would help anticipate potential obstacles. The following case study on parking reform in San Francisco illustrates how certain regulation implemented to meet parking demands had negative consequences on cities. By working with a variety of stakeholders, autonomous vehicle companies can potentially anticipate and mitigate future obstacles.

Advancements in transportation technologies have affected spatial arrangements in the United States (Muller 2004, cited in Chapin). After the invention of the automobile, as the circulation of cars increased, spaces for parking became scarce (Shoup 2011, cited in Chapin 2016). Chapin (2016) explains that cities thought the problem was the short of supply. To meet high parking demands, urban planners thought that the solution would be to simply build more parking spaces (Chapin 2016, 1). The minimum parking requirement was later developed and passed in cities to provide more off-street parking and meet the high parking demands. However, this resulted in excess parking and had negative effects on cities. Parking/car storage produces ongoing high expenses (Chapin 2016, 13). Hence, one of the unintended consequences included increased housing costs regardless of car ownership; this was either due to the shifted burden of expenses from the developers to the renters/homebuyers or due to the restrictions on the supply of housing (Chapin 2016, 13). Chapin's (2016) study of minimum parking requirement policy in a section of San Francisco showed that modifying the minimum parking requirement regulations in San Francisco's planning code influenced housing density and affordable housing in a positive way. Repealing the minimum parking requirement gave way to greater housing density and more affordable housing units in that area. In addition to the zoning codes in the area, one of the stakeholders with significant influence over these reforms were the neighborhood associations. Other stakeholders consisted of urban planners, developers, and city officials.

In the next chapter, I provide use cases for autonomous vehicle technology. These use cases also require companies working on autonomous vehicle technology to collaborate with other entities. Collaborating with different stakeholders would also help anticipate and mitigate the consequences that come with the use cases discussed in the following chapter. Moreover, these Use Cases are important part of the deliverable to the Nissan Research Center, as these use cases will encourage researchers to think about the different manners in which autonomous vehicles could be integrated in our social landscapes, and how urban spaces may be repurposed as a consequence of autonomous vehicle technology.

Chapter 6. Use Cases

The advent of autonomous vehicles will bring many opportunities for cities and autonomous vehicle companies. However, autonomous vehicle technology will also bring a host of unintended consequences with them, and cities are going to need to manage these consequences. In this section, I discuss various use cases for autonomous vehicle companies and the consequences that might accompany them: 1) using autonomous vehicles as transit connectors to solve the first/last mile problem; 2) utilizing autonomous vehicles technology to aid the Vision Zero Project to make roadways safer; 3) repurposing land-use by reallocating parking spaces; 4) potentially advertising public spaces, and 5) collaborating with local governments in terms of collecting and sharing data.

Transit connectors

Interviews with officials who work with the Department of Transportation in San José and with the San Francisco County Transportation Authority showed interest in using autonomous vehicles as transit connectors. During my interview with Jennifer, from the Department of Transportation in San José, mentioned that the Department of Transportation wants to explore how autonomous vehicle technology can address the different needs and challenges of the city, and understand how autonomous vehicles could be integrated into the city's ecosystem. In 2017, when the City sent out a Request for Information (RFI) to automotive companies regarding the piloting of autonomous vehicles, the Department of Transportation identified some use cases for implementing autonomous vehicles into the city's ecosystem.

One of the use cases involved using autonomous vehicles to solve the first/last mile problem. Planners use the term "the first/last mile problem" to describe the difficulty in getting

access to and from public transport (Quadrifoglio and Chandra 2011). Autonomous vehicles can help fill the gap between first and last mile connection for commuters by connecting them to transit hubs. Examples of these connected routes included Downtown San José to the Diridon Station, and Downtown San José to the Mineta Airport. Another intended route included connecting emergency housing to VTA light rail transit. The City of San José wants to utilize autonomous vehicles as a tool to increase ridership for public transportation. Jennifer argued that the emergence of services such as Uber and Lyft took people away from using public transit. Services like taxicabs, Ubers, and Lyft resulted in having more end-to-end services. Hence, the City wants to utilize autonomous vehicles for first and last mile connections and increase ridership for public transportation. By having on-demand, fixed geo-located routes with autonomous vehicles, they can be positioned in certain areas to pick up people at their door, and drop them back to transit stations. According to Jennifer, this would make transit hubs people movers, and would prevent reduced ridership on public transits.

The San Francisco County Transportation Authority had similar concerns over how the integration of autonomous vehicles might affect mass transit. In conversation with Alison, principal planner at the SFCTA, if there were not an incentive for autonomous vehicles to be high capacity/occupancy, it could potentially lead to an increased number of vehicles on the road, adding to the already existing traffic congestion. Alison mentioned that another potential risk would be that cities might stop investing in mass transit infrastructure. Alison stressed the importance of the mass transit system and how mass transit services such as the MUNI Metro in San Francisco are essential to the city's transportation ecosystem. Andrew, Senior Transportation Planner at the SFCTA, suggested that designing autonomous buses and trains would be easier to

design and implement within the transportation ecosystem as they would be required to stay on a singular track, making it less chaotic.

Andrew mentioned that the residents of the SOMA neighborhood had shown interest in an autonomous shuttle system that could connect them from their neighborhood to the different BART stations on Market Street, and other parts of the city such as the financial district. SOMA is also an area that has the right grid angle that allows for the coordination of an efficient shuttle system loop. However, Andrew stated that the residents wanting an autonomous shuttle presented an interesting caveat since the distance to get to transit hubs on Market Street is a short distance that is walkable. Andrew described this as a symptom of a different issue: the fast-moving traffic that runs through SOMA. Andrew hypothesized that the residents wanted a safer way to get to transit. To conclude, in both scenarios, city officials in San José and San Francisco were interested in using autonomous vehicles to increase mass transit ridership. While autonomous vehicle companies can benefit from commercial use, they should also explore opportunities where they can work with local governments and aid public transit use.

Visions Zero Project

Vision Zero is a global project that aims to increase traffic safety, eliminate traffic fatalities, and provide equitable transportation for all (Vision Zero Network, 2018). Autonomous vehicle technology has the potential to aid the goals of the Vision Zero project. On traffic safety, automation of vehicles has the potential to perform better by eliminating human driver error, thereby reducing collisions and improving traffic safety (Faheem 2017). The City of San José already wants to pilot autonomous vehicles in the city's vision zero corridors to mitigate accidents and making their roadways safer for all types of space users. Autonomous vehicles can

also be used in a similar fashion in other neighborhoods by identifying their respective vision

zero corridors. In addition to improved traffic safety, autonomous vehicle technology can assist

in providing equitable transportation by expanding mobility options for demographics that are

unable to drive. It is estimated that full vehicle automation will increase mobility and the vehicle

miles travelled for demographics of people such as children, the elderly, and people with

disabilities and other medical conditions (Harper et al. 2016). However, while autonomous

vehicles can provide increased mobility for the above-mentioned demographics, Alison further

explained that the same demographics might lack the access to technologies such as smartphones

and/or might not know how to use them. Andrew mentioned that there are emerging services that

are coalescing towards tertiary services. For example, a person can make a call from a landline or

a regular phone, or text the service, which would act as an intermediary between the person and

the original service. An example of this is a service called Arrive that orders on-demand Uber

and Lyft rides for its members via regular phone. Tertiary services like these would potentially

address the uptake barrier. Thus, there is an opportunity for autonomous vehicle companies to

collaborate with similar tertiaries services to expand and maximize their user base. Moreover,

autonomous vehicle companies can go further and provide affordable transportation for people in

low-income areas.

Re-Purposing Land-Use

An analysis conducted by Donald Shoup (2005) on parking policy showed that a car is

parked for about 95 percent during its lifetime, and hence, much of our landscapes are dedicated

to parking. When parking space pervades our landscapes, it takes away land-use that could be

utilized for other purposes. However, with the advent of autonomous vehicles, and the adoption

of a robo-taxi business model, we can re-purpose land-use dedicated for parking by reallocating

a certain amount of parking spaces with public spaces or other mixed-use spaces. Moreover, these spaces can take inspiration from universal design concepts where spaces are accessible for pedestrians, bike users, vehicles, and skateboarders. Michael, from San José Downtown Association, stressed the importance of incorporating autonomous vehicles in a way that it helps the city's goal in giving city space back to the people.

One of the ways parking spaces can be re-purposed is if driverless cars are fleet owned and people use them based on an on-demand service model. For example, Anderson et al. (2014) suggest that when a passenger is dropped off, an autonomous vehicle could direct itself to a remote parking spot away from the busy parts of the city, which could reduce the necessity of parking space within the busy parts of the city, or in a taxi model scenario, an autonomous vehicle would be rarely required to park as it would be constantly picking up and dropping off passengers (Anderson et al., 2014, 27). However, pick-up and drop-off services would have unintended consequences. The SFCTA is the appointed Congestion Management Agency for San Francisco, and both Alison and Andrew from the SFCTA expressed concerns regarding curb management issues with pick-up and drop-off services. Alison argued that pick-up and drop-off services would lead to more contestation of space-use. She gives an example of a pick-up and drop-off service called Charriot, where it sets up a pick-up and drop-off location for commuters to wait for their ride; however, when sidewalks become congested, it cannot always accommodate the demands of all the space users. Furthermore, Andrew explained that there are curb management issues already present among different space users since there are many mobility services that pick-up and drop-off people and goods. Allocating more space would lead to further chaos. Andrew highlights that even in an ideal scenario where every other block in a neighborhood was made to be a pick up and drop off spot, a different challenge arises where

some people might feel that their on-street parking was being taken away and that might ruin their business.

Advertising space

In conversation with Michael, he brought up the idea of digitally experiencing a space. Referencing this topic from a conference he attended, Michael explains that a person's first introduction to a space is digital when they read about the place, read reviews, and/or map the place. So, a person's relationship to the space is formed via the digital realm, which then shapes one's relationship and/or perception of the space. Michael discussed that their organization is thinking of different ways to highlight public spaces in a better way. He argues that public spaces can be gritty, and some people do not necessarily understand that to be public is to be gritty. Michael suggested that autonomous vehicles could be potentially used to change people's perception of public spaces. Moreover, autonomous vehicle services can also collaborate with local governments and businesses to advertise spaces – whether it is giving consumers a virtual tour, a brief summary, or displaying reviews.

Data Collaboration Opportunity

Earlier, we got a glimpse of how partnerships between local governments and autonomous vehicle companies could potentially facilitate a smoother transition of autonomous vehicles. Local governments and automotive companies working on autonomous vehicles are both instrumental to introducing new emerging mobility in our ecosystem. Working collaboratively will help anticipate new challenges, and eventually help mitigate them. This working partnership could also benefit from collective data gathering and the sharing of data. These sets of data can then be used to train autonomous vehicles to navigate in an efficient way.

Jennifer, previously having worked in the private sector for Google Maps, explained that in San José, the Department of Transportation collects data points on near misses between various vehicle types on the road, signal timings, and pedestrian movements. However, the data collected may not always be accurate. For example, for pedestrian movements, the city collects pedestrian numbers by gathering data from the crosswalk buttons. However, the numbers can be off when an individual presses the button multiple times, or an individual presses the button, but there are multiple people at the crosswalk. Jennifer mentioned that the City of San José hopes that autonomous vehicles can assist in collecting this type of data and eventually, even act as a fleet of vehicles that capture every detail on the road. Jennifer also mentioned a map that consists of certain components such as measurements of where buildings are located, how faraway a person is, and a map that has access to signal phase and timing data is in the works. Jennifer called it the *Map of the Future.* This map would eventually use 3G, LTE, 4G, and 5G data to see what is going on miles away. If both local governments and autonomous vehicles companies share their data with each other, they can triangulate this data to achieve accurate data points in terms of traffic and mobility patterns.

Chapter 7. Conclusion

Overview of Insights

The goal of this research study was to contribute to Dr. Melissa Cefkin's ongoing research on how autonomous vehicles can adapt to different types of urban and social landscapes. To do so, this project researched the nature of urban landscapes by looking at various phenomena that I classified as cultural markers/physical and behavioral characteristics that distinguish a neighborhood.

'Streetscape Design Elements' include urban design features that contribute to shaping cities. Architects and planners formally plan these features, the notion references in Lefebvre's (1991) *representations of space* and De Certeau's (1984) *concept city*. Streetscape design elements such as urban street trees, streetlights, sidewalks/pavements, murals, seating structures, etc. influence the make-up of a community and its space users. 'Mobility Behaviors' provided insights on how different types of space users often chose multiple methods of transportation based on time, location, and occasion. This section also shed light on conflict of space-use among various space users. Data from my fieldwork illustrates the interconnectedness of the built form of cities. Many times the built form cannot accommodate the expectations and needs of diverse space users. Thus, people find ways to negotiate their spatial rights, which creates chaos and conflict. 'Vernacular Landscapes' helped us understand that everyday spaces such as roadways and streets are intermittent in nature. Organizations that plan and design for autonomous vehicles have to realize that these vernacular landscapes have unpredictable land-use.

What all of these cultural markers have in common is that they all reflect community character and community identity. They also display how power operates within our urban and

social landscapes. With the varying levels of power and control present in our landscapes, various space users have differing access to urban spaces. We have to keep asking Lefebvre's question of who really has the rights to the city. With the advent of autonomous vehicles, city planners, local governments, and people working on autonomous vehicle technologies have to be conscious as to how technological advances in autonomous vehicle technology will affect spatial arrangements in our neighborhoods. One concerning unintended consequence that autonomous vehicle technology might bring with it is the further exclusion of different types of space users from our urban landscapes. Thus, we need to advocate for a universal design that accommodates every type of space user, and gives them equal access to urban spaces. By taking a collaborative research and design approach, where autonomous vehicle technology companies, urban planners, local governments, architects, and the public work together, universally designed spaces can be achieved.

Deliverable and Client Response

I presented insights from this study in the form of a presentation to Dr. Melissa Cefkin and her colleagues at Nissan. Initially, I emailed the project report to Dr. Melissa Cefkin. Dr. Melissa Cefkin sent the project abstract to her colleagues and arranged a meeting where I would present my findings. On August 2, 2018, I presented my data in the form of a PowerPoint presentation at the Nissan Research Center. I followed the presentation with a question and answer session where I answered questions from the audience and discussed my findings from the study. The presentation lasted for twenty minutes, and the question and answer session lasted for about thirty minutes. Dr. Melissa Cefkin attended the meeting, along with three researchers from Dr. Melissa Cefkin's team, a designer that works closely with autonomous vehicle technology, and Dr. Jan English-Lueck.

I made the presentation simple and understandable for audience members that did not have a background in the social sciences (see appendix C). Overall, based on the discussions we had, the audience grasped the main takeaways from the study. Audience members showed interest in four main topics. First, audience members acknowledged the value of interviews with specialists such as urban planners, and the value of their expertise in how landscapes are shaped and defined. Next, socio-economic data and commuter data from 'Community Profile helped the audience think about 1) how power operates in communities, and 2) understand the different transportation restraints within communities. Next, audience members were intrigued by Figure 19 - Dynamic Use of Vernacular Landscapes. We spent some time talking about how different forms of tactical urbanism can make vernacular spaces such as streets and roadways intermittent in nature. Lastly, the audience also recognized the systemic approach I took in imagining the various use cases for autonomous vehicles after talking to multiple specialists in the urban planning and transportation fields.

In a separate conversation, Dr. Cefkin pointed out that some of the strengths of this ethnographic work included observations of how streetscape design elements contributed to shaping cities as illustrated by the input gained from city planners and transportation authorities. Dr. Cefkin also pointed out that she found chapter four, 'Marking Community and Streetscape Design Elements,' the highlight of this report. She mentioned that chapter four gave her a new perspective on "the different ways of reading space and understanding how it is planned and conceptualized" (personal conversation with Dr. Cefkin). Dr. Cefkin also acknowledged the use of various conceptual frameworks in this applied work, and noted they gave her insights to some of the team's own approaches.

Some of the topics that Dr. Cefkin thought were promising for further exploration include the notions of how power is enacted through people's lived spaces. While my participant observations and interviews with different types of space users did not focus on how people might have experienced power operating through the built infrastructure, it would be an interesting topic to explore further in a future collaboration between San José State University and the Nissan Research Center.

Reflections on Fieldwork

Utilizing Multiple Methodologies

While putting together the research design for this project, I was excited to have the opportunity to integrate multiple methodologies. Methodologies such as interviews with specialists, interviews with different types of space users, observations in the field, social media research, and the walking tour allowed for a holistic lens into the research questions and provided richer results. Carrying out a research project that utilizes multiple methodologies had its learning curves. First, conducting fieldwork at multiple field sites, and then organizing the data was a time-consuming process. In the future, I would consider asking for assistance when conducting fieldwork. Additionally, I would also consider using transcription services like REV in the future to reduce the workload.

Another challenge was arranging the data collected from various methodologies in a way that made sense. The process can be chaotic and could take lots of trial and error. Eventually, I figured out a system that helped me mitigate some of these challenges. I first made a timeline of when I would carry out certain methodologies. Then, I found it helpful to take notes and to write a brief summary of insights from the fieldwork done that day. This proved to be helpful in

organizing my data, and eventually analyzing it. Another challenge involved narrowing down the data that was relevant to the research questions I was trying to answer. After all the data has been collected and analyzed, it is hard to exclude certain data points. Being selective of what data to use was difficult but going back to the research question to see if the data addresses the research question was helpful in narrowing down relevant data. Lastly, I also had to come to terms that not all methods would be fail proof. For example, during my fieldwork, I reached out to a couple neighborhood associations in hopes that I could interview them. However, they were inaccessible. Other methods such as interviews with specialists from the urban planning and transportation fields made up for it.

Triangulation of Data

An advantage of incorporating multiple methods was being able to triangulate some of the data collected. For instance, when conducting observations in the field, I took notes and pictures of urban design features that stood out to me the most. Later, while conducting interviews with specialists, I was able to confirm some of the urban design features that affect how people move in space and learn more about their functions. Triangulation of data enabled me to find similar themes and/or outliers within the data collected. In another instance, data from social media research supported the data from interviews with specialists on how murals and other forms of public art promote place-making and help build a community.

Lastly, one of my many favorite parts of this research project involved being able to engage in a discipline that was unfamiliar to me. I took an Introduction to Urban Design course that was taught by Dr. Gordon Douglas from the Urban Planning Department at San José State University. This course introduced me to urban planning theory, and concepts that played an integral role in designing and shaping cities. Combining concepts from urban planning with

concepts from anthropology and sociology enabled for an interdisciplinary approach. Integrating

theoretical frameworks from all three disciplines helped provide a holistic analysis of different

elements that 1) contribute to making a place, 2) reflect community character, and 3) help

understand how space is used by different types of space users. This interdisciplinary approach

brought forth a unique perspective and enabled new discourses to take place.

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Appendix A: Interview Guide for Participants

What brings you to this neighborhood?

Do you live here / how long have you lived here / how often do you come here?

How familiar are you with this place?

How significant is this location to you? Or What do you like the most about this neighborhood?

What do you dislike about this neighborhood?

What are the things that stand out to you about this neighborhood?

What are the modes of transportation that you use in this area?

Preference for any specific mode of transportation?

For events:

What brings you to this event?

How often do you come here?

How familiar are you with this event?

What do you like about this event? Do you go to similar events?

How do you navigate traffic to get here?

Do you use any other modes of transportation?

What were the difficulties navigating here?

What were the things that worked for you to get here?

Appendix B: Semi-Structured Questions for Specialists

Could you please tell us a little about your background and what your current role at this organization entails?

Could you please provide a brief overview for how cities design and plan for different mobility options?

What are some distinguishing characteristics of this neighborhood/city in terms or urban design or transportation?

What are some urban design features that affect how people use space?

What are some transportation challenges or mobility issues in this area?

Do locals get a say in any of the decisions that get made? If so, how?

From your perspective, how do you see autonomous vehicle technology affecting this community?

What parties are involved when it comes to making decisions regarding new modes of mobility in the community?

What are some of the guideline or regulations that autonomous vehicles would have to follow?

The nature of these questions were different depending on which specialist was interviewed.

Appendix C: Presentation Slides

Slide 1

Slide 2

Slide 3

Slide 4

Slide 5

Slide 6

Slide 8

Community Profile
Commuter Data
Comparison of Mobility Strategies

	Drive Alone	Public Transportation	Carpool	Walk	Work from Home	Other
United States	76.3%	5.1%	8.3%	2.7%	5%	2.6%
Downtown San Jose (95113)	62.6%	13.9%	1.4%	12.6%	4.7%	4.8%
SOMA, SF (94105)	25.1%	18.3%	3.8%	44.1%	4.8%	3.9%
SOMA, SF (94103)	20.2%	35.6%	4.1%	23.1%	5.7%	11.3%
Downtown Campbell (95008)	80.8%	3.1%	7.3%	1.6%	4.6%	2.6%

Source: American Community Survey (2012-2016); U.S. Bureau of Transportation Statistics

Slide 9

Streetscape Design Elements
▶ Trees, Murals, Sidewalks, and Streetlights etc.

Street Trees   Murals

Slide 10

Slide 11

Slide 12

Slide 13

Slide 14

Slide 15

Slide 16

Slide 17