

Project Sidewalk: Mapping the Accessibility of the Physical World **at Scale** using Interactive Computational Tools

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WASHINGTON



30.6

**million U.S. adults
have a mobility impairment**



Source: US Census, 2010

15.2

million use an assistive aid





CHANEL

CHANEL

CHANE

CHANEL

CHANEL

CHANEL

DIESEL

ONE WAY

NO PARKING
Between
11:30 - 1:00

© 2013 Google



NO CURB RAMPS



PHYSICAL OBSTACLES

SURFACE PROBLEMS





INCOMPLETE SIDEWALKS



PHYSICAL OBSTACLES

NO CURB RAMP

SURFACE DEGRADATION



Accessible infrastructure
has a significant impact
on the **independence**
and **mobility** of citizens

[Thapar *et al.*, 2004 ; Nuernberger, 2008]



The National Council on Disability noted that there is **no comprehensive information** on “the degree to which sidewalks are accessible” in cities.



National Council on Disability, 2007

The impact of the Americans with Disabilities Act: Assessing the progress toward achieving the goals of the ADA

OUR VISION


Design systems that transform the way urban accessibility information is **collected** and **utilized**.



Reset View

WELCOME TO ACCESS SCORE

Interactive Visual Exploration of Physical Accessibility

Start exploring the accessibility of Washington DC by dragging the  cursor into a rectangular box over the map.



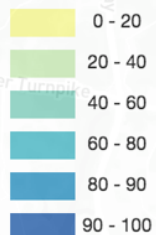
The selected regions will be colored based on their accessibility scores. More information for the selected regions will be shown on the right sidebar panel. Click on any specific region to know more about a neighborhood.

Start Coloring!

Data Coverage: **100%**
Average Access Score: **89.7**

[Know More](#)

Access Scores



Least accessible (low score) to most accessible (high score)

Green-Yellows indicate inaccessible neighborhoods

Georgetown

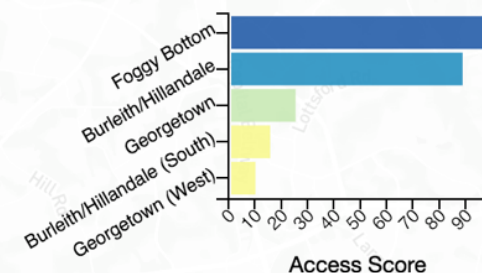
Blues indicate an accessible neighborhoods

Showing information for the selected area

Georgetown
24.5

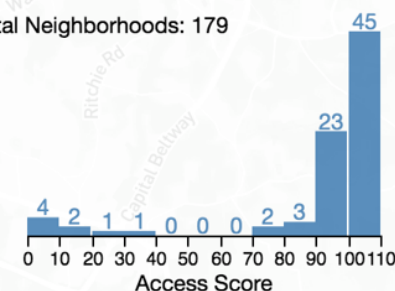
Average score **88.9**

Top 5 accessible regions



Histogram of Access Scores

Total Neighborhoods: 179



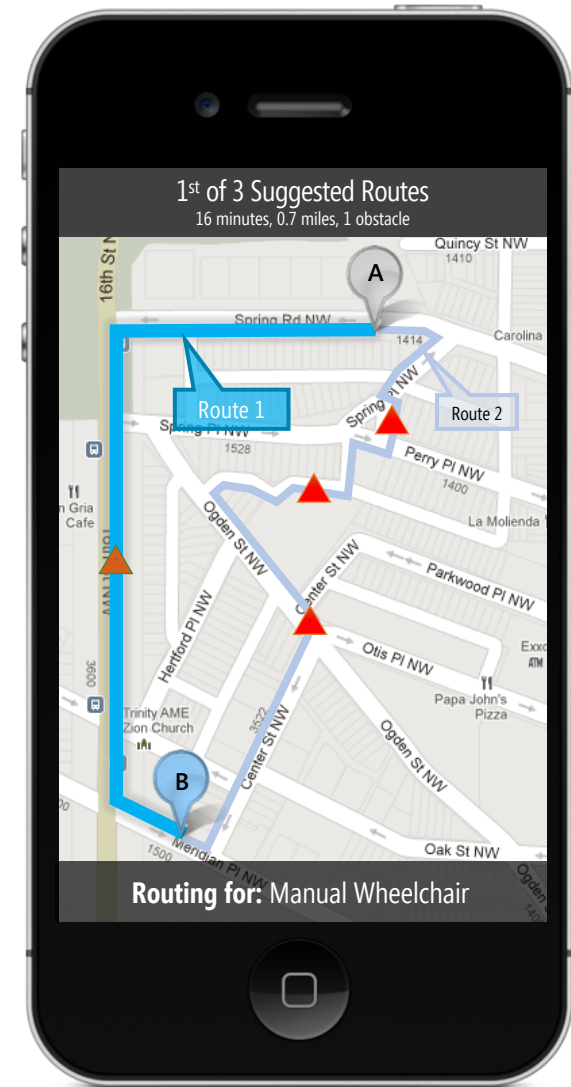
Interactive Visualization of Accessibility Data

MOTIVATION

ACCESSIBILITY-AWARE NAVIGATION



Showing alternate routes tailored to a person

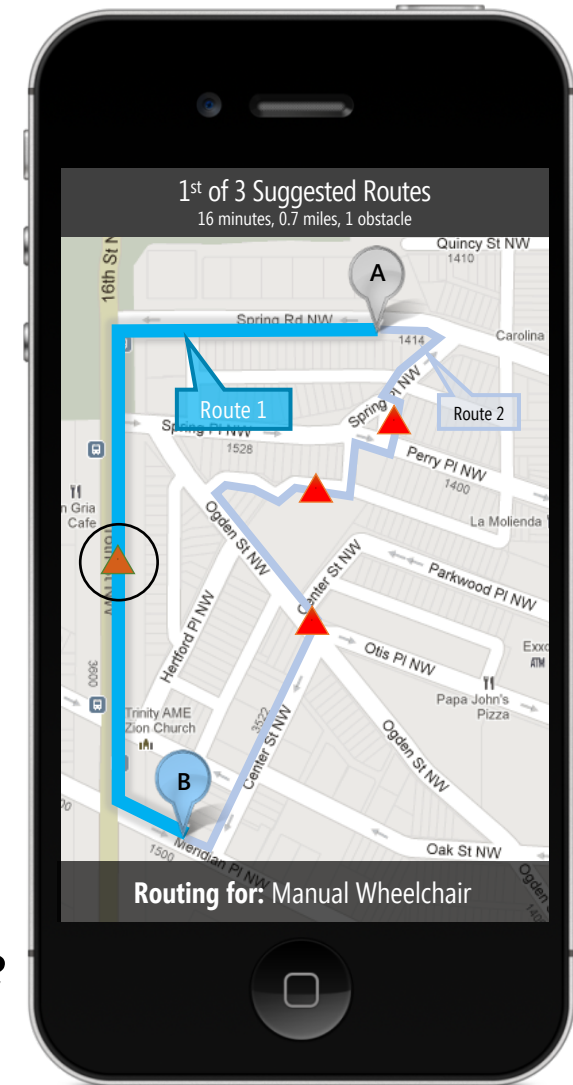


MOTIVATION

ACCESSIBILITY-AWARE NAVIGATION



Investigating mobility barriers along the route

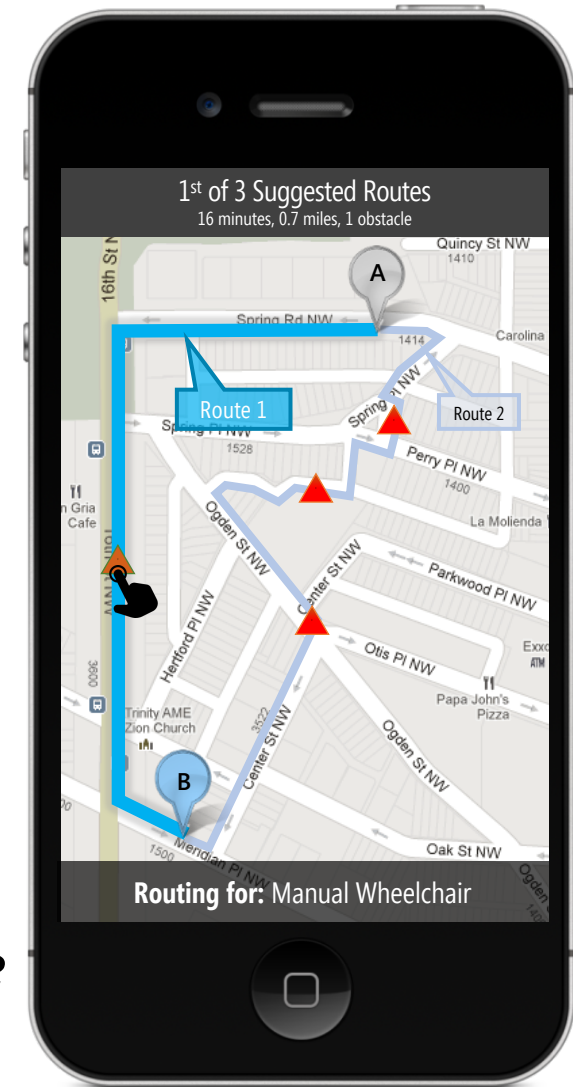


MOTIVATION

ACCESSIBILITY-AWARE NAVIGATION



Investigating mobility barriers along the route



MOTIVATION

ACCESSIBILITY-AWARE NAVIGATION



Investigating mobility barriers along the route



THESE APPLICATIONS HAVE

**HUGE
DATA**

REQUIREMENTS

THESE APPLICATIONS HAVE

**HUGE
DATA**

REQUIREMENTS



*How do we get
this data?*

Traditional Physical Audits



Walkability Audit
Wake County, North Carolina

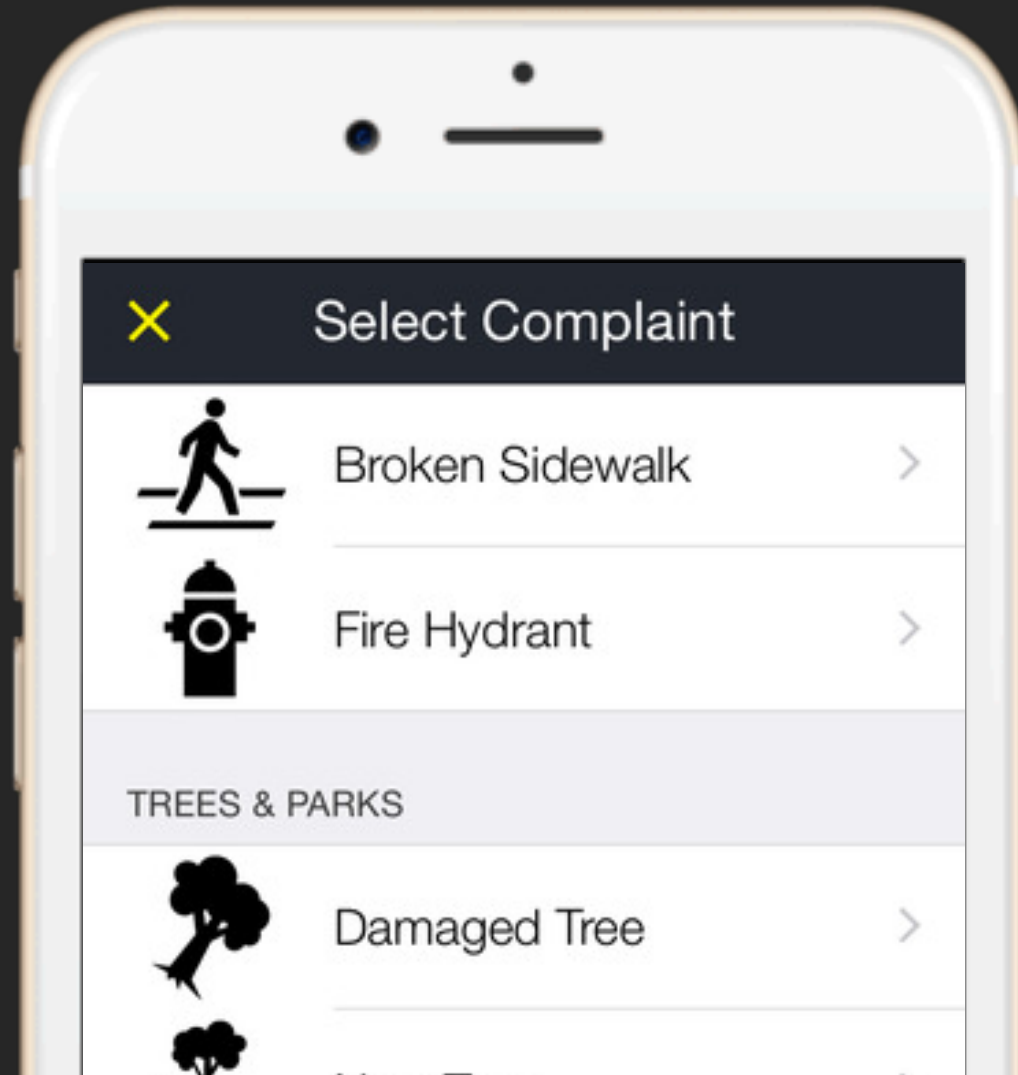


Walkability Audit
Wake County, North Carolina



Safe Routes to School Walkability Audit
Rock Hill, South Carolina

Mobile Reporting Solutions



CHALLENGES OF TRADITIONAL DATA COLLECTION APPROACHES?



Slow, Manual, and
Laborious

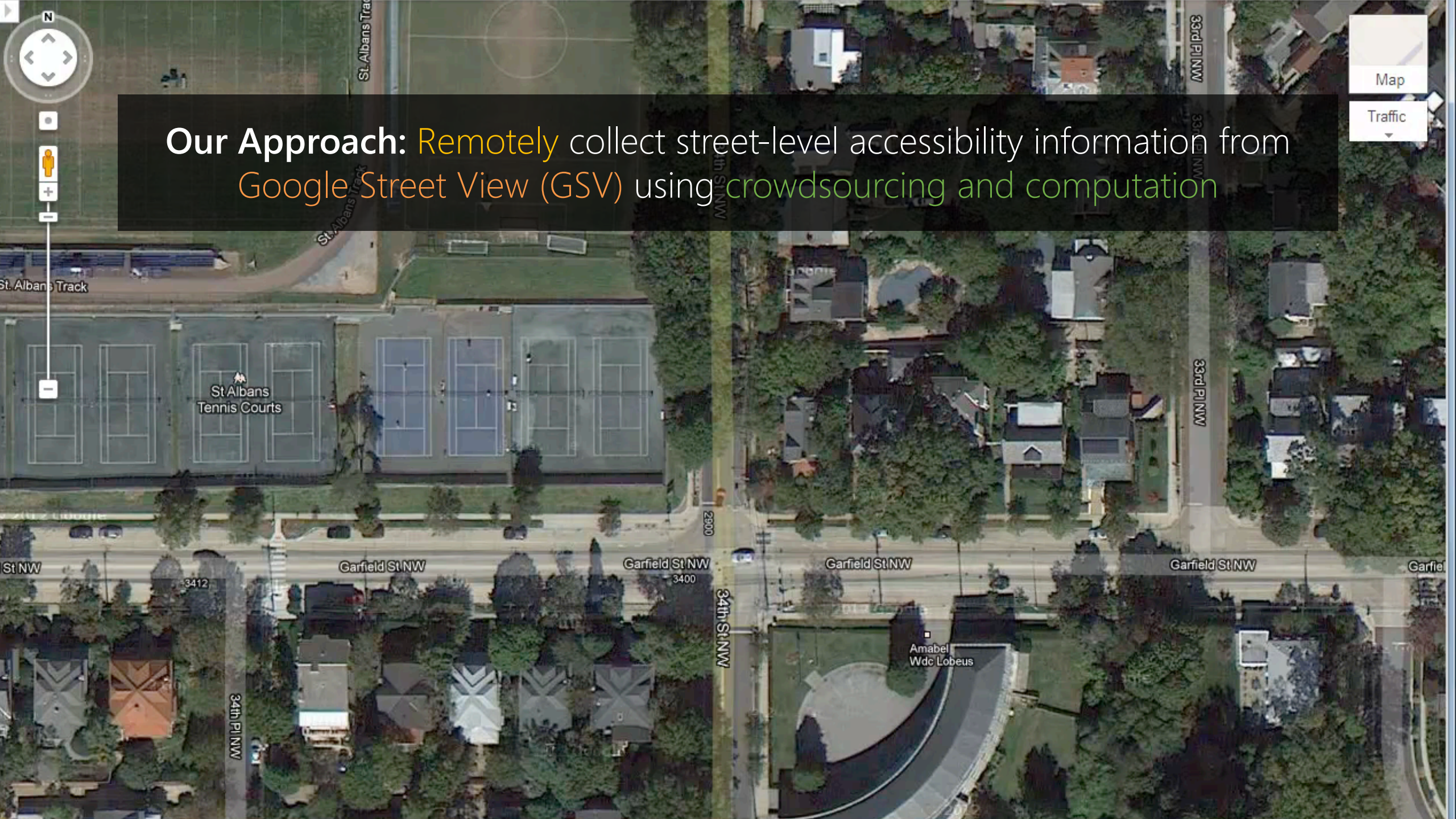


Huge Cost



Localized

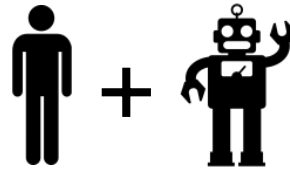
Our Approach: Remotely collect street-level accessibility information from Google Street View (GSV) using crowdsourcing and computation



How can we **combine automated methods** to increase the data collection efficiency?



Crowdsourced
Data Collection



Automated
Data Collection



Accessibility-aware
Application Design

How can we **collect** accurate street-level accessibility data using crowdsourcing?

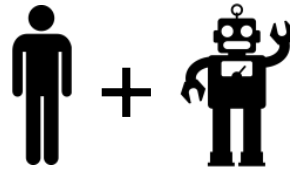
How can we **leverage** this unprecedented level of accessibility data to **build** new interactive GIS tools?

THIS TALK WILL BE...



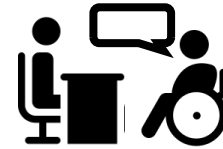
Crowdsourced
Data Collection

70%



Automated
Data Collection

10%

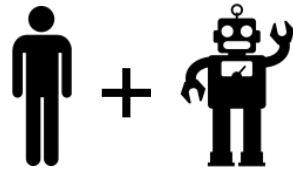


Accessibility-aware
Application Design

20%



Crowdsourced
Data Collection



Automated
Data Collection



Accessibility-aware
Application Design



Crowdsourced
Data Collection



Automated
Data Collection



Accessibility-aware
Application Design

1. How can we design a crowdsourcing system to collect street-level accessibility data from Google Street View?
2. How to quickly train crowd workers to accurately label accessibility features in Google Street View imagery?



PROJECT
SIDEWALK

[HTTP://PROJECTSIDEWALK.IO](http://PROJECTSIDEWALK.IO)

<http://projectsidewalk.io>

Let's create a path for everyone

Start Exploring Seattle

We are also in: [Newberg, OR](#) [Washington, DC](#)

Interactive tool that empowers **anyone** to **virtually** walk city streets and **remotely** label accessibility problems

<http://projectsidewalk.io>

Let's create a path for everyone

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Interactive tool that empowers **anyone** to **virtually** walk city streets and **remotely** label accessibility problems

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Let's create a path for everyone

Start Exploring Seattle

We are also in: [Newberg, OR](#) [Washington, DC](#)

Interactive tool that empowers **anyone** to **virtually** walk city streets and **remotely** label accessibility problems

TOOL WALKTHROUGH

Find and label the following

Explore

Curb Ramp

Missing Curb Ramp

Obstacle in Path

Surface Problem

Other

Zoom In


Zoom Out

Undo

Redo

Current Neighborhood
Fort Stanton, D.C.

Audit 1000ft of Fort Stanton



Your mission is to audit 1000ft of Fort Stanton and find all the accessibility features that affect mobility impaired travelers!

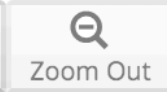
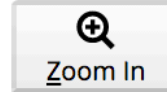
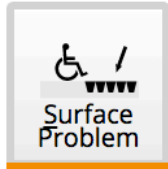
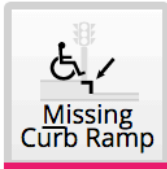
OK

Sound

Jump

Feedback

Find and label the following



Current Neighborhood
Fort McNair, D.C.

0.0 miles 0 labels

Audit the streets and find all the accessibility attributes



Current Mission

Audit 1000ft of this neighborhood

15% complete



2 curb ramps



0 missing curb ramp



0 surface problem

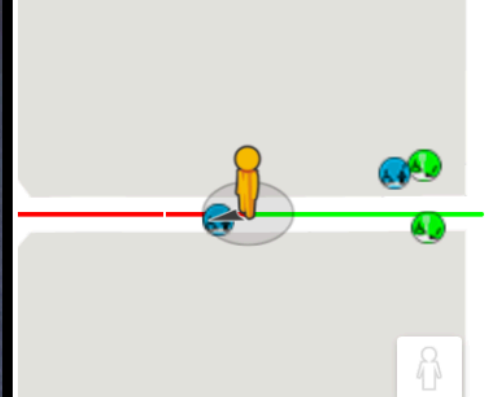


2 obstacles



0 other

Follow the red line



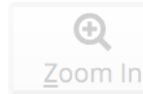
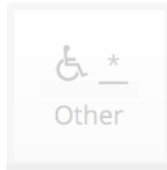
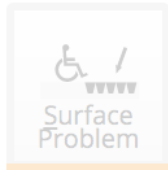
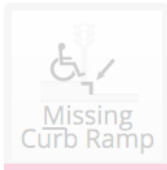
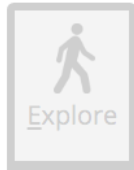
Do you see any unlabeled problems? If not,



Turn slightly towards right

TOOL WALKTHROUGH

Find and label the following



GSV exploration and labeling pane

Current Neighborhood
Fort McNair, D.C.

0.0 miles 0 labels

Audit the streets and find all the accessibility attributes



Current Mission

Audit 1000ft of this neighborhood

15% complete



2 curb ramps



0 missing curb ramp



0 surface problem



2 obstacles



0 other

Follow the red line



Do you see any unlabeled problems? If not,
Turn slightly towards right

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Map data ©2017 Google Terms of Use

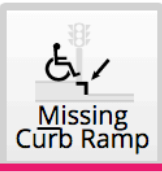
TOOL WALKTHROUGH



Explore



Curb Ramp



Missing Curb Ramp



Obstacle in Path



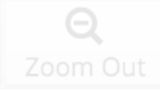
Surface Problem



Other



Zoom In



Zoom Out



Undo



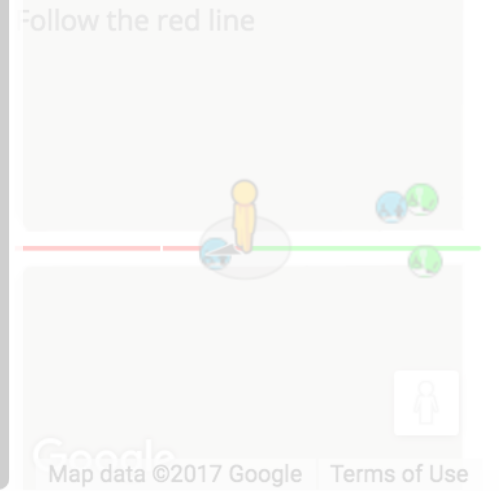
Redo

Current Neighborhood
Fort McNair, D.C.

0.0 miles 0 labels

Current Mission
Audit 1000ft of this neighborhood
15% complete

2 curb ramps
0 missing curb ramp
0 surface problem
2 obstacles
0 other



Audit the streets and find all the accessibility attributes

Labeling button menu bar



Do you see any unlabeled problems? If not,
Turn slightly towards right

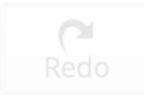
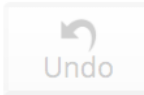
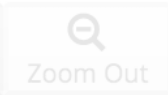
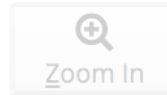
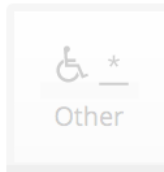
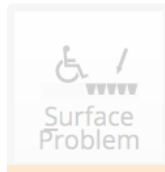
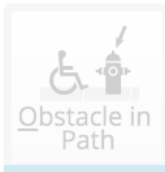
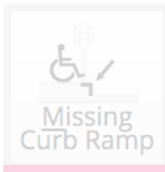
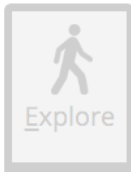
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Map data ©2017 Google Terms of Use

TOOL WALKTHROUGH

Feedback

Find and label the following



Current Neighborhood
Fort McNair, D.C.

0.0 miles 0 labels

Audit the streets and find all the accessibility attributes



Label icon

Passable

1

2

3

4

5

Not Passable

Description (e.g., light pole blocking sidewalk)

☐ Temporary (e.g., construction, trash)

OK

see any unlabeled problems? If not,

Turn slightly towards right

Current Mission

Audit 1000ft of this neighborhood

15% complete



2 curb ramps



0 missing curb ramp



0 surface problem

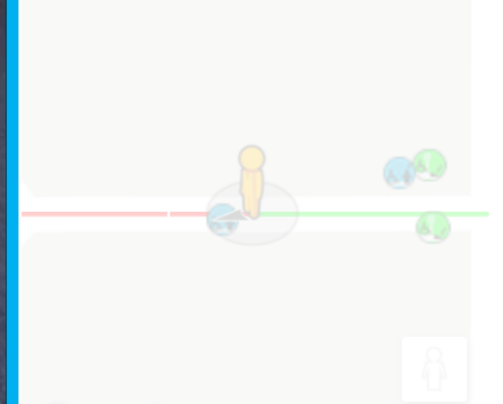


2 obstacles



0 other

Follow the red line

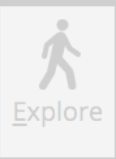



Map data ©2017 Google Terms of Use

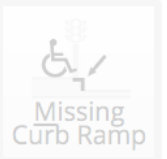
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TOOL WALKTHROUGH

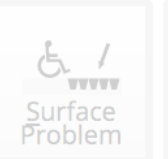
Find and label the following

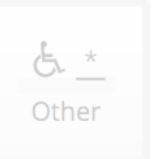
 Explore

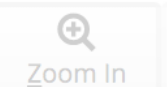
 Curb Ramp


 Missing Curb Ramp


 Obstacle in Path


 Surface Problem

 Other

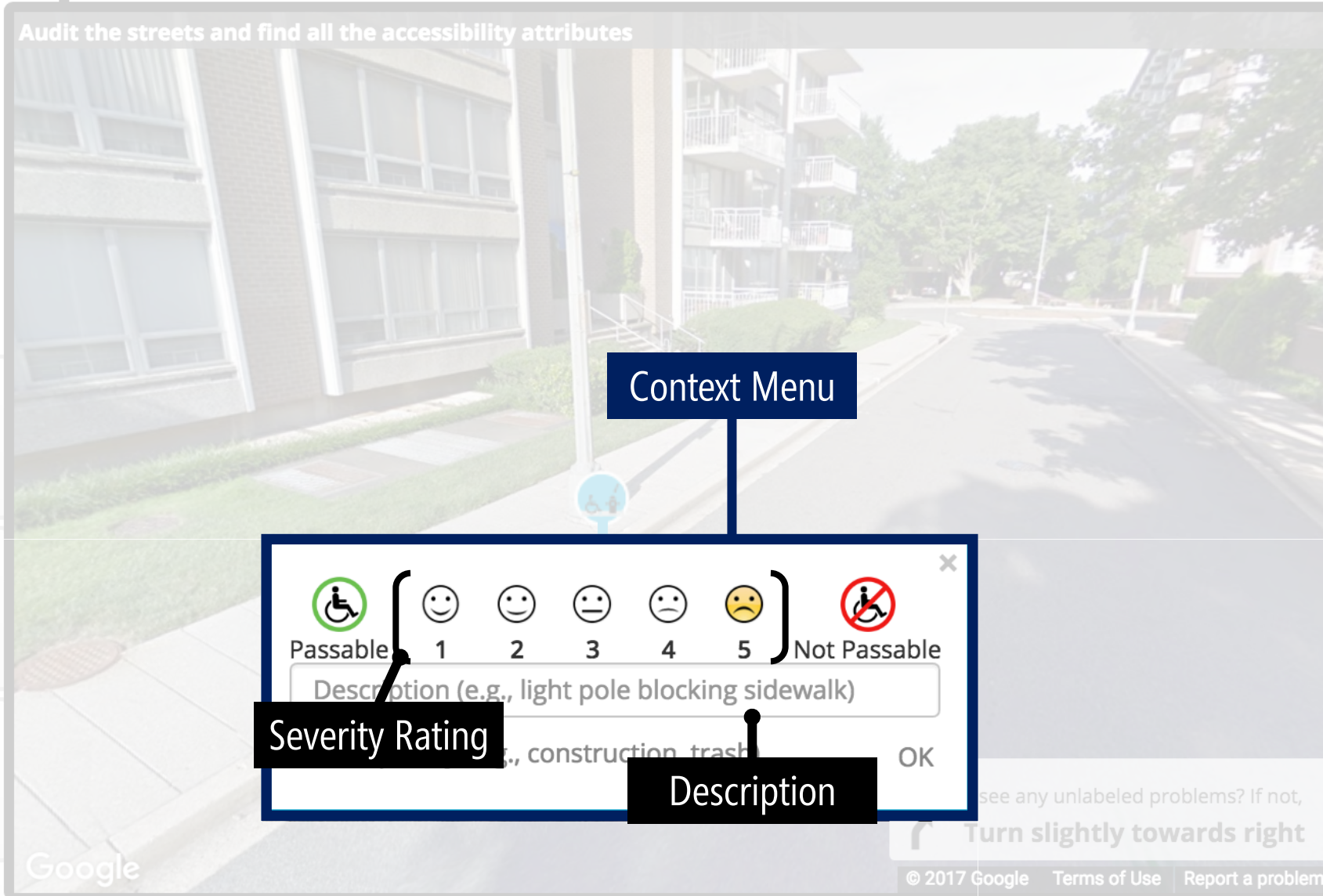
 Zoom In

 Zoom Out


 Undo


 Redo


Audit the streets and find all the accessibility attributes





Context Menu


 Passable


 1

 2

 3

 4

 5



 Not Passable

Description (e.g., light pole blocking sidewalk)

g., construction trash


OK


Current Neighborhood
Fort McNair, D.C.


 0.0 miles  0 labels


Current Mission
Audit 1000ft of this neighborhood


15% complete

 2 curb ramps

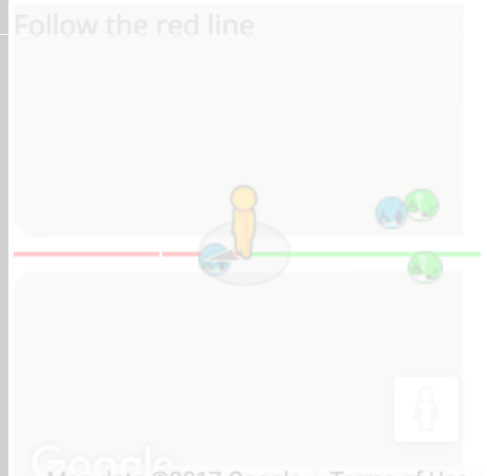
 2 obstacles

 0 missing curb ramp

 0 other

 0 surface problem

Follow the red line



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Map data ©2017 Google Terms of Use

TOOL WALKTHROUGH

Feedback



Mission Progress Pane

Current Neighborhood
Fort McNair, D.C.

0.0 miles 0 labels

Current Mission
Audit 1000ft of this neighborhood

Progress bar 15% complete

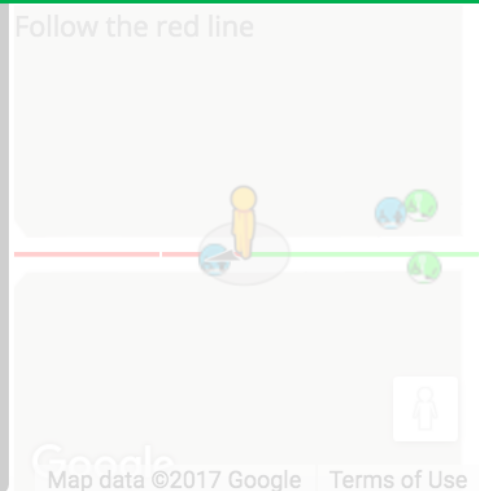
2 curb ramps

0 missing curb ramp

0 surface problem

2 obstacles

0 other



TOOL WALKTHROUGH

Find and label the following

Explore

Curb Ramp

Missing Curb Ramp

Obstacle in Path

Surface Problem

Other

Zoom In

Zoom Out

Undo

Redo

Current Neighborhood
Fort McNair, D.C.

0.0 miles 0 labels

Current Mission
Audit 1000ft of this neighborhood
15% complete

2 curb ramps
0 missing curb ramp
2 obstacles

Route Guidance

Top-down map

Obstacle in Path

Follow the red line

Do you see any unlabeled problems? If not,
Turn slightly towards right

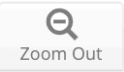
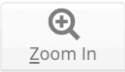
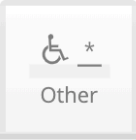
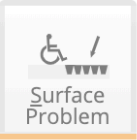
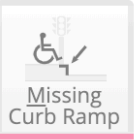
© 2017 Google Terms of Use Report a problem

Man data ©2017 Google Terms of Use

PROJECT SIDEWALK SYSTEM

INTERACTIVE TUTORIAL

Find and label the following



Current Neighborhood
Woodridge, D.C.

0.0 miles 0 labels

In this Street View image, we have drawn an arrow to a curb ramp. Let's label it. Click the flashing "Curb Ramp" button above.



Current Mission
Complete the onboarding tutorial!
3% complete

- | | |
|---------------------|-------------------|
| 0 curb ramp | 0 surface problem |
| 0 missing curb ramp | 0 no sidewalk |
| 0 obstacle | 0 other |

1



PROJECT SIDEWALK SYSTEM

INTERACTIVE TUTORIAL

Explore

Curb Ramp

Explore

Curb Ramp

Missing Curb Ramp

Obstacle in Path

Surface Problem

No Sidewalk

Other

Zoom In

Zoom Out

Find and label the following

Current Neighborhood
Woodridge, D.C.

0.0 miles 1 labels

Current Mission
Complete the onboarding tutorial!
8% complete

1 curb ramp

0 surface problem

0 missing curb ramp

0 no sidewalk

0 obstacle

0 other

Follow the red line

In this Street View, you have drawn a curb ramp. Let's rate its quality. The number 1 is flashing above. Click the number above.

Now, you can rate the quality of the curb ramp where 1 is passable and 5 is not passable for a wheelchair user. **Let's rate it as 1, passable.**

Passable 1 2 3 4 5 Not Passable

Description (e.g., narrow curb ramp)

☐ Temporary (e.g., construction, trash) OK

Curb Ramp

Please click to label a severity

Google 1 Google

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Map data ©2019 Google | Terms of Use

INTERACTIVE TUTORIAL

11% complete

Follow the red line


Google 1

2

Google







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INTERACTIVE TUTORIAL

 Zoom Out

 **0.0 miles**  **7 labels**

89% complete

	
5 curb ramps	0 surface problem
	
1 missing curb ramp	1 no sidewalk
	
0 obstacle	0 other

└┐

 **U turn**

Map data ©2019 Google Terms of Use

OK

Great! Let's adjust the camera and look at another intersection. Go to the Street View pegman on the left.

Google1

Google2

Google**3**

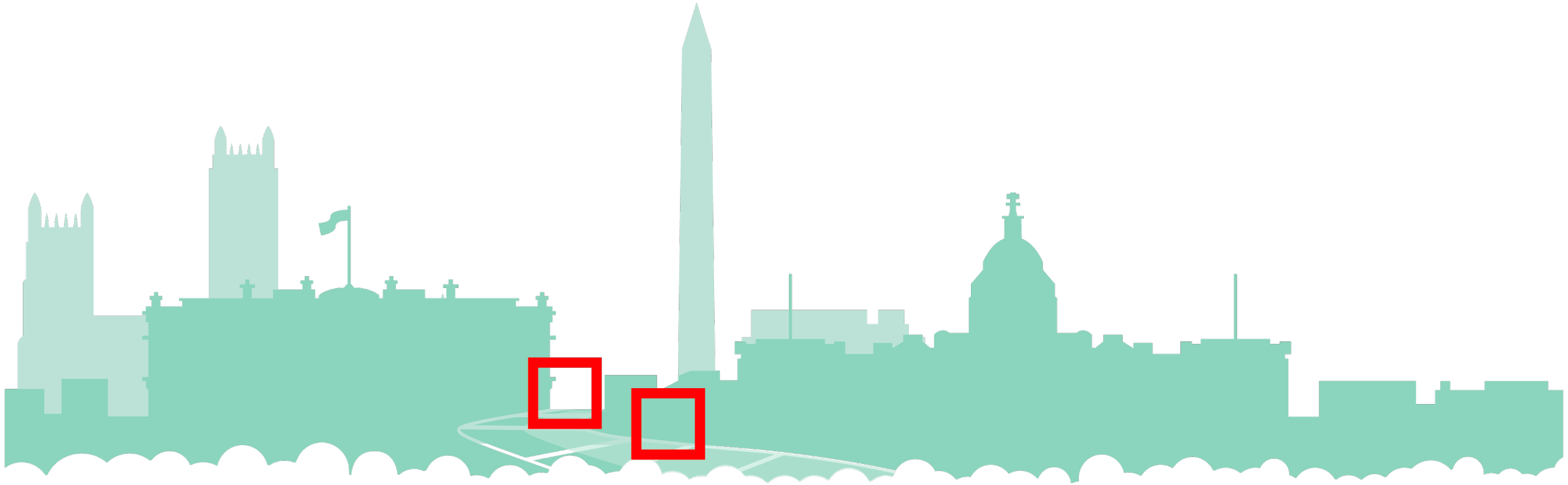
■ ■ ■

Google

PROJECT SIDEWALK SYSTEM

DEPLOYMENT

Washington DC



18-month deployment ~ Fall **2016** - Spring **2018**

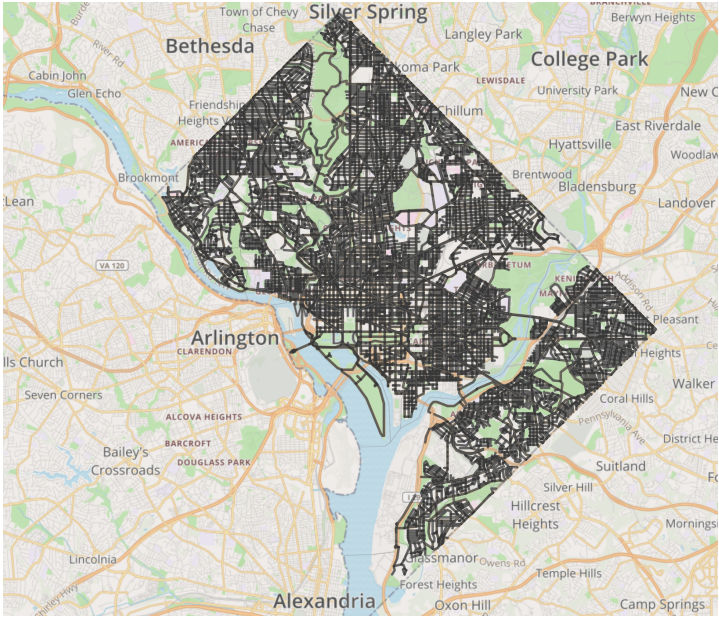
DC DEPLOYMENT

DATA COLLECTED

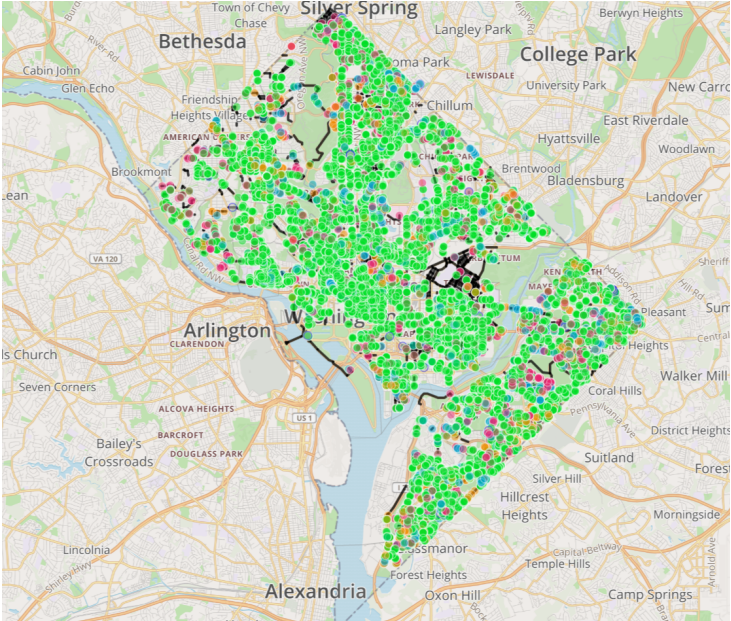


~800
USERS

Volunteers Turkers

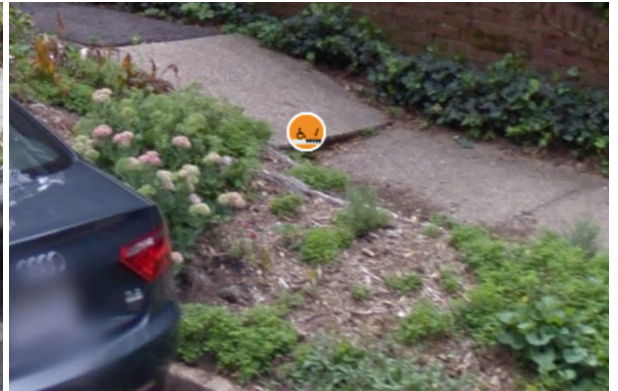
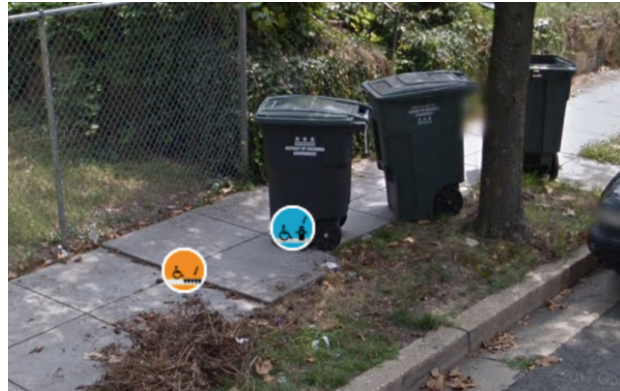
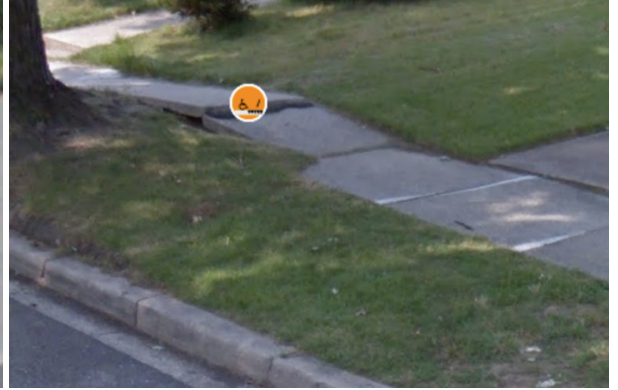
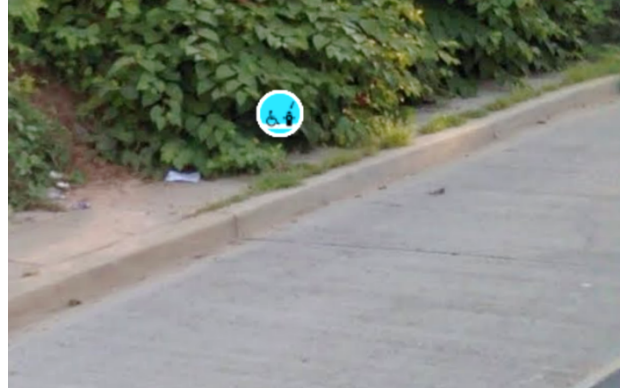


~3000
MILES



250,000+
LABELS

DEPLOYMENT LABEL EXAMPLES



142,835
Curb Ramps

18,719
Missing Curb Ramps

21,736
Obstacles

8309
Surface Problems

DEPLOYMENT

MORE CITIES!

Seattle, WA



37%

Seattle mapped

685+

miles covered

78,500+

labels

DEPLOYMENT

MORE CITIES!

Newberg, OR



~50%

Newberg mapped

52

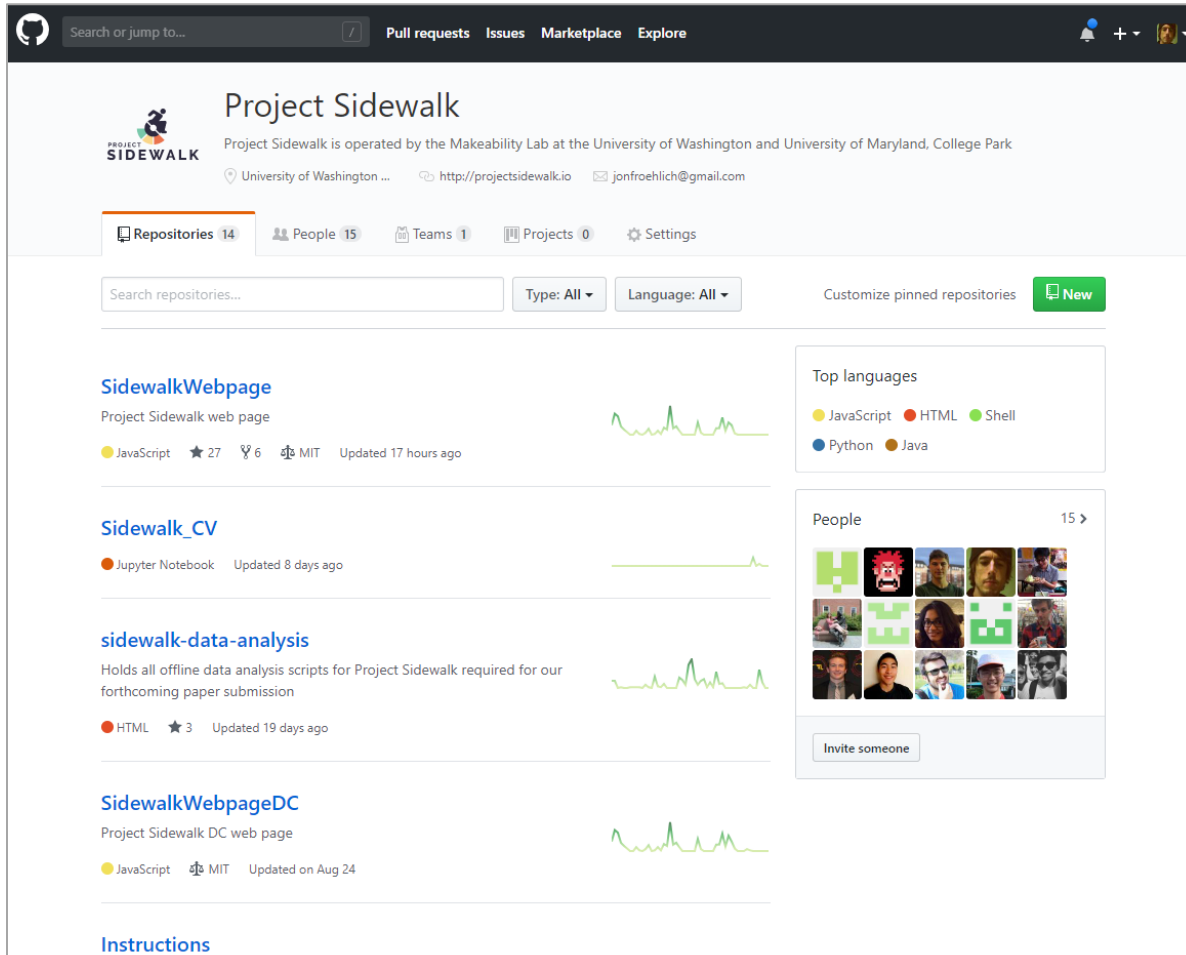
miles covered

6,825

labels

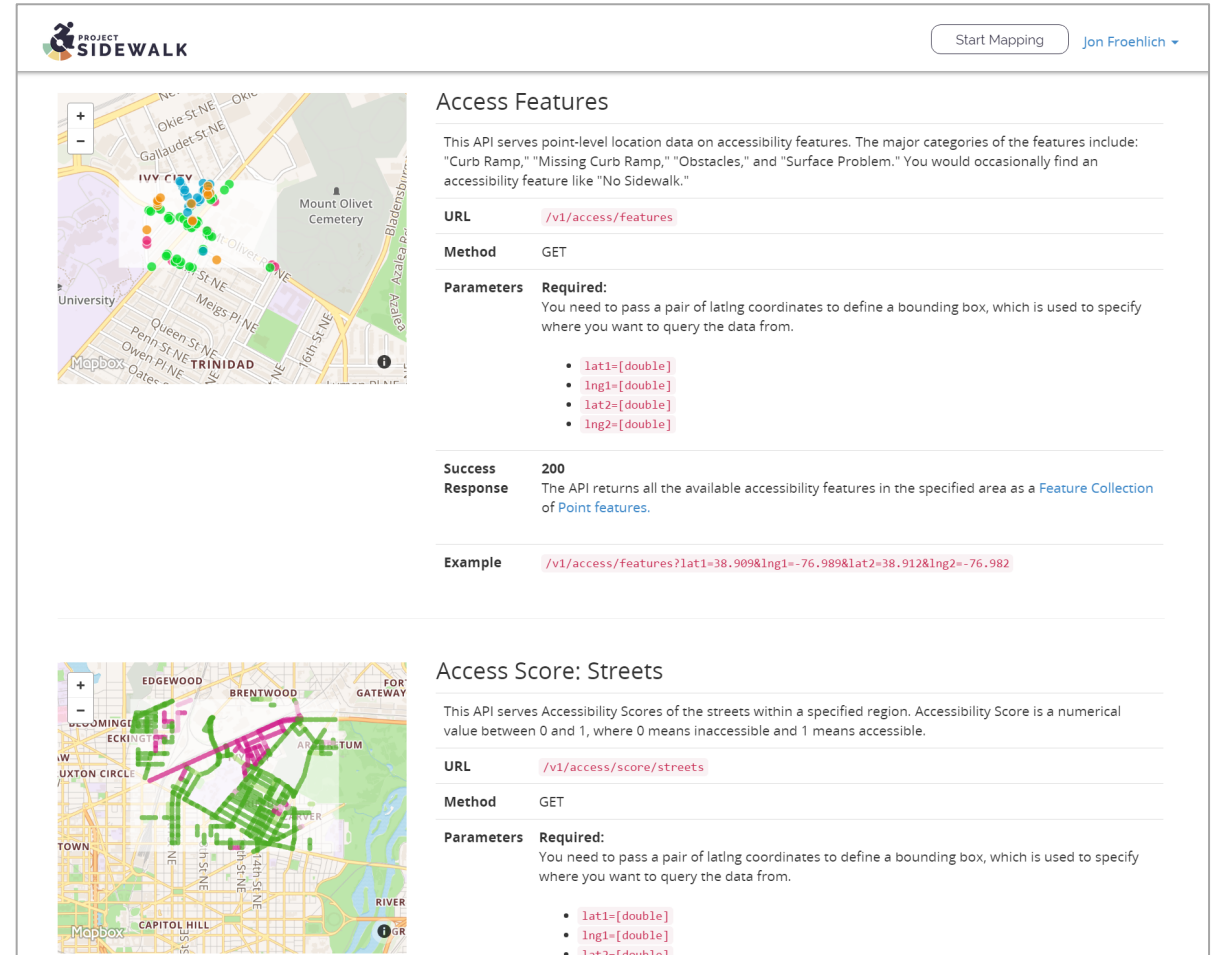
PROJECT SIDEWALK

OPEN SOURCE & OPEN DATA



The screenshot shows the GitHub repository page for Project Sidewalk. The header includes the GitHub logo, a search bar, and navigation links for Pull requests, Issues, Marketplace, and Explore. The repository name "Project Sidewalk" is prominently displayed, along with a description: "Project Sidewalk is operated by the Makeability Lab at the University of Washington and University of Maryland, College Park." Below this, there are statistics for Repositories (14), People (15), Teams (1), and Projects (0). A search bar for repositories is present, along with filters for Type and Language. The main content area lists several repositories: "SidewalkWebpage" (JavaScript, 27 stars, updated 17 hours ago), "Sidewalk_CV" (Jupyter Notebook, updated 8 days ago), "sidewalk-data-analysis" (HTML, 3 stars, updated 19 days ago), and "SidewalkWebpageDC" (JavaScript, updated on Aug 24). A sidebar on the right shows "Top languages" (JavaScript, HTML, Shell, Python, Java) and a "People" section with a grid of profile pictures and an "Invite someone" button.

<https://github.com/ProjectSidewalk>



The screenshot shows the Project Sidewalk API documentation page. The header includes the Project Sidewalk logo, a "Start Mapping" button, and the name "Jon Froehlich". The page is divided into two main sections: "Access Features" and "Access Score: Streets".

Access Features

This API serves point-level location data on accessibility features. The major categories of the features include: "Curb Ramp," "Missing Curb Ramp," "Obstacles," and "Surface Problem." You would occasionally find an accessibility feature like "No Sidewalk."

URL `/v1/access/features`

Method GET

Parameters Required: You need to pass a pair of latlng coordinates to define a bounding box, which is used to specify where you want to query the data from.

- `lat1=[double]`
- `lng1=[double]`
- `lat2=[double]`
- `lng2=[double]`

Success Response 200
The API returns all the available accessibility features in the specified area as a [Feature Collection of Point features](#).

Example `/v1/access/features?lat1=38.909&lng1=-76.989&lat2=38.912&lng2=-76.982`

Access Score: Streets

This API serves Accessibility Scores of the streets within a specified region. Accessibility Score is a numerical value between 0 and 1, where 0 means inaccessible and 1 means accessible.

URL `/v1/access/score/streets`

Method GET

Parameters Required: You need to pass a pair of latlng coordinates to define a bounding box, which is used to specify where you want to query the data from.

- `lat1=[double]`
- `lng1=[double]`
- `lat2=[double]`

<http://projectsidewalk.io/api>

STAKEHOLDER PERCEPTIONS AND CONCERNS

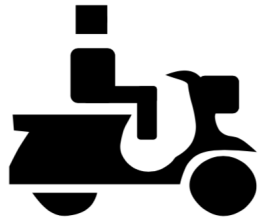
Perceived Value

Usability

Concerns



KEY STAKEHOLDERS



People with Mobility Impairments



Caregivers

KEY STAKEHOLDERS



Accessibility Advocates



Government Officials

KEY STAKEHOLDERS



Accessibility Advocates



Government Officials



Elected Officials
and other policymakers

DOTs

WHAT ARE THE STAKEHOLDERS' PERCEPTIONS AND CONCERNS?

Perceived Value

Enabled rapid data collection

Gathered diverse perspectives about accessibility

Helped engage citizens in thinking about urban design

WHAT ARE THE STAKEHOLDERS' PERCEPTIONS AND CONCERNS?

Perceived Value

“

It's really good for a starting point. This is a first observation, and when you send somebody out in the field, they can see those observations and pick up more information. It's just neat!

-G4

”

WHAT ARE THE STAKEHOLDERS' PERCEPTIONS AND CONCERNS?

Concerns

Data age i.e., outdated GSV imagery or labels

Data reliability

Conflicted data

WHAT ARE THE STAKEHOLDERS' PERCEPTIONS AND CONCERNS?

Concern: *Conflicting Perspectives*

“

My concern as a user [is that] someone said this was accessible and I got there and it wasn't accessible, because everyone has different opinions on accessibility.

-MI1 ”

WHAT ARE THE STAKEHOLDERS' PERCEPTIONS AND CONCERNS?

Concern: *Data Reliability*

“

I would have more confidence if different people did it, did the same street.

-G4 ”

DATA VALIDATION

DEALING WITH MISLABELING

Is this a **Curb Ramp**?



Is this an **Obstacle in Path**?



VALIDATION INTERFACES


Hide Label


Skip


Feedback

Is this an **Obstacle in Path**?


Zoom In


Zoom Out



Google

© 2019 Google | [Terms of Use](#) | [Report a problem](#)

 Agree

 Disagree

 Not sure

 6 labels

Current Mission

Validate 10 labels

60% complete

Obstacle in Path



NOT an Obstacle in Path



DATA VALIDATION

MOBILE VALIDATION — TRY IT!

Go to **projectsidewalk.io** on your phones



Validate 10 Missing Curb Ramp labels



Your mission is to determine the correctness of 10 Missing Curb Ramp labels placed by other users!

Ok



Crowdsourced
Data Collection



Automated
Data Collection



Accessibility-aware
Application Design



Crowdsourced
Data Collection



Automated
Data Collection



Accessibility-aware
Application Design



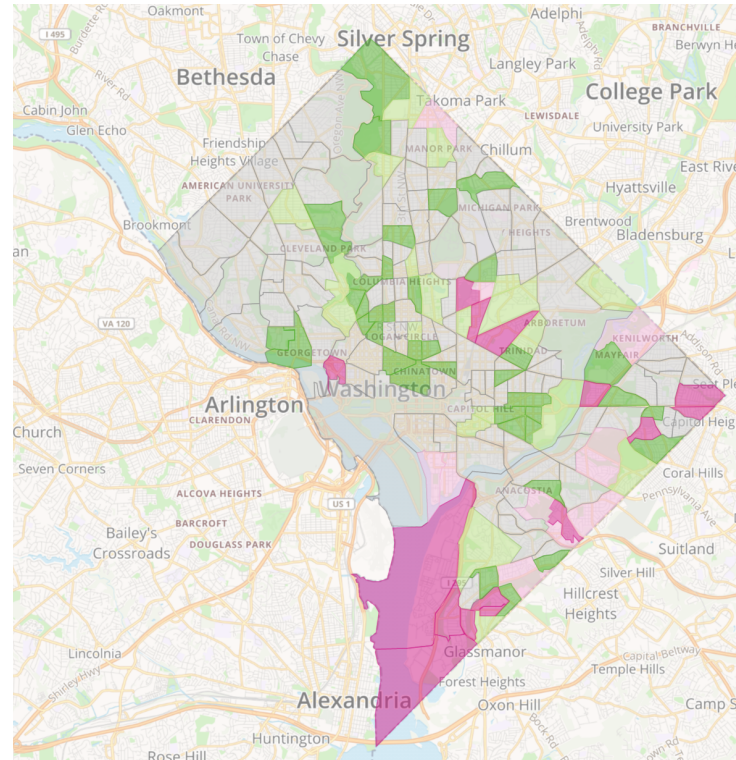
1. What location-based applications should we design with the collected accessibility data?
2. How do we design these interactive GIS applications?

INTERACTIVE GIS TOOLS

ACCESSIBILITY-AWARE APPLICATIONS



Smart routing for people with impairments

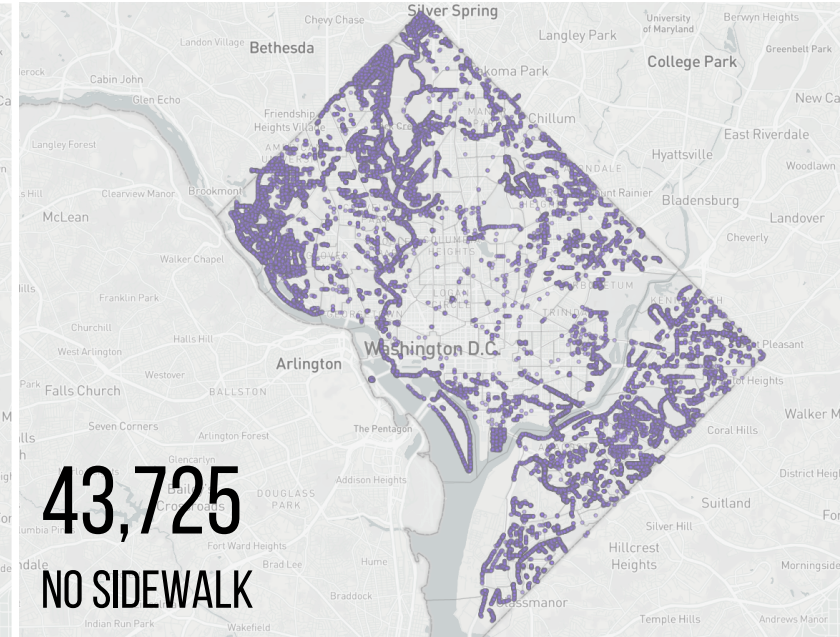
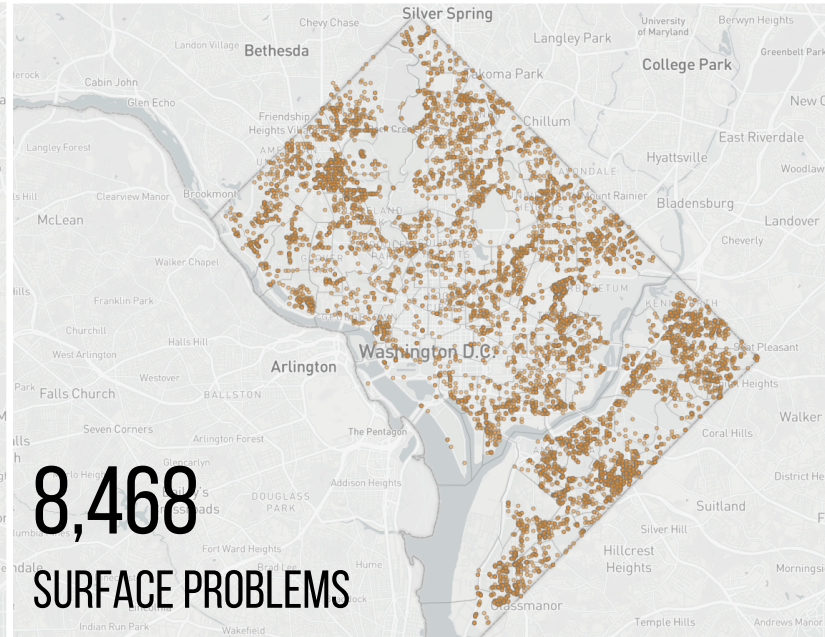
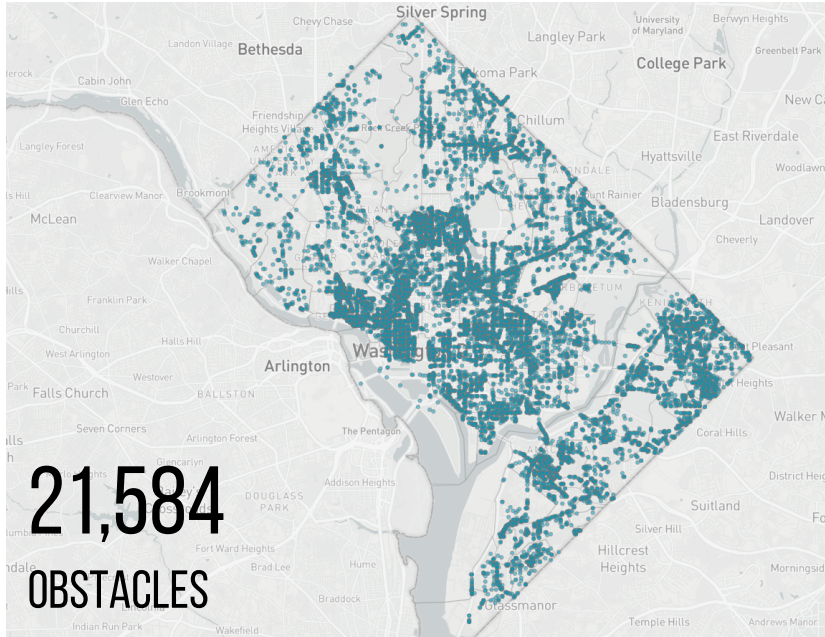


City accessibility visualizations

DC
vs
Seattle

Cross-city comparison tools

VISUALIZING ACCESSIBILITY

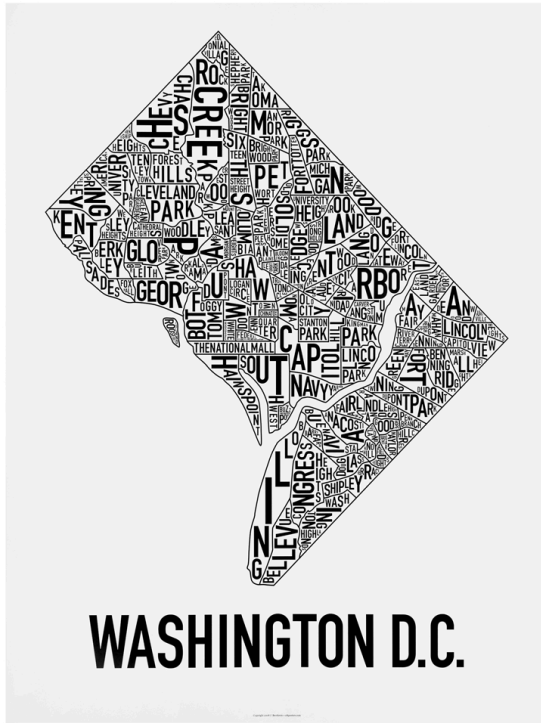


What are the (in)accessible areas of the city?

Why are they (in)accessible?

Where are the areas with highest repair needs?

MODELING ACCESSIBILITY



VS



VS



What are the **correlates** to accessibility?
How do we **compare** accessibility across cities?

WHAT ARE THE STAKEHOLDERS' PERCEPTIONS AND CONCERNS?

Concern: *Conflicting Perspectives*

“

My concern as a user [is that] someone said this was accessible and I got there and it wasn't accessible, because everyone has different opinions on accessibility.

-MI1 ”

INTERACTIVE GIS TOOLS

ACCESS SCORE: PERSONALIZING ACCESSIBILITY MODELS

Interactively Modeling and Visualizing Neighborhood Accessibility at Scale: An Initial Study of Washington DC

Anthony Li¹, Manaswi Saha², Anupam Gupta², Jon E. Froehlich²

¹University of Maryland, College Park, ²University of Washington, Seattle

anti@umd.edu, {manaswi, anupam, jonf}@cs.washington.edu

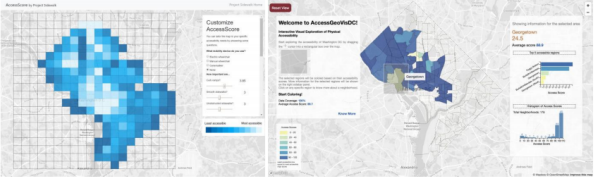


Figure 1. In this poster paper, we explore the initial design and implementation of two interactive geo-visualizations of neighborhood accessibility for people with mobility impairments: (a) *AccessScore* and (b) *AccessVisDC*. Both prototypes model and visualize accessibility using Project Sidewalk’s API [9].

ABSTRACT
Walkability indices such as walkscore.com model the proximity and density of walkable destinations within a neighborhood. While these metrics have gained widespread use (e.g., incorporated into real-estate tools), they do not integrate accessibility-related features such as sidewalk conditions or curb ramps—thereby excluding a significant portion of the population. In this poster paper, we explore the initial design and implementation of neighborhood accessibility models and visualizations for people with mobility impairments. We are able to overcome previous data availability challenges by using the Project Sidewalk API, which provides access to 255,000+ labels about the accessibility and location of DC sidewalks.

Author Keywords
Urban accessibility; geo-visualization; walkability indices

ACM Classification Keywords
H.5.m. Information interfaces and presentation (e.g., HCI)

INTRODUCTION
Websites such as walkscore.com model and visualize the “walkability” of neighborhoods by measuring the proximity and density of walkable destinations (e.g., grocery stores, parks, and restaurants). While recent work suggests that neighborhood walkability correlates with real estate value, lower crime rates, and more walking trips for non-work purposes [3, 7], these metrics do not incorporate accessibility-related features such as sidewalk conditions, the presence of curb ramps, and road grade. One key challenge has been data availability.

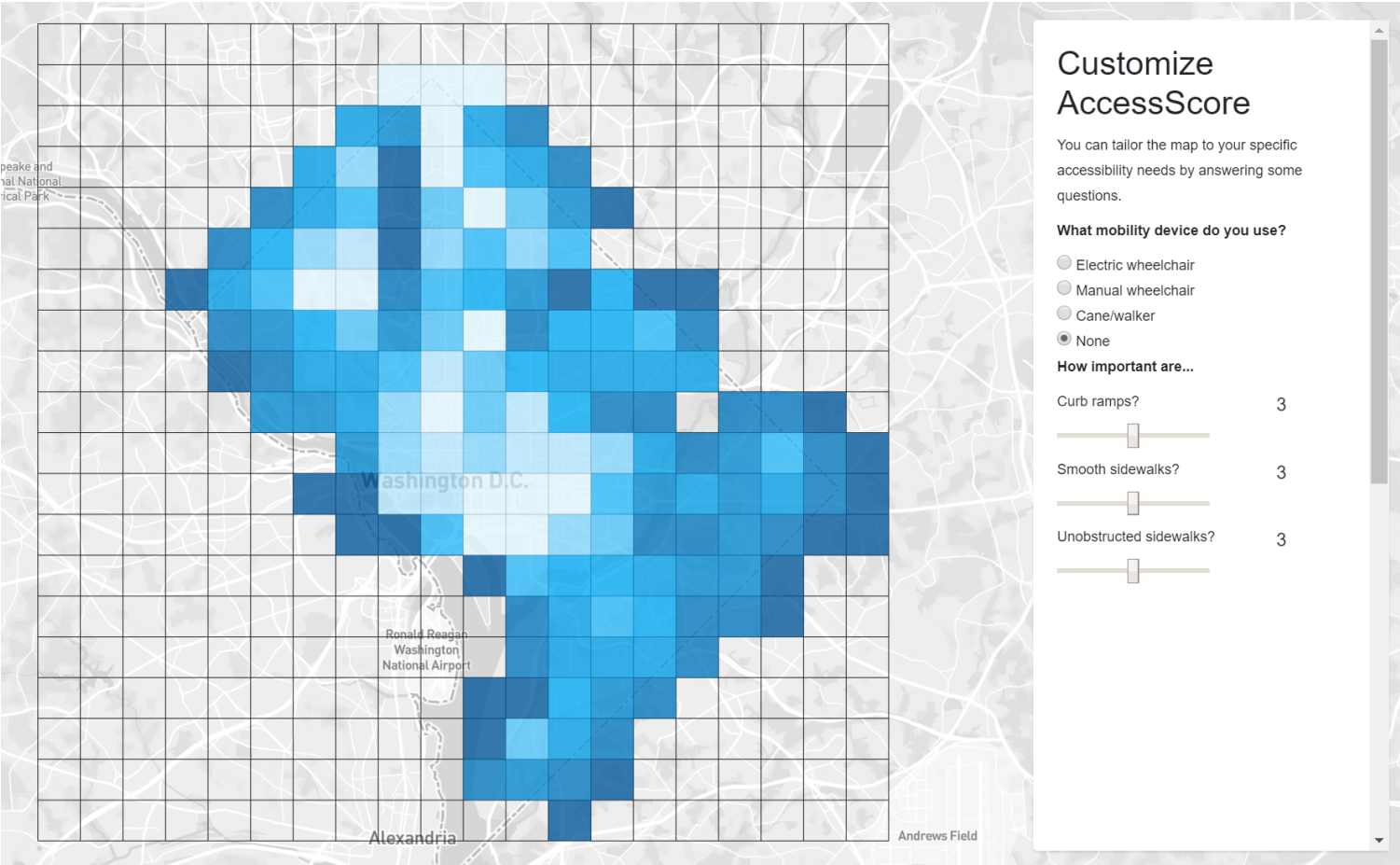
Enabled by Project Sidewalk’s API (projectsidewalk.io/api), which provides access to 255,000+ labels describing the accessibility and location of Washington DC sidewalks [9], we designed and implemented two interactive geo-visualizations of neighborhood accessibility for people with mobility impairments (Figure 1). While recent work has explored accessibility-aware pedestrian routing algorithms and tools [1, 11], these systems are focused on wayfinding rather than modeling and visualizing higher-level abstractions of accessibility. Our aim is complementary: to provide personalizable, interactive, and glanceable visualizations of city-wide accessibility.

As early work, our research questions are exploratory: how can we develop algorithmic models that accurately describe the accessibility of streets and sidewalks? How can we make these models and resulting visualizations parameterizable to meet the needs of different users (e.g., manual vs. electric wheelchair users)? How can we make our visualizations responsive and interactive over the web (even with 100,000+ data points)? To begin addressing these questions, we report on the initial development of two open-source prototype visualization tools: *AccessScore* and *AccessVisDC*.

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ACM ISBN 978-1-4503-5600-3/18/10.
<https://doi.org/10.1145/3234695.3241000>

¹ Source code and live demos for AccessScore: <https://goo.gl/d0MR3G>
and AccessVisDC: <https://goo.gl/yet93RZ>.





Crowdsourced
Data Collection



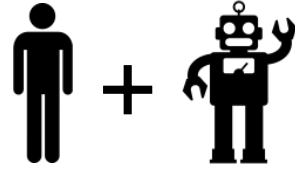
Automated
Data Collection



Accessibility-aware
Application Design



Crowdsourced
Data Collection



Automated
Data Collection

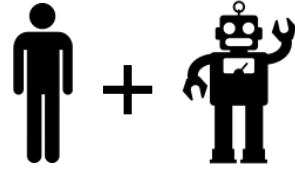


Accessibility-aware
Application Design

1. How can we use computer vision to automatically and accurately detect accessibility attributes?
2. How can we combine crowdsourcing and computer vision to increase the data collection efficiency?



Crowdsourced
Data Collection



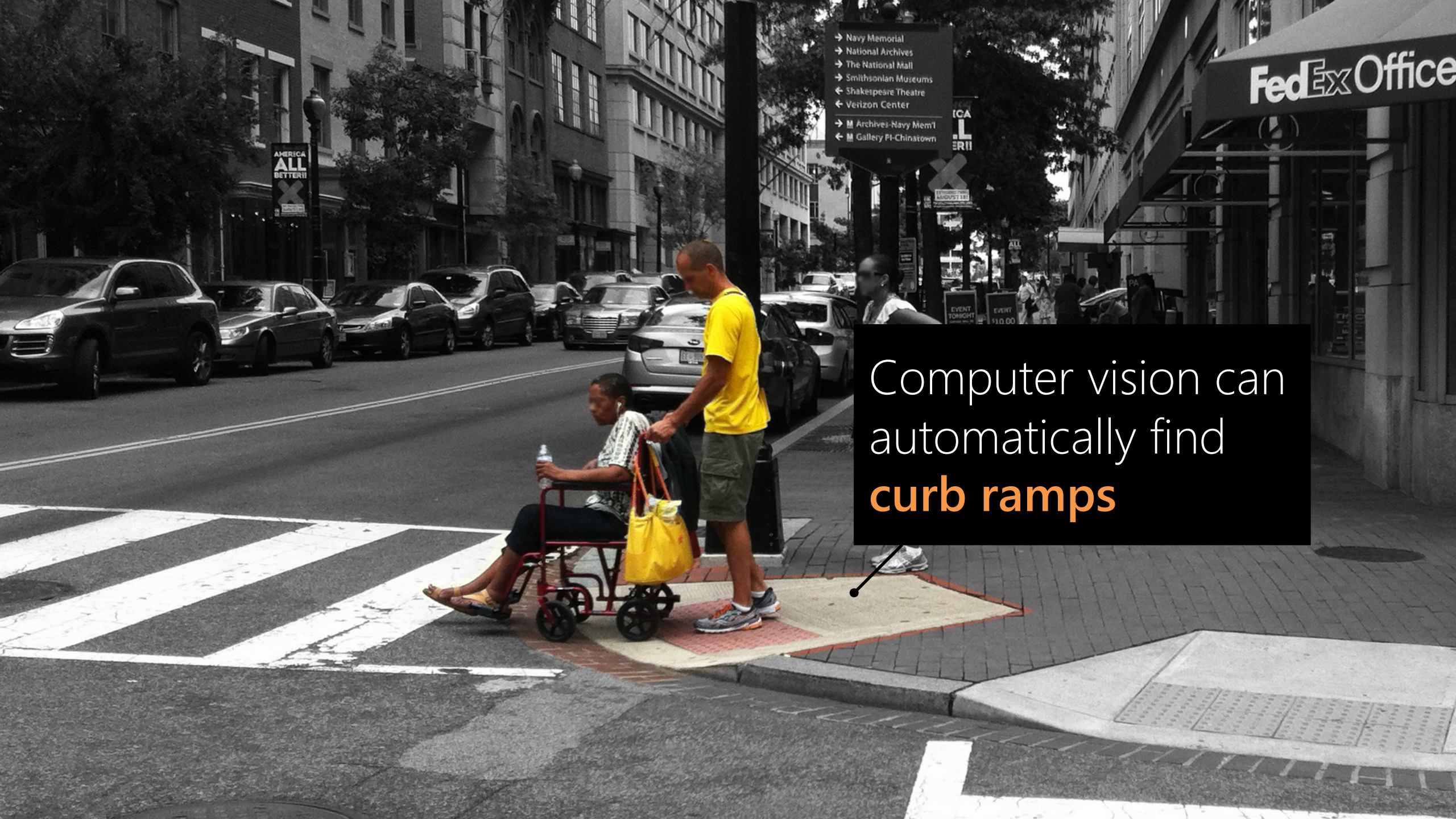
Automated
Data Collection



Accessibility-aware
Application Design

1. How can we use computer vision to automatically and accurately detect accessibility attributes?
2. How can we combine crowdsourcing and computer vision to increase the data collection efficiency?





Computer vision can
automatically find
curb ramps

OTHER TOOLS

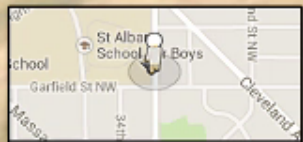
AUTOMATING DATA COLLECTION USING COMPUTER VISION



What **more**?



Temporal Tracking: Tools for tracking sidewalk infrastructure over time using computer vision



Back to Map

Google



OTHER TOOLS

TRACKING ACCESSIBILITY INFRASTRUCTURE OVER TIME



Sept 2007



Jul 2009



May 2011



June 2011



May 2014



Aug 2014



Nov 2016

ACKNOWLEDGEMENTS

PROJECT SIDEWALK TEAM



Manaswi Saha



Michael Saugstad



Galen Weld



Ather Sharif



Hanuma Teja Maddali



Jon Froehlich



Aileen Zeng



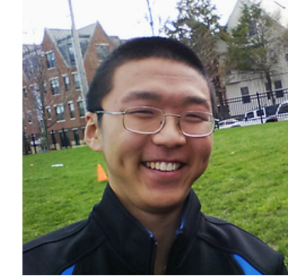
Hank Tadeusaik



Tim Nguyen



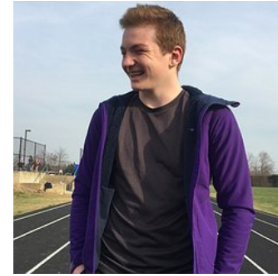
Marianne Aubin
Le Quéré



Anthony Li



Steven Bower



Ryan Holland



Aditya Dash



Sage Chen

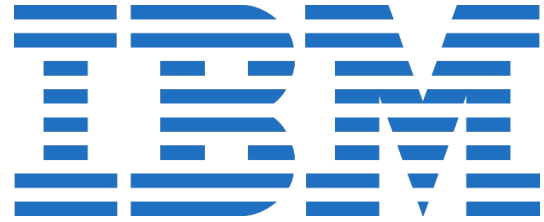


Kotaro Hara

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PI Froehlich, Co-PI David Jacobs



Help make the world more **accessible** for everyone!

Join us. Contact  manaswi@cs.uw.edu  [manaswisaha](https://twitter.com/manaswisaha)

 <https://github.com/ProjectSidewalk>  <http://projectsidewalk.io/api>



Any Questions?

