

License Plate Readers in Acadia: Informing Vehicle Congestion

Sam McCaffery

Ben Gilchrist

Nick Rogerson

Zach Pitts

Reservation System

- Needs accurate **dwell time**
- Get accurate **predictions**
- Obtain results with **license plate readers**

Past WPI Efforts to Monitoring Traffic

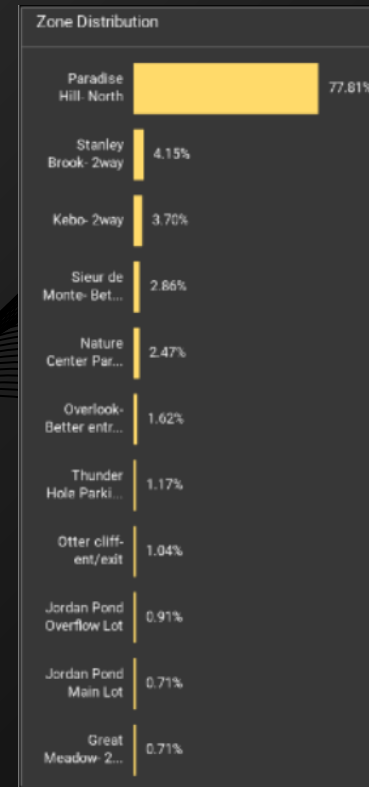
Tube Sensors



Trail Cameras



Big Data



Phone App



Project Goal

Demonstrate the accuracy and **applications** of using **License Plate Readers** to alleviate congestion in Acadia

Project Objectives

- Demonstrate Cameras
- Case studies
- Applications

Demonstrating Cameras

The Cameras

- Proof of Concept
- Temporary Implementation
- Simulate permanent infrastructure

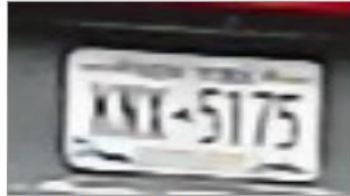


Data Collection

Result



2023-07-19 12:08:15 PM KPG0349



2023-07-19 12:08:00 PM 5175



2023-07-19 12:07:56 PM 4ZWK24



2023-07-19 12:07:42 PM 528KS5



2023-07-19 12:07:05 PM F4410



2023-07-19 12:06:14 PM TF3G1L



2023-07-19 12:05:22 PM U25PMG



2023-07-19 12:05:15 PM WBT2604



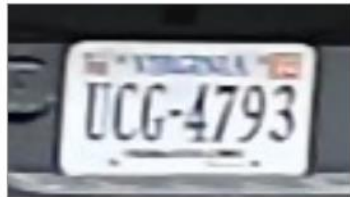
2023-07-19 12:05:02 PM KCG1532



2023-07-19 12:03:39 PM 2FVG66



2023-07-19 12:03:33 PM YDD5915



2023-07-19 12:03:19 PM CG4793



2023-07-19 12:02:28 PM 1449ZK



2023-07-19 12:02:05 PM K97WYP



2023-07-19 12:02:03 PM 5101567

1 / 31 15 View 1 - 15 of 461

Search

Start Time

2023-07-03 12:00:00 AM

End Time

2023-07-20 11:59:59 PM

List Type

Unknown vehicle

License plate number

5264773

Search

Tips: A maximum of 500 pictures can be searched at a time.

Export Im.

Export

Time Range

2023-07-14 09:16:49 PM

↓ ↓

2023-07-19 12:08:15 PM

Data Collection



2023-07-19 12:07:05 PM F4410





2023-07-19 12:03:39 PM 2FVG66



2023-07-19 12:02:03 PM 5101567

- Images
- Date and Time
- Plate Number

Dwell Time Calculations

Enter		Exit		Dwell
	2:36		5:42	3:06

Accuracy



96% accuracy

Case Studies

Case Study: Locations

- Cadillac Mountain
- Sand Beach
- Park Loop Road
- Distant Locations

Cadillac Mountain

Goals

- Track dwell time at the summit

Camera Locations

Results

Cadillac Mountain

Goals

- Track dwell time at the summit
- Track dwell time for the entire mountain

Camera Locations

Results

Cadillac Mountain

Goals

Camera Locations

Results





Cadillac Mountain

Goals

Camera Locations

Results

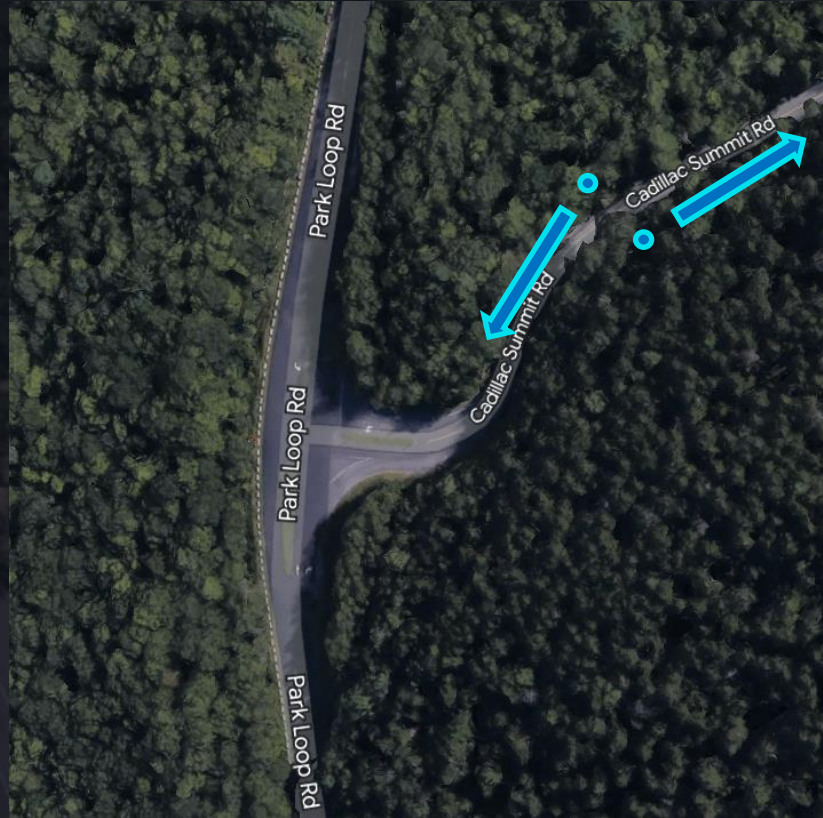


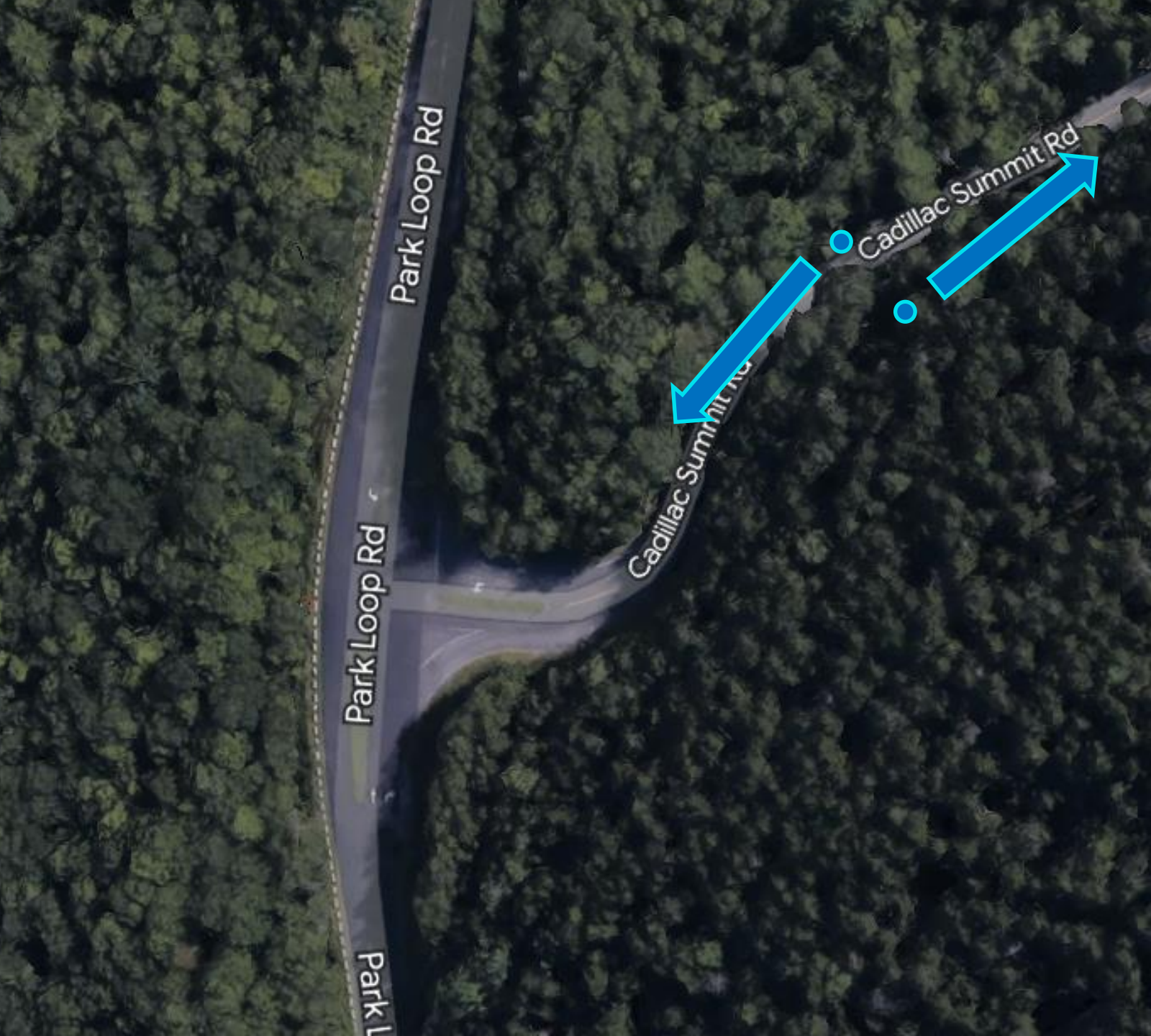
Cadillac Mountain

Goals

Camera Locations

Results



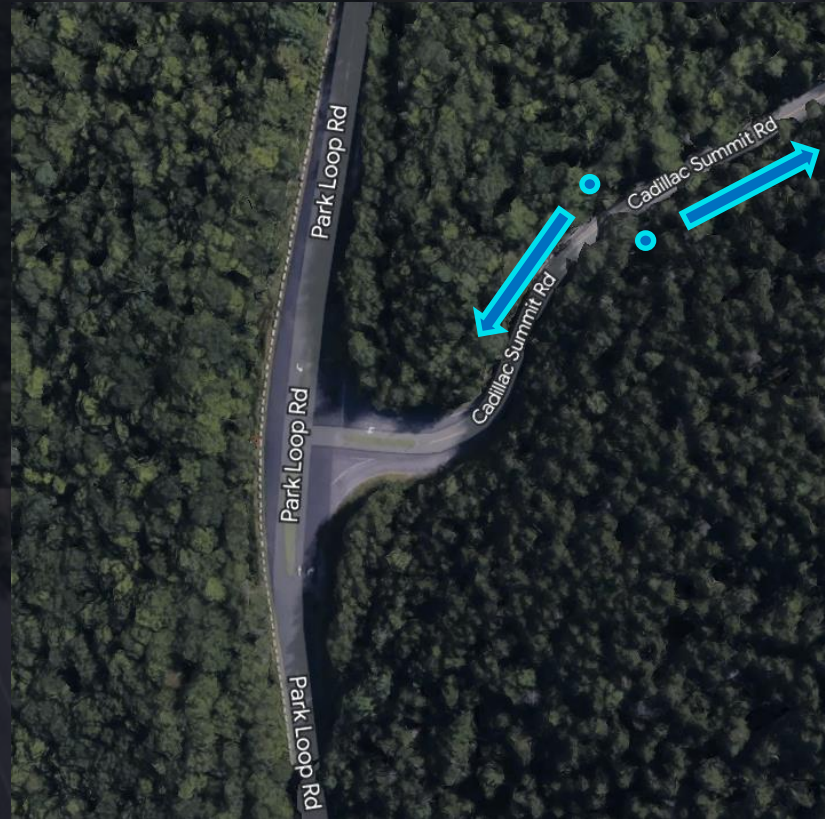


Cadillac Mountain

Goals

Camera Locations

Results



Cadillac Mountain

Goals

(All Days)

- Average Dwell Time: 54 mins

Camera Locations

Results

Cadillac Mountain

Goals

Camera Locations

Results

(All Days)

- Average Dwell Time: 54 mins
- % of cars that stayed:
 - 0-30min: 22%
 - 30-60min: 43%
 - 60-90min: 23%
 - 90+min: 12%

Cadillac Mountain

Goals

Bottom of Mountain

- **Average Dwell Time: 96 mins**

Camera Locations

Results

Cadillac Mountain

Goals

Camera Locations

Results

Bottom of Mountain

- **Average Dwell Time: 96 mins**
- **% of cars that stayed:**
 - 0-30min: 3%**
 - 30-60min: 20%**
 - 60-90min: 40%**
 - 90+min: 37%**

Cadillac Mountain

Goals

Camera Locations

Results

Bottom of Mountain

- **Average Dwell Time: 96 mins**
- **% of cars that stayed:**
 - 0-30min: 3%**
 - 30-60min: 20%**
 - 60-90min: 40%**
 - 90+min: 37%**
- **Hour with most entries: 5PM**

Sand Beach

Goals

Camera Locations

Results

- Track dwell time in parking lot

Sand Beach

Goals

Camera Locations

Results





Sand Beach

Goals

Camera Locations

Results



Sand Beach

Goals

Camera Locations

Results

○ Camera placement

Sand Beach Overlook

Sand Beach

Beehive Lagoon

Park Loop Road

Goals

Camera Locations

Results

- Track dwell time across Park Loop Road

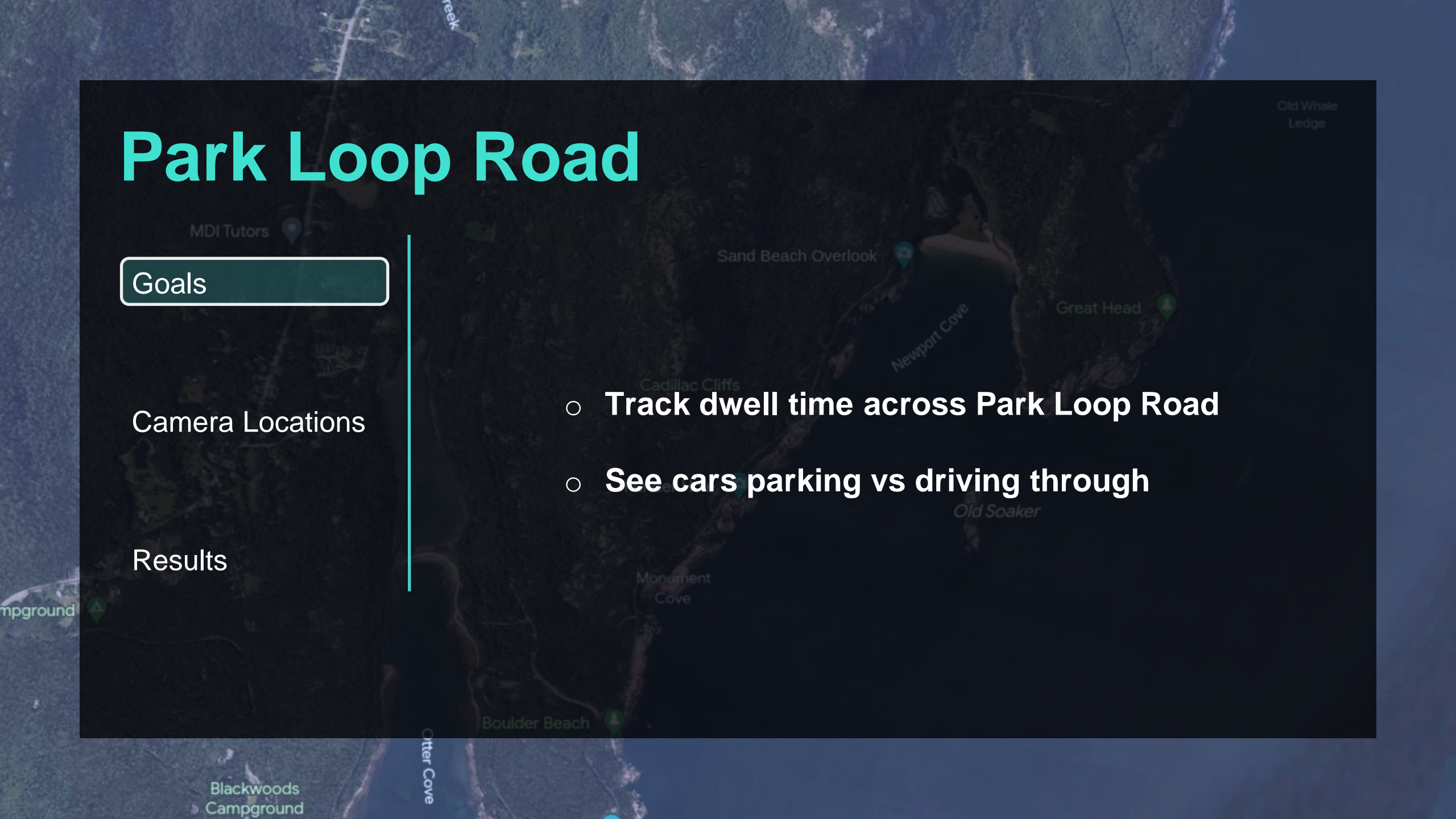
Park Loop Road

Goals

Camera Locations

Results

- Track dwell time across Park Loop Road
- See cars parking vs driving through

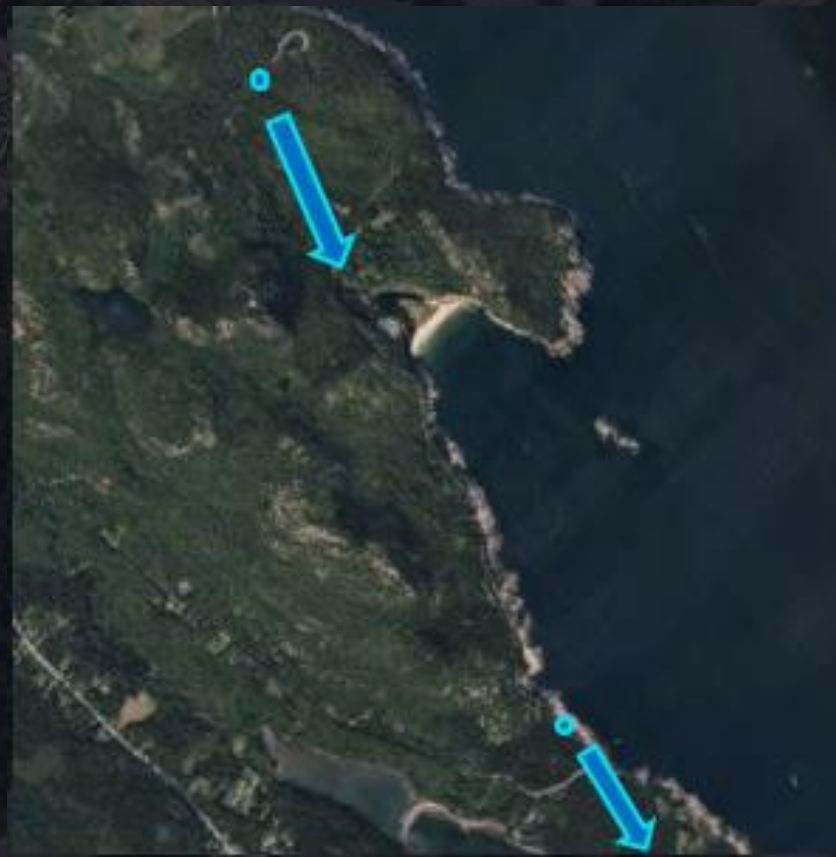


Park Loop Road

Goals

Camera Locations

Results

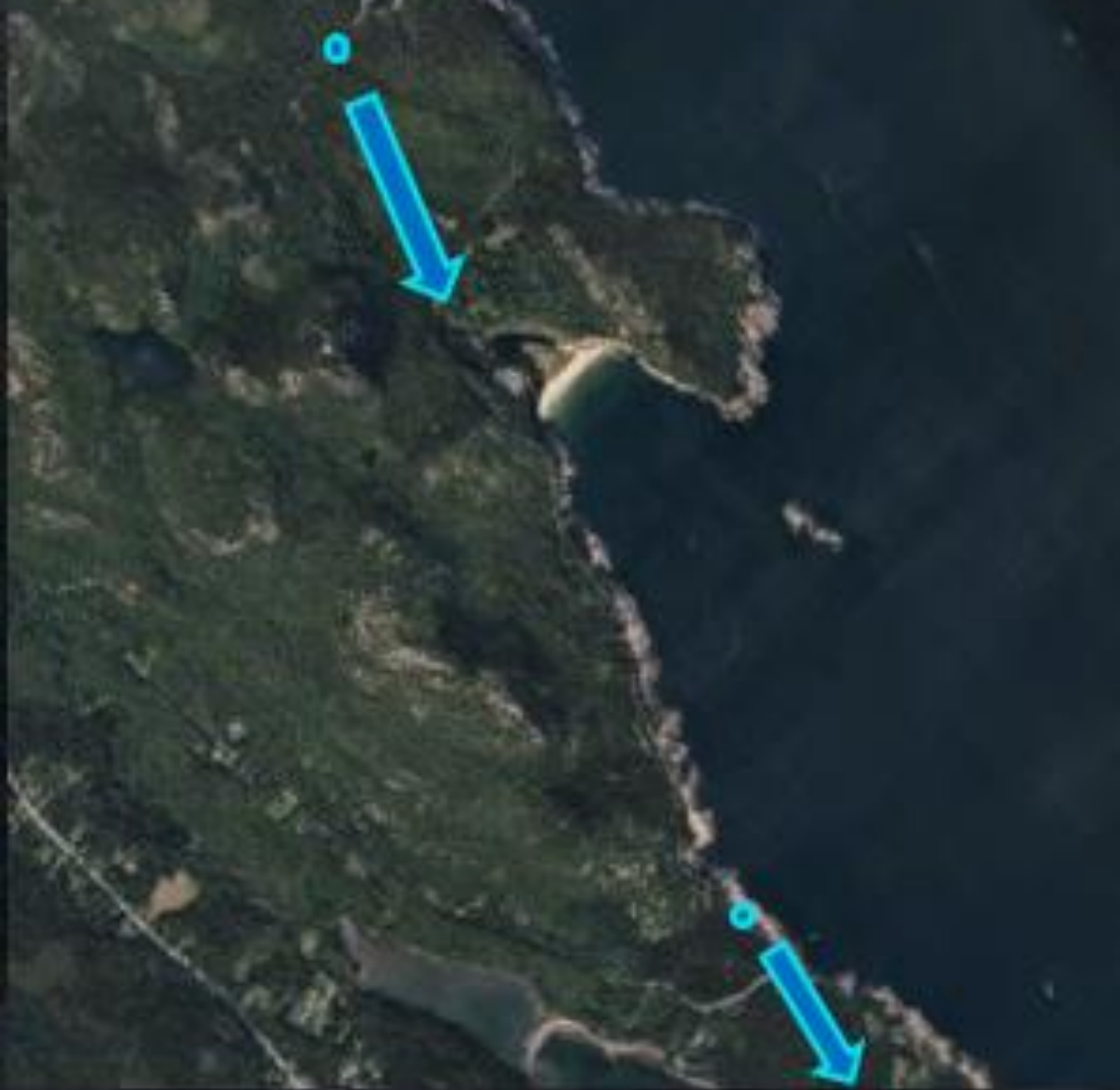


Park Loop Road

Goals

Camera Locations

Results

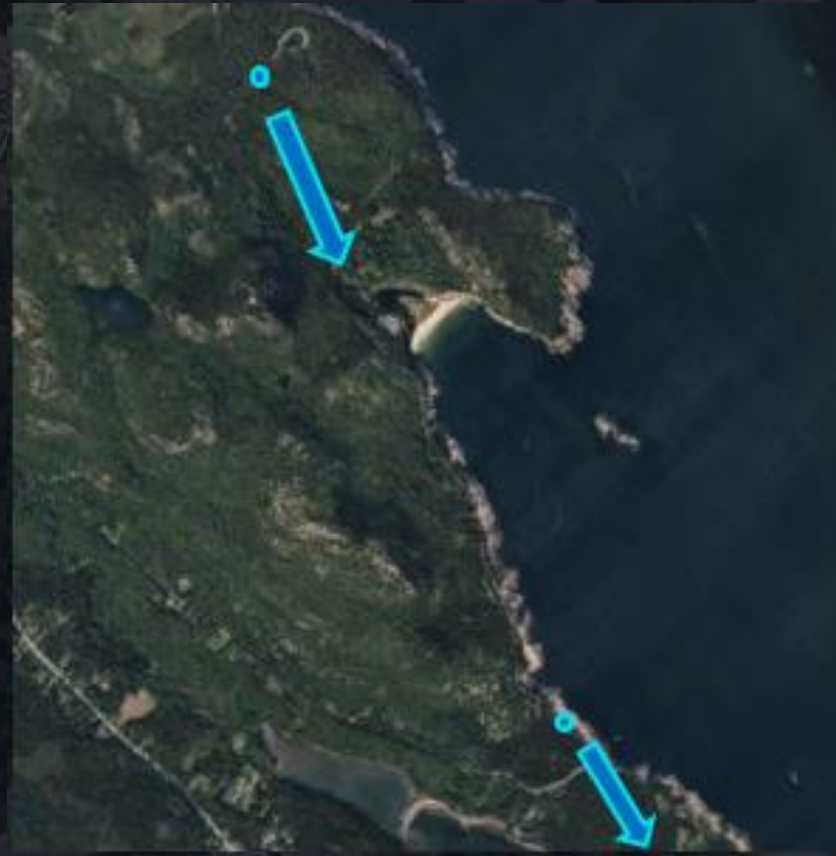


Park Loop Road

Goals

Camera Locations

Results



Park Loop Road

Goals

Camera Locations

Results

- **Average Dwell Time: 53 mins**
- **% of cars that stayed:**
 - 0-15min: 22%**
 - 15-60min: 41%**
 - 60-90min: 17%**
 - 90+min: 19%**
- **Over 22% of cars are not stopping**

Distant Locations

Goals

- **Understand Traffic Patterns**

Camera Locations

- **Show how a larger fleet of cameras could assist the park**

Results

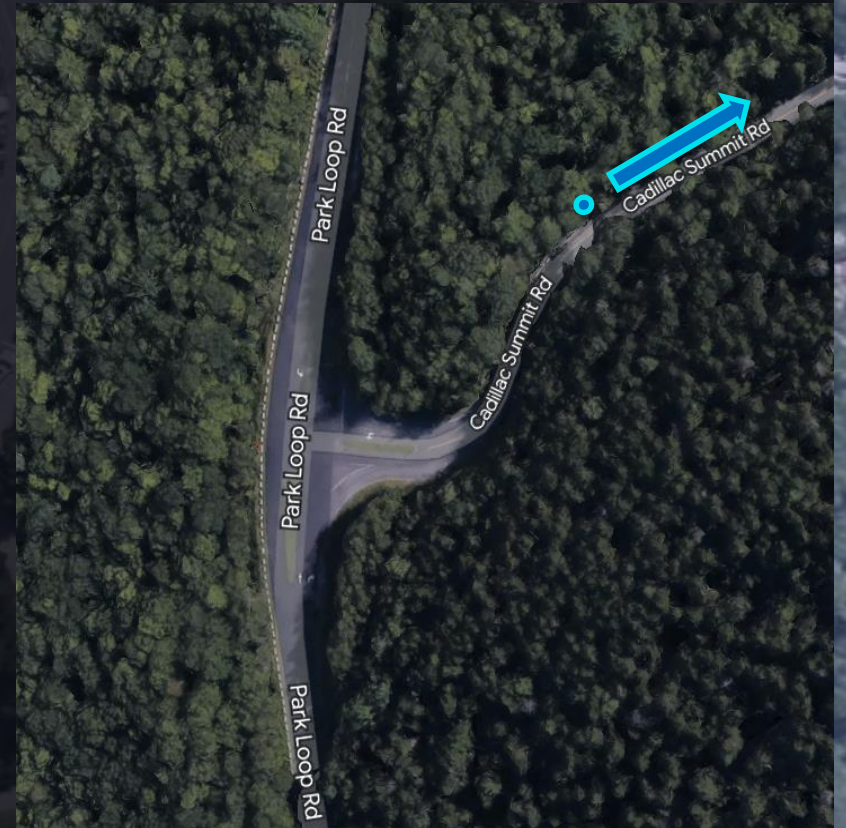
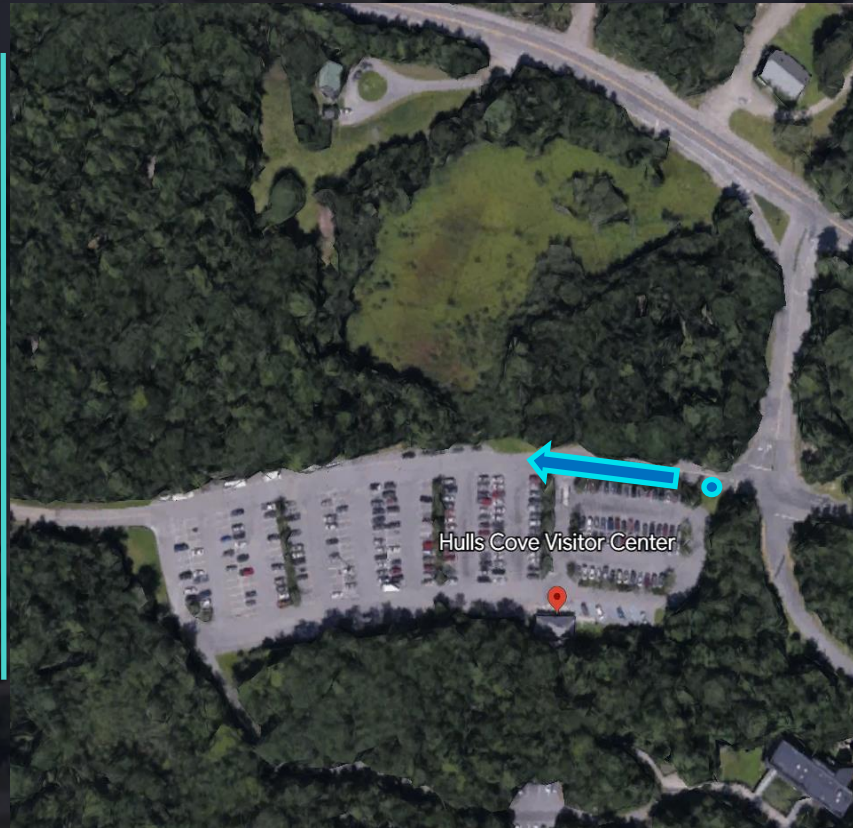
- **Understand Visitor Behavior trends**

Distant Locations

Goals

Camera Locations

Results



Distant Locations

Goals

Cadillac -> Visitor Center

Visitor Center -> Cadillac

Camera Locations

- PH0TOG 0:08:12
- HM294 2:05:17
- 4HBY95 0:17:06

- LAL1377 1:51:19
- 4468760 0:54:10
- BA34764 1:37:53

Results

Applications & Recommendations

Applications



Live Feed



Occupancy



Travel Time



Correlations



Live Feed



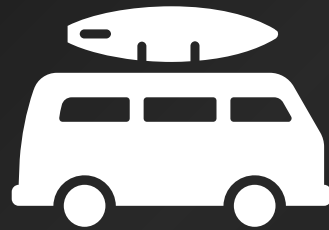
Applications



Live Feed



Occupancy



Travel Time

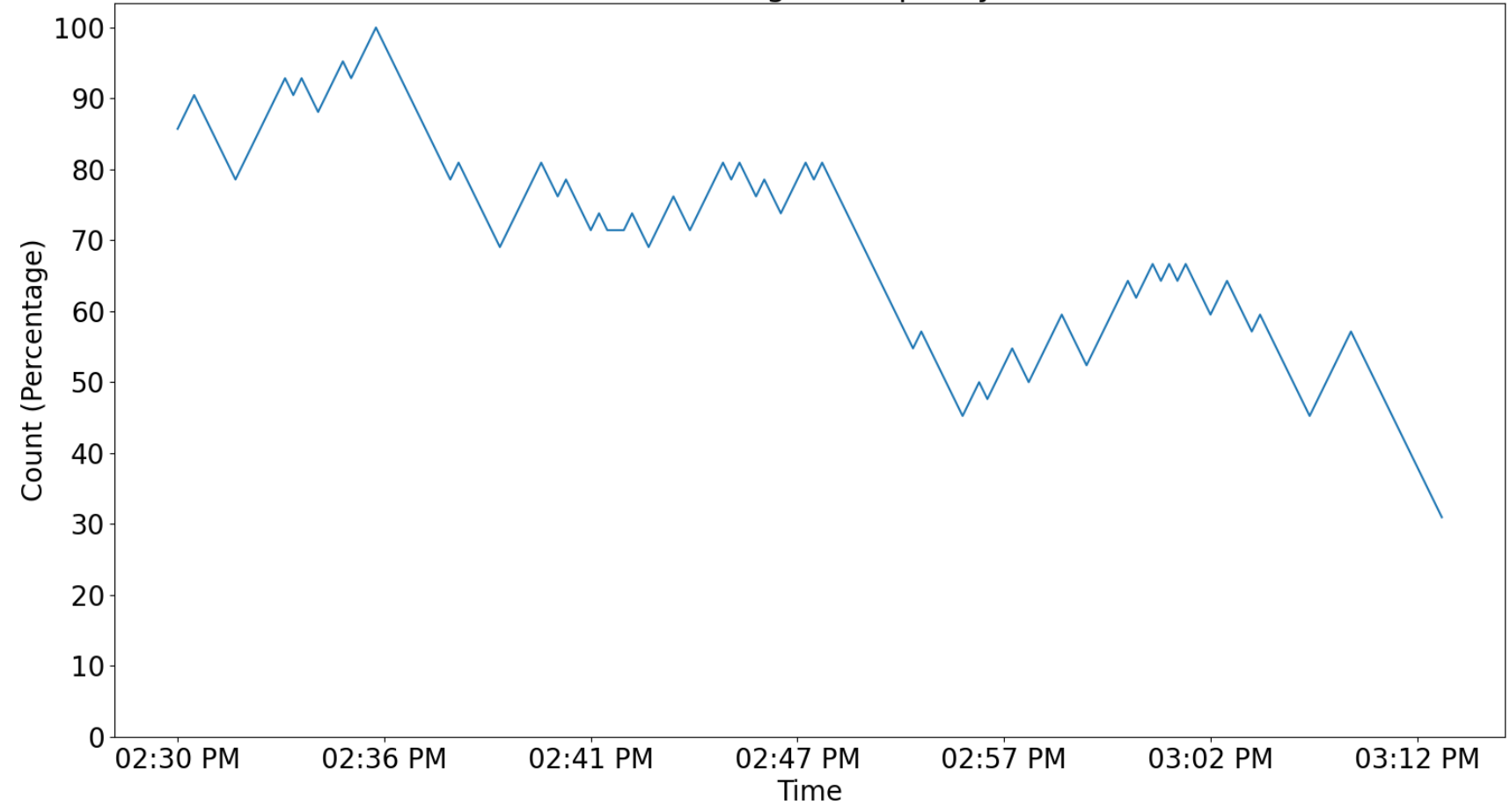


Correlations



Occupancy

Percentage Occupancy



Digital display showing the number of spaces available in East Parking for levels 1 through 5.

Level	Spaces Available
5	214
4	121
3	195
2	188
1	155

Applications



Live Feed



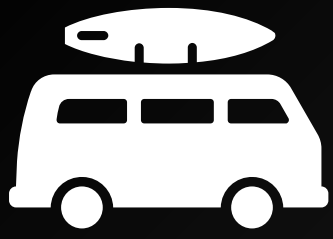
Occupancy



Travel Time



Correlations



Travel Time



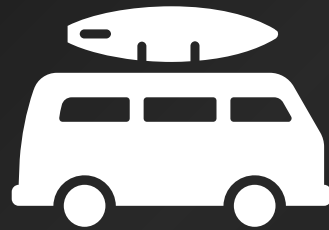
Applications



Live Feed



Occupancy



Travel Time



Correlations



Correlations

Dwell Time =

- Date
- Weather
- Visibility
- Time
- Holidays
- ...

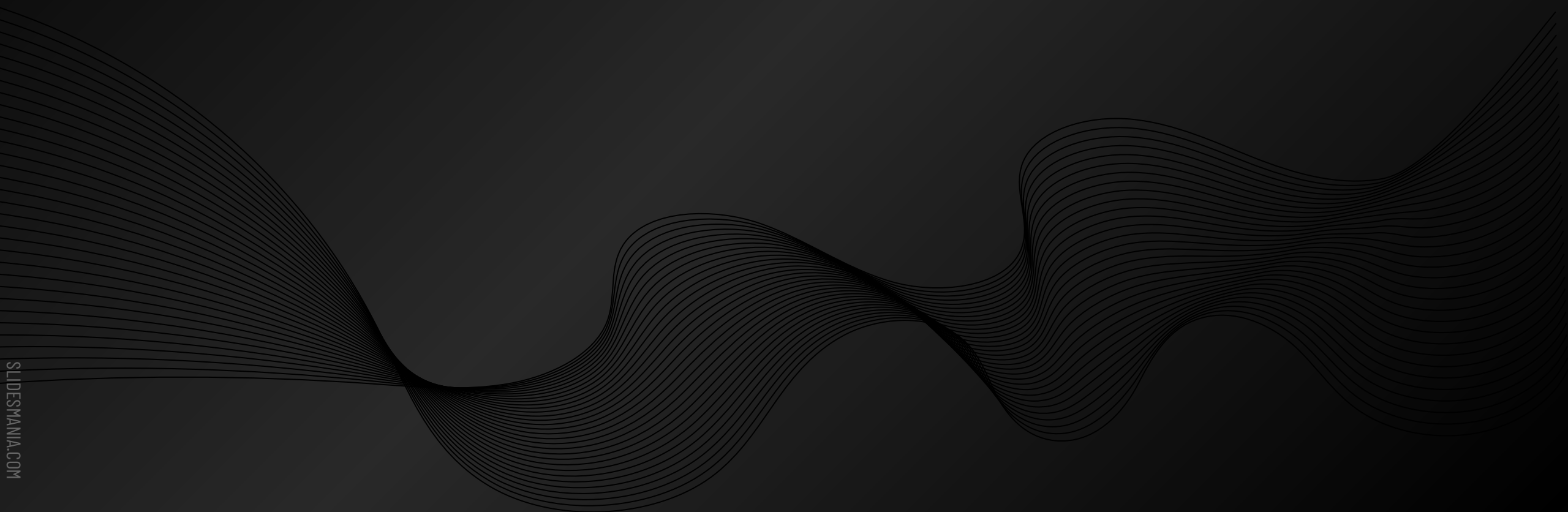
A photograph of four young people standing on the side of a paved road. They are all wearing bright yellow safety vests. The person on the far left is a young woman with long brown hair, smiling and giving a thumbs-up. Next to her is a young man in a light-colored t-shirt and brown pants, also smiling. The third person is a young man with glasses, wearing a black t-shirt and black shorts, smiling. The person on the far right is a young man in a red t-shirt and blue jeans, smiling. In the foreground, a GoPro camera is mounted on a tripod. The background consists of a dense forest of green trees. A wooden signpost is visible on the left side of the road. A red and white bag is on the ground in the bottom right corner.

Thank you!

Cost Predictions

- **Equipment cost: ~\$540 for each camera**
- **Set up cost: ~\$40-\$60 per camera**
- **Third Party Consultant: at least \$2,500**
- **Software Cost: Free**
- **Data Storage Cost: ~\$132 per terabyte**

Estimated Total:
~\$2632 + \$600x
X being the num of
cameras



Cadillac Mountain

Goals

Camera Locations

Results

(Bottom of Mountain)

- Average Dwell Time: 96 mins
- % of cars that stayed:
 - 0-30min: 3%
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 - 60-90min: 40%
 - 90+min: 37%
- Hour with most entries: 5PM

Cadillac Mountain

Goals

Camera Locations

Results

(All Days)

- Average Dwell Time: 54 mins
- % of cars that stayed: 0-30min: 22%
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90+min: 12%



Correlations



Dwell Time



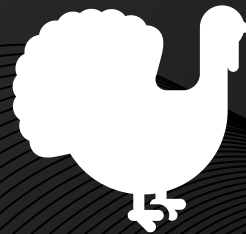
Visibility



Weather



Dwell Time



Holiday



Reservations

Cons



Camera No: Vieutron IPC
Vehicle No: 58:5b:69:47:49:82 Capture Time: 2023-07-12 07:10:41 AM Car Plate: CC8730



2023-07-12 07:10:41 AM CC8730 Unknown vehicle



Camera No: Vieutron IPC
Vehicle No: 58:5b:69:47:49:82 Capture Time: 2023-07-12 06:59:47 AM Car Plate: 1985



2023-07-12 06:59:47 AM 1985 Unknown vehicle








Cons



2023-07-11 03:33:19 PM 3BJH52 Unknown vehicle



Data Collection



	Search
2023-07-19 12:07:05 PM F4410	Start Time 2023-07-03 12:00:00 AM 
	End Time 2023-07-20 11:59:59 PM 
2023-07-19 12:03:39 PM 2FVG66	<input type="checkbox"/> List Type
	Unknown vehicle 
2023-07-19 12:02:03 PM 5101567	<input type="checkbox"/> License plate number
	5264773
	Search
	Tips: A maximum of 500 pictures can be searched at a time.
	Export Im. 
	Export
	Time Range
	2023-07-14 09:16:49 PM
	↓ ↓
	2023-07-19 12:08:15 PM

Privacy

We recognize and appreciate the significance of privacy concerns associated with the use of such technology. As a responsible and informed team, we are fully aware of the potential issues.

Data Collection

Result

 2023-07-19 10:54:05 AM 5264773	 2023-07-18 06:00:31 PM 5264773			

Navigation: 1 / 15 View 1 - 2 of 2

Search

Start Time: 2023-07-03 12:00:00 AM

End Time: 2023-07-20 11:59:59 PM

List Type

Unknown vehicle

License plate number

5264773

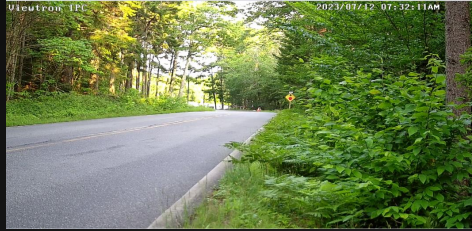
Search

Tips: A maximum of 500 pictures can be searched at a time.

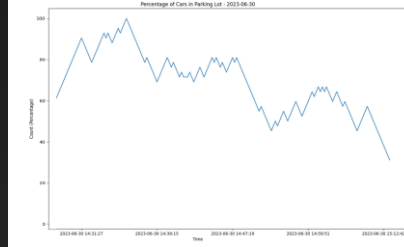
Export Im. Export

Time Range: 2023-07-18 06:00:31 PM to 2023-07-19 10:54:05 AM

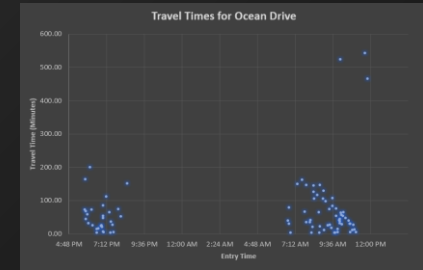
Applications



Live Feed



Occupancy



Travel Time



Correlations

Reservation System

- High visitor count
- Complex system
- Limited Parking Spaces

Appreciation

We are sincerely grateful for the opportunity to contribute our ideas in slides to support Acadia. We wholeheartedly appreciate the chance to make a positive impact and are hopeful that our suggestions can be translated into actionable initiatives that bring about meaningful change.

**Below is old/test slide material, to be
deleted before the final presentation**

Recommendations

Hardware

Data Transfer

Optimized Positions

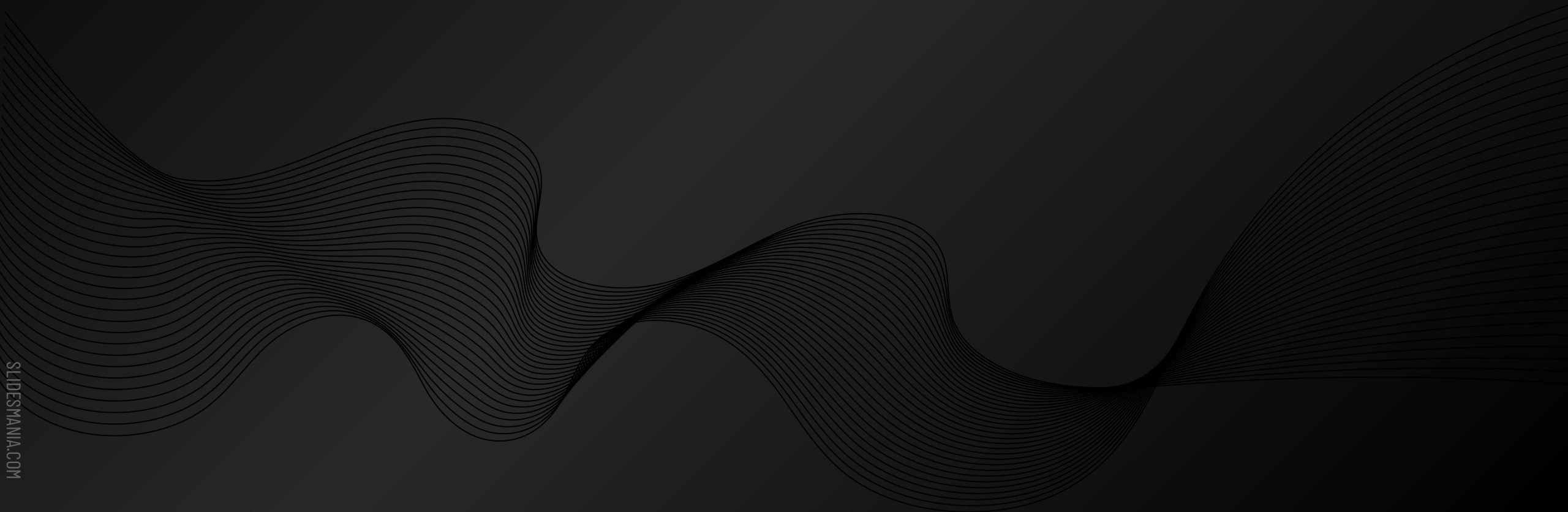
Live Feed



Unparalleled Accuracy



Overview



Findings

Can license plate readers improve reservations?

Unique road layout allows for circulation data

Transportation plan.

Calculate dwell times.

Identify lot capacity.

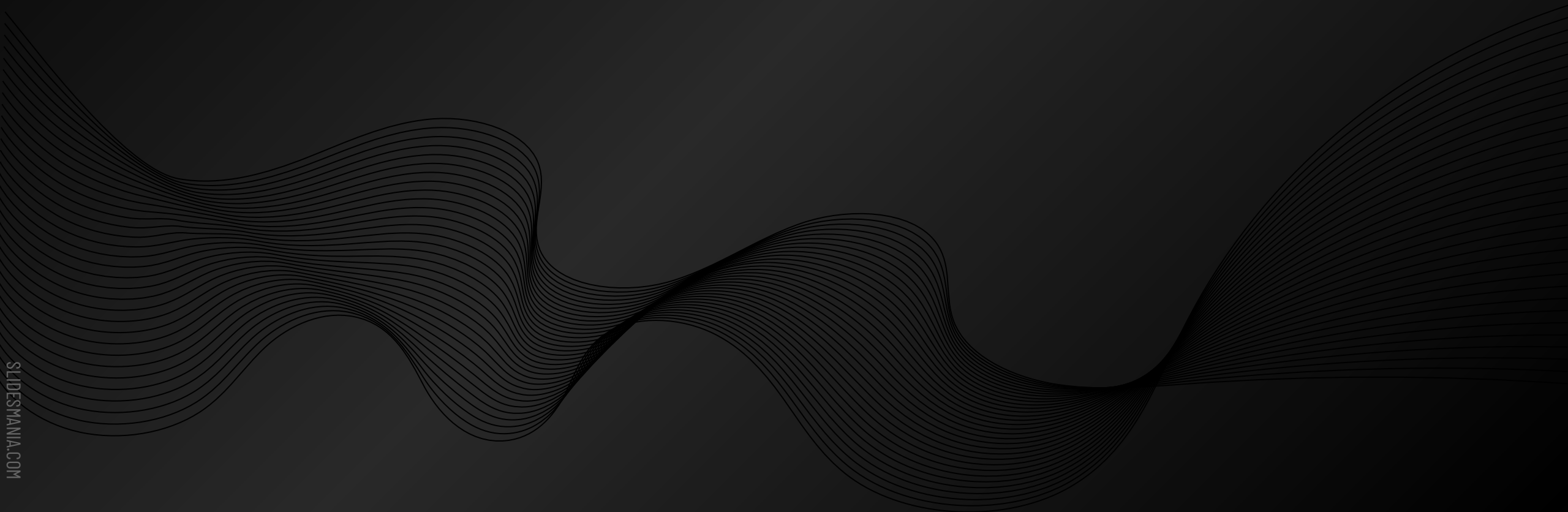
Determine Correlations.

Thunder Hole

Add a brief introduction of your section here.

Let's dive in and get to know some interesting facts about animals!

Overview



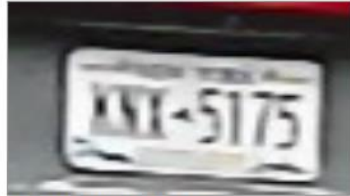
Findings

Park Wide Data

Result



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2023-07-19 12:07:42 PM 528KS5



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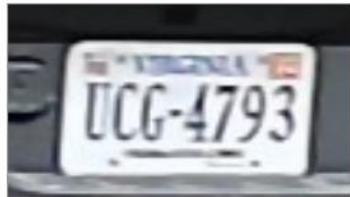
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2023-07-19 12:02:03 PM 5101567

1 / 31 15 View 1 - 15 of 461

Search

Start Time

2023-07-03 12:00:00 AM

End Time

2023-07-20 11:59:59 PM

List Type

Unknown vehicle

License plate number

5264773

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Export Im.

Export

Time Range

2023-07-14 09:16:49 PM

↓ ↓

2023-07-19 12:08:15 PM

Sand Beach

Add a brief introduction of your section here.

Let's dive in and get to know some interesting facts about animals!

Project Goals

The problem:
Congestion



Overview

Project Setup

- **Project Goals**
- **The Cameras**
- **Automation Systems**
- **Dwell Time Calculation**

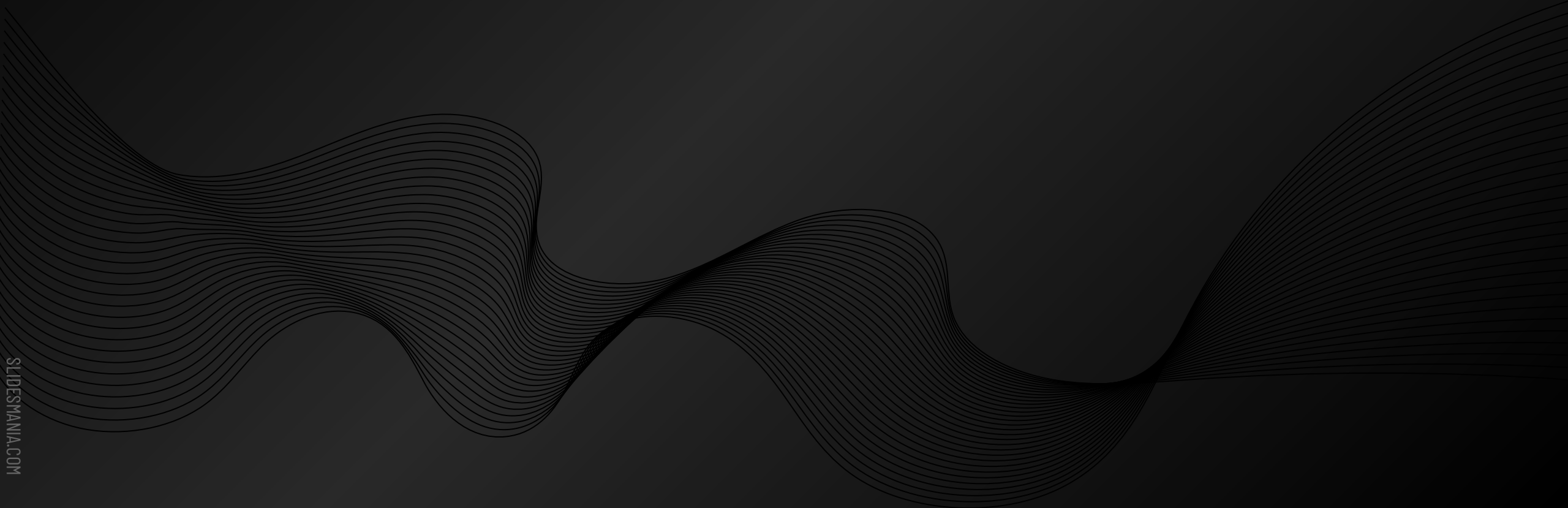
Case Studies

- **Cadillac Mountain**
- **Sand Beach**
- **Ocean Drive**
- **Park Loop Road**
- **(etc)**

Applications & Recommendations

- **Live feed**
- **Occupancy**
- **Travel Patterns**
- **Traffic Speeds**
- **Recommendations**
- **Cost Predictions**

Overview



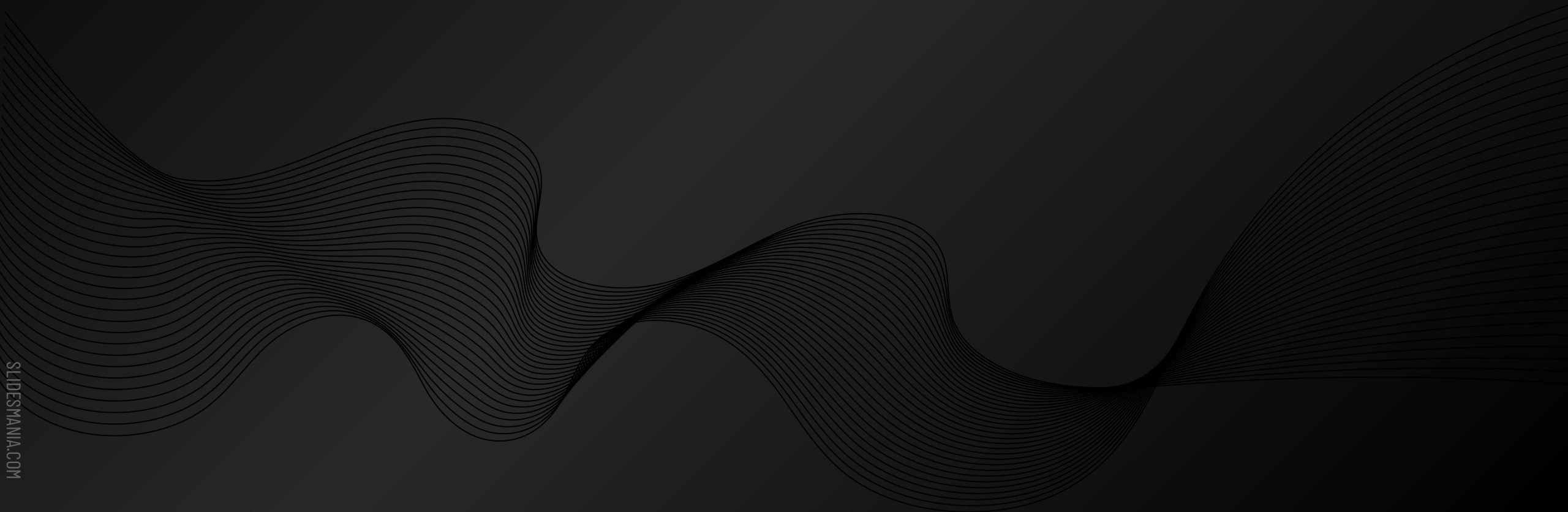
Findings

Schoodic Peninsula

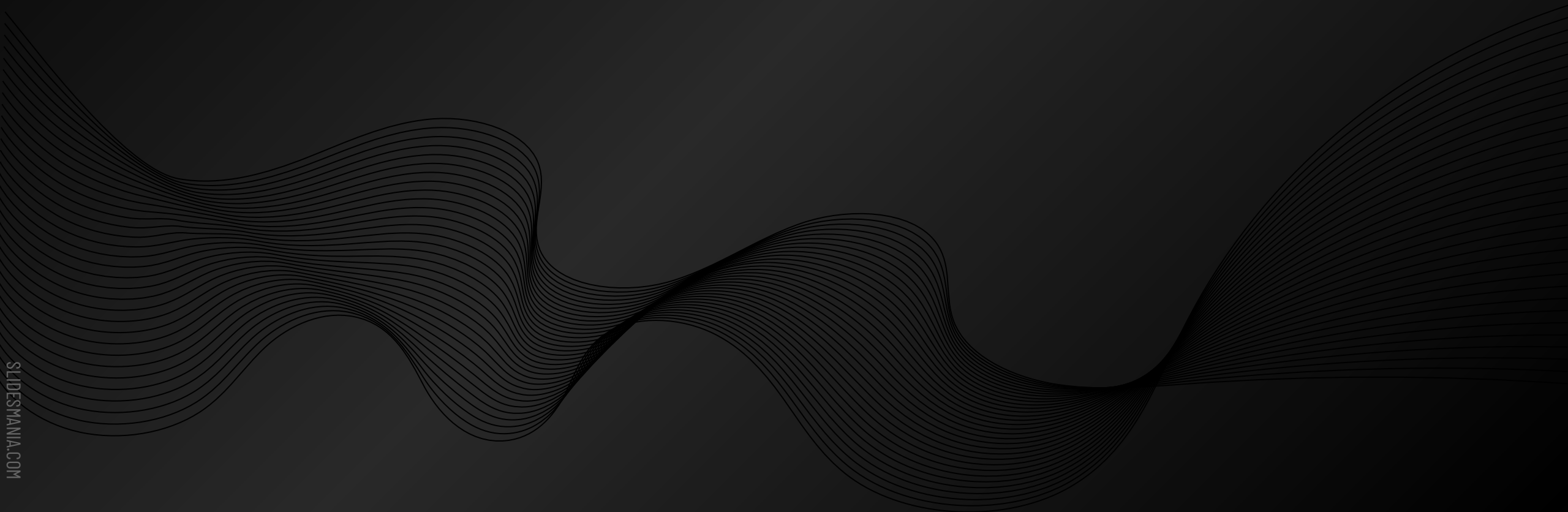
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Overview



Findings

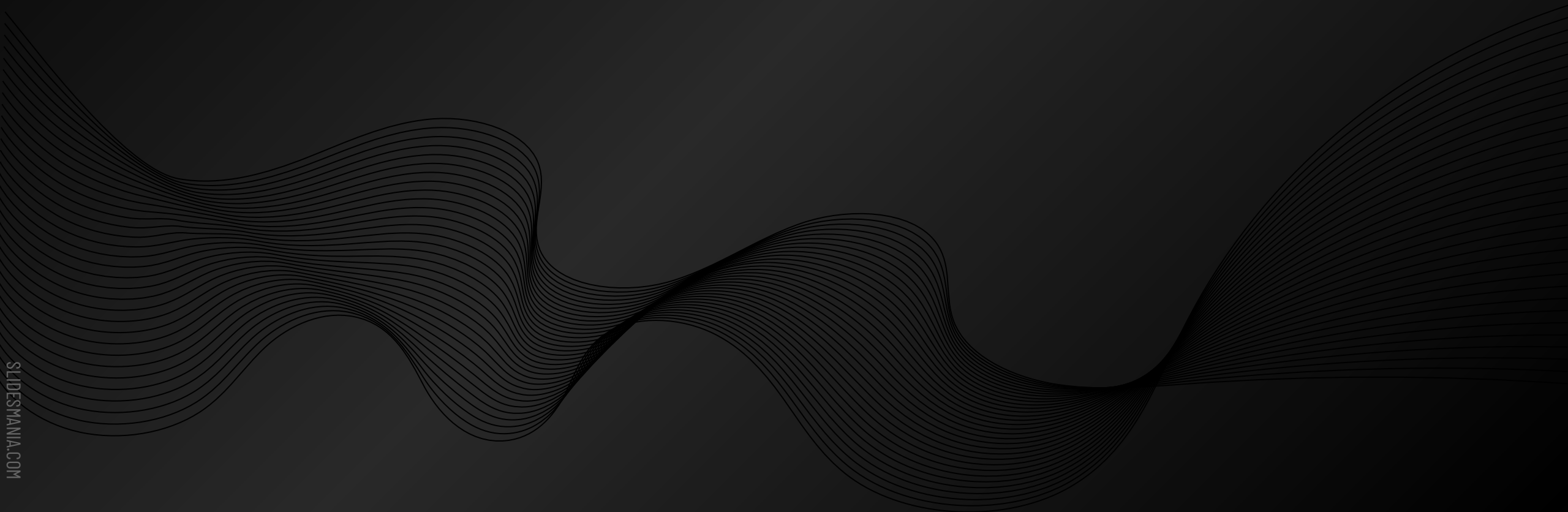


Bass Harbor Lighthouse

Add a brief introduction of your section here.

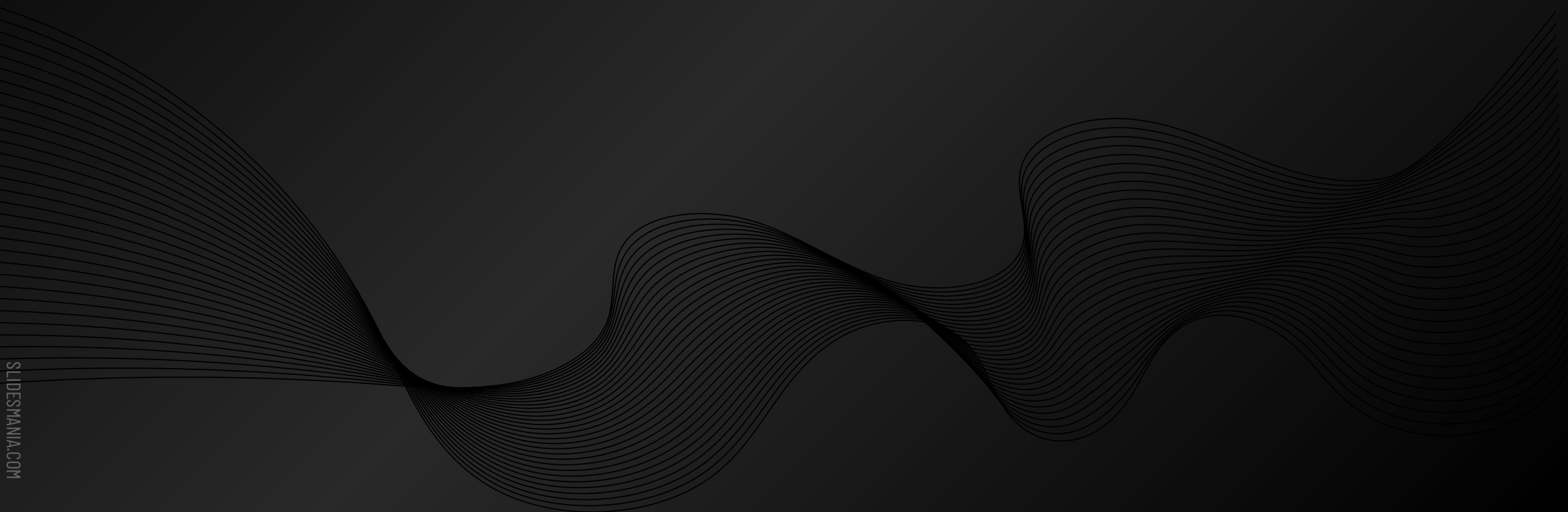
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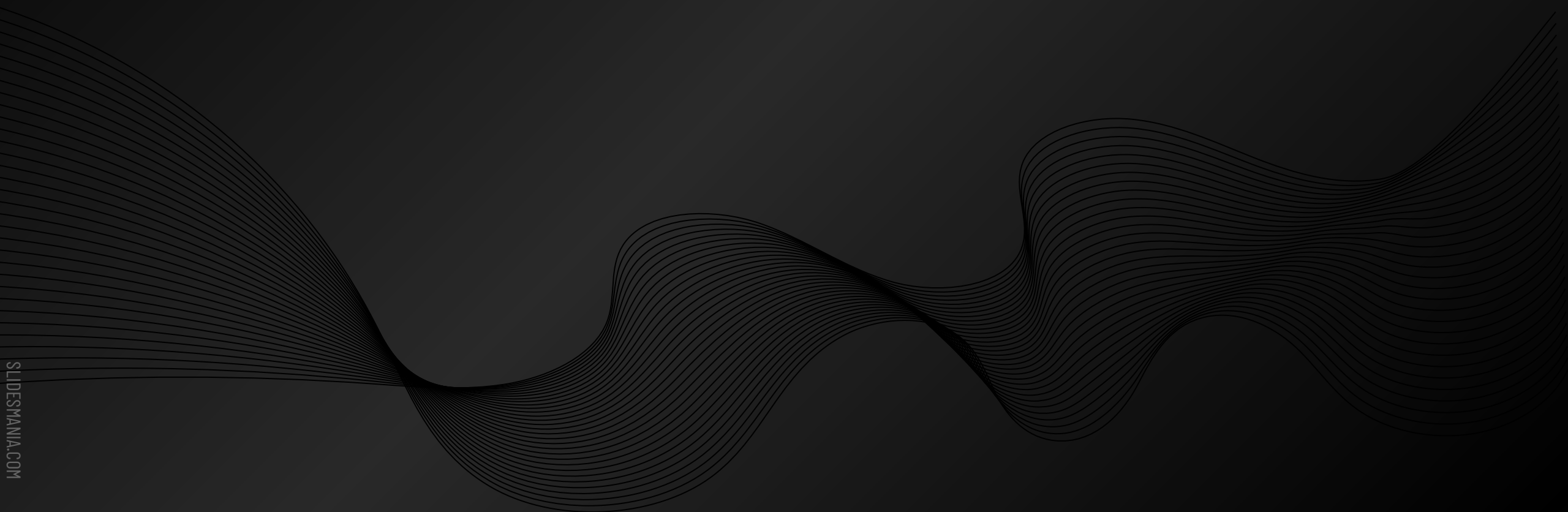
Overview



Findings

Key Takeaways





Future Slides

Camera slides:

Accuracy

Cost

Infrastructure requirements

Problems

Benefits

Conclusions

Recommendations

Other

- Remaining locations
 - Similar to cadillac



Hello! I'm...

Here is where you introduce yourself.

You can add your name, title and a little background. Right click the image and replace it with your own.

Did you know?

A man's best friend...

Did you know that dogs can smell your feelings?

Dogs can pick up on subtle changes in your scent, which can help him figure out how you are feeling, such as by smelling your perspiration when you become nervous or fearful.

Mmm, can I fit in?...

Did you know that a cat uses its whiskers as feelers to determine if a space is too small to squeeze through?

Also, cats love to sleep. A fifteen-year-old cat has probably spent ten years of its life sleeping.

“

Clearly, animals know more than we think, and think a great deal more than we know.

Irene M. Pepperberg

”

Pandas don't hibernate.

When winter approaches, they head lower down their mountain homes to warmer temperatures, where they continue to chomp away on bamboo!





**Koalas are
even more
lazy than
cats.**

Koalas don't have much energy and, when not feasting on leaves, they spend their time dozing in the branches. Believe it or not, they can sleep for up to 18 hours a day!

Cats use their whiskers as feelers...

...to determine if a space is too small to squeeze through.

Also, cats love to sleep. A fifteen-year-old cat has probably spent ten years of its life sleeping.



Did you know?

Pandas don't hibernate.

When winter approaches, they head lower down their mountain homes to warmer temperatures, where they continue to chomp away on bamboo!

There are more kangaroos than humans in Australia.

It is estimated that more than 50 million kangaroos live there. They are Australia's national symbol and appear on postage stamps, coins, and airplanes.

Koalas are even more lazy than cats.

Koalas don't have much energy and, when not feasting on leaves, they spend their time dozing in the branches. Believe it or not, they can sleep for up to 18 hours a day!

**Very interesting
facts.**

Some facts about my cats.

100%

Of my cats are
adorable.

25%

Traveled by plane.
Twice!

75%

Are females.

This is our team!



Erika V.

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Aenean commodo ligula eget dolor.



John S.

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Aenean commodo ligula eget dolor.



Marie M.

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Aenean commodo ligula eget dolor.

This is an editable world map.

Showcase places

You can use maps to show your offices or markets. Or as charts, highlighting the countries and adding your data.

100% Editable

You can double click on the desired country and change fill color.

And this is a timeline or process

1995

Lorem ipsum dolor sit amet, consectetur adipiscing elit.

2006

Lorem ipsum dolor sit amet, consectetur adipiscing elit.

2022

Lorem ipsum dolor sit amet, consectetur adipiscing elit.

2003

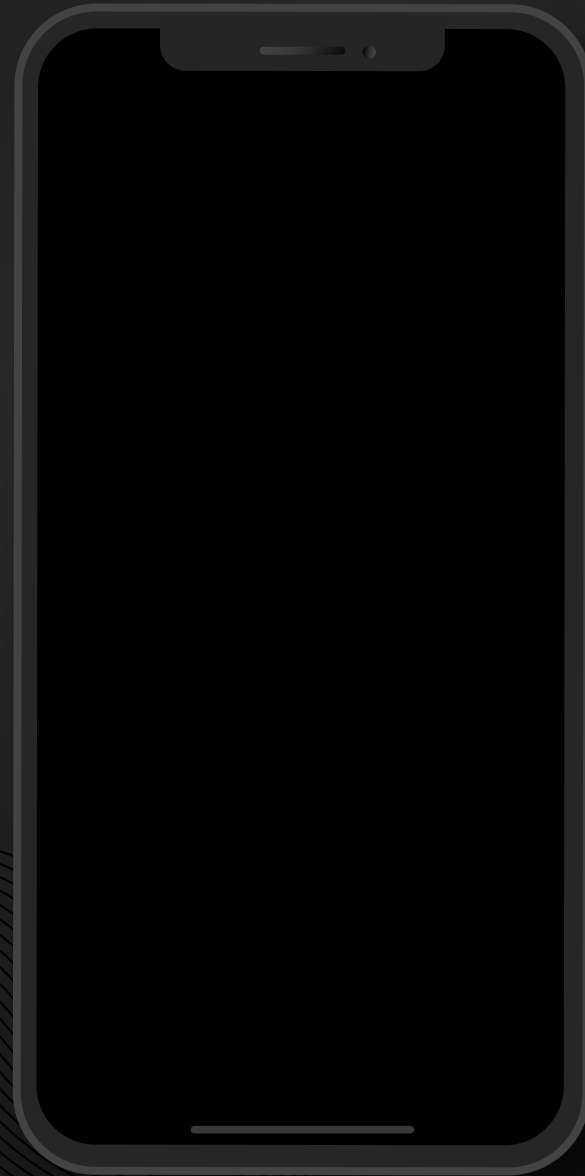
Lorem ipsum dolor sit amet, consectetur adipiscing elit.

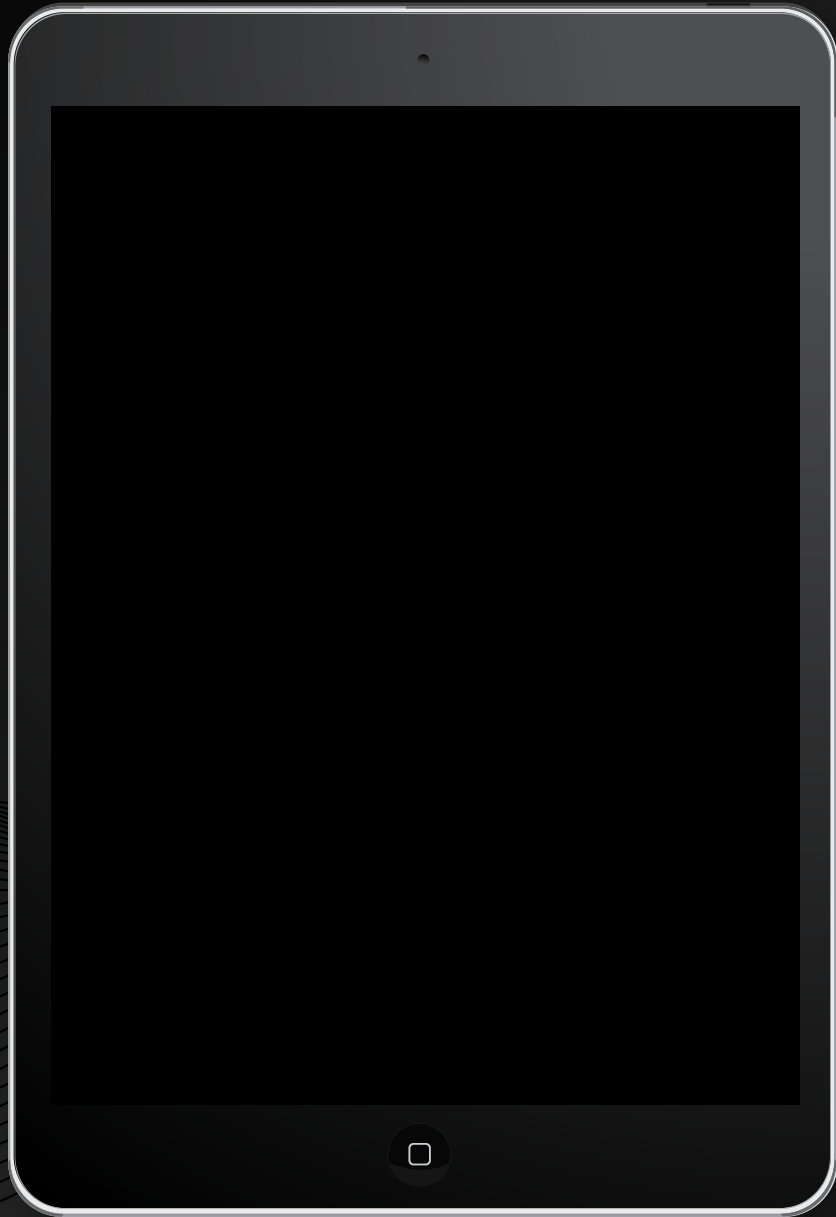
2015

Lorem ipsum dolor sit amet, consectetur adipiscing elit.

Presenting a website or an app?

If you are presenting a website, an internet product or an app, you can place a screenshot of it here.





Presenting a website or an app?

If you are presenting a website, an internet product or an app, you can place a screenshot of it here.

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Sample Images: [Unsplash](#)

Fonts used in this presentation: DM Sans

Editable Icons





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