MyBikeTraffic.com
A framework for traffic analysis using bicycle radar and video data

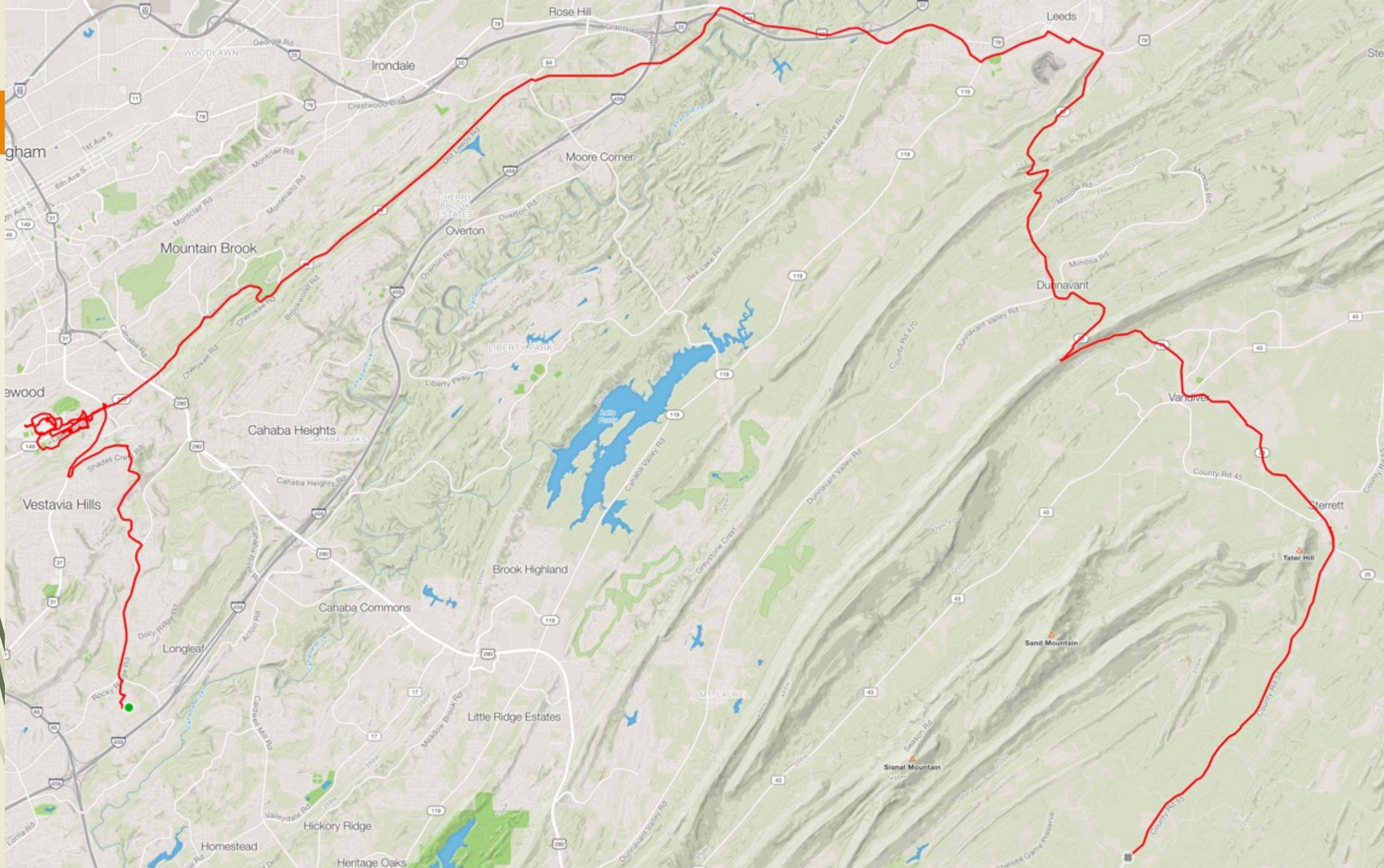Brian Toone, current research (2018 – 2023)
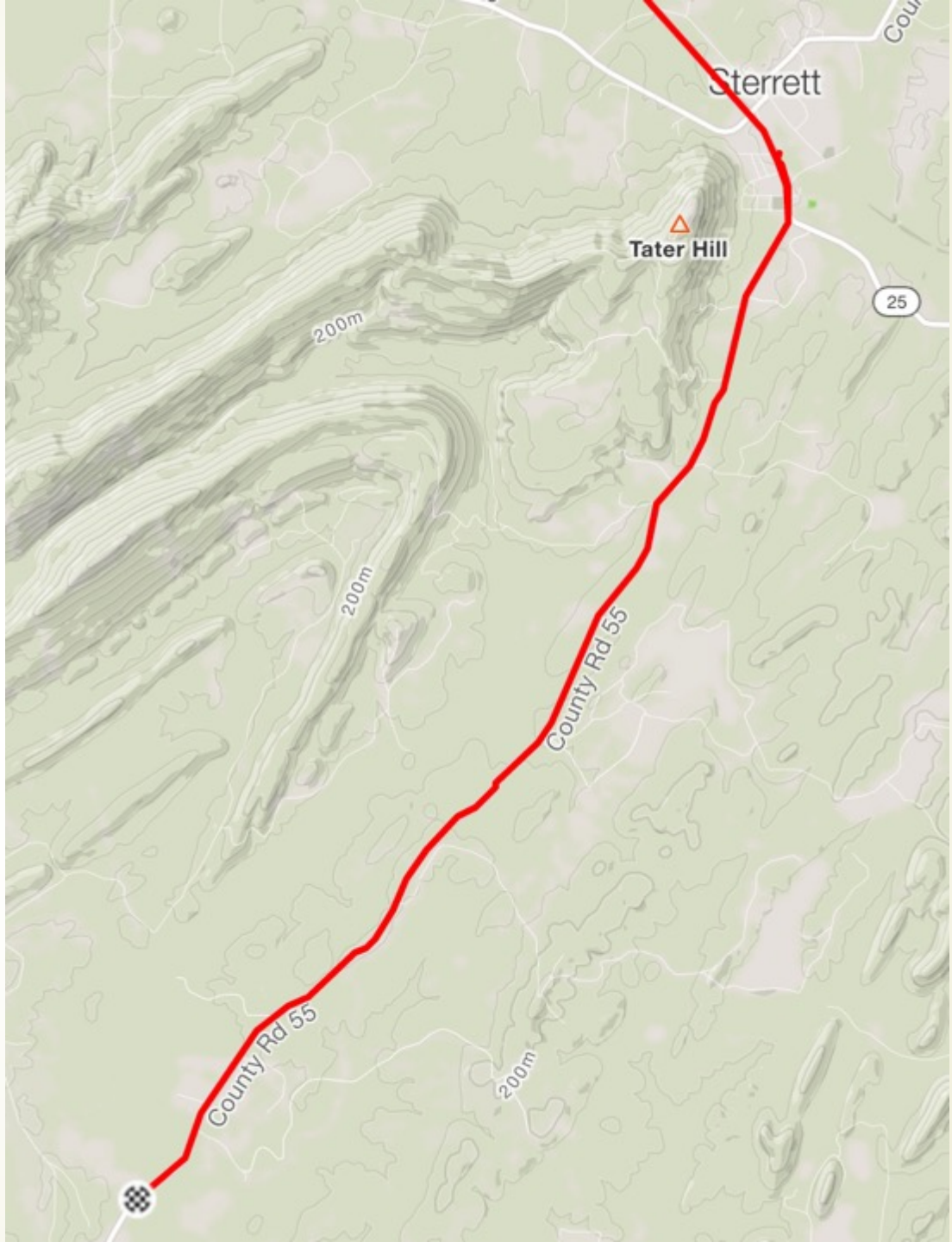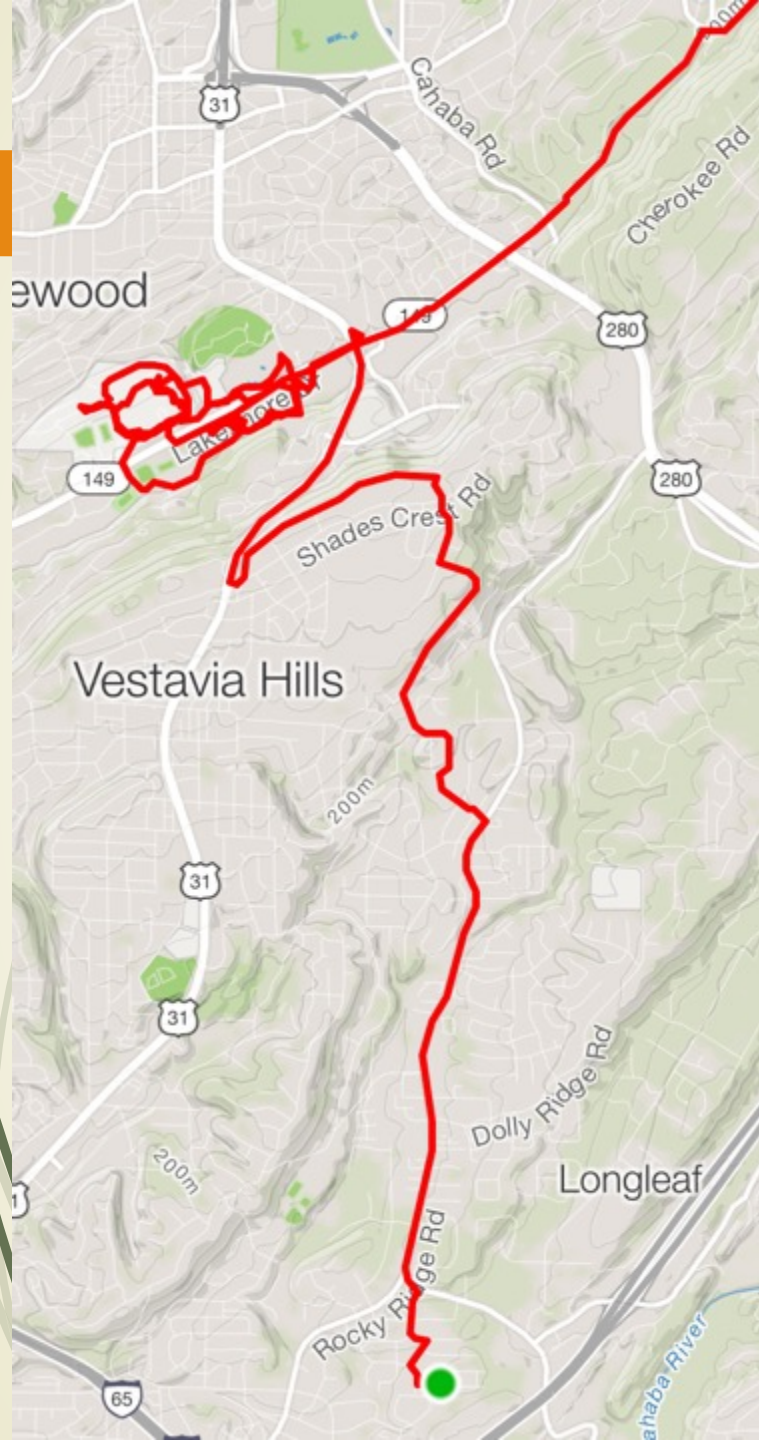
November 20, 2017

- Riding home from work
- Co Rd 55, Sterrett

November 20, 2017

- Riding home from work
- Co Rd 55, Sterrett, Alabama
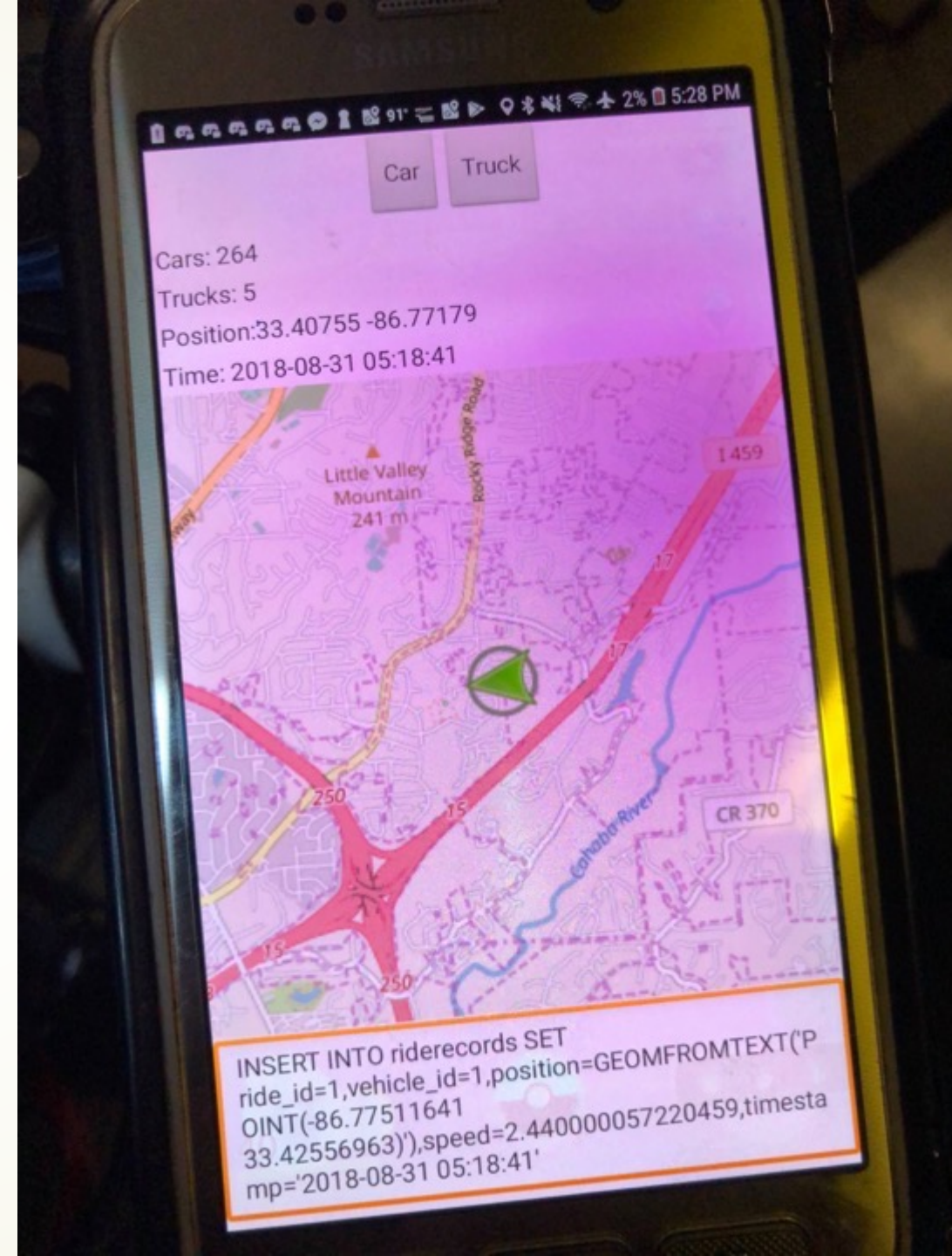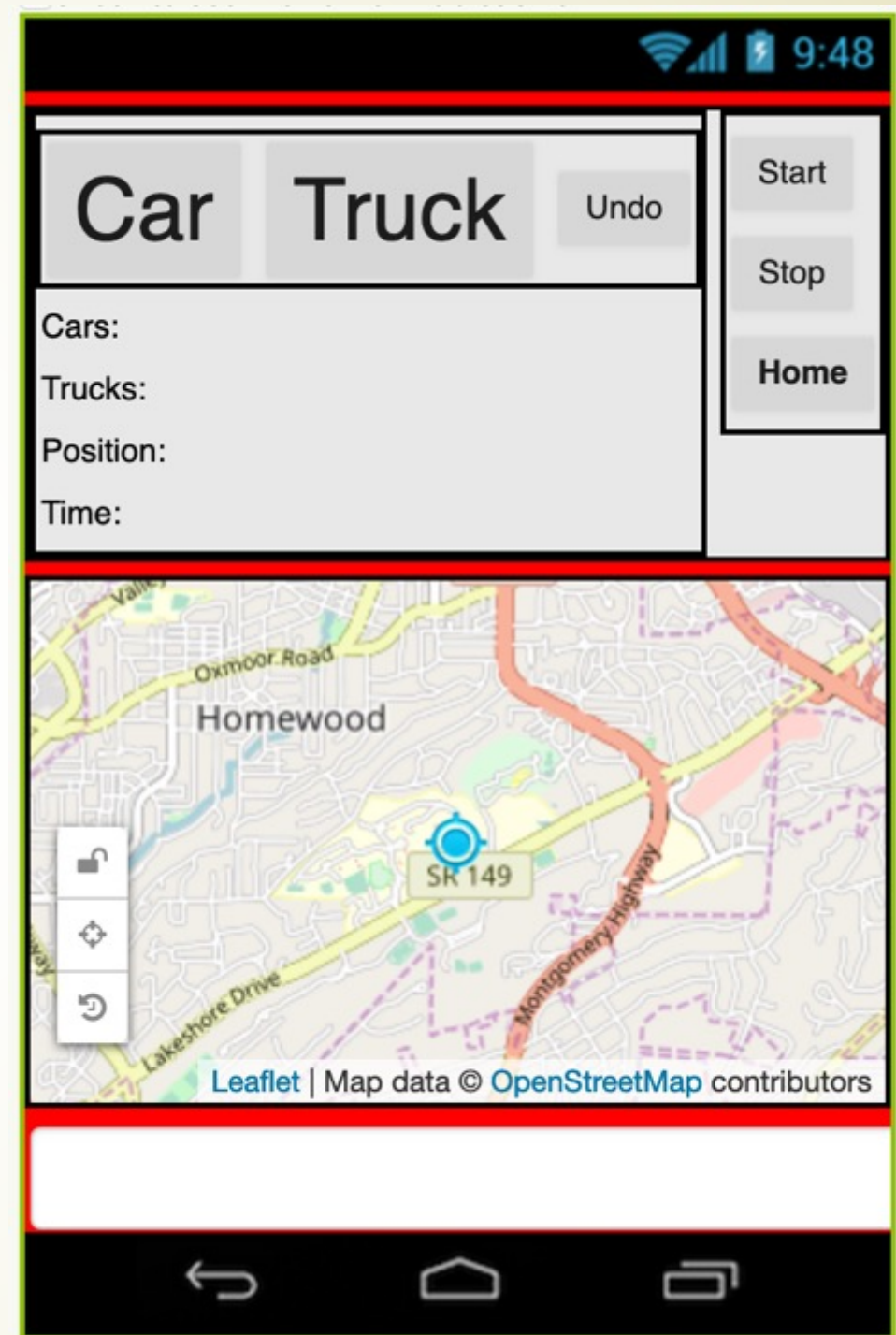- 5 days in hospital, don't remember much from first day

Project goal

- Count the cars
- Time-of-day traffic analysis
- Version 1.0

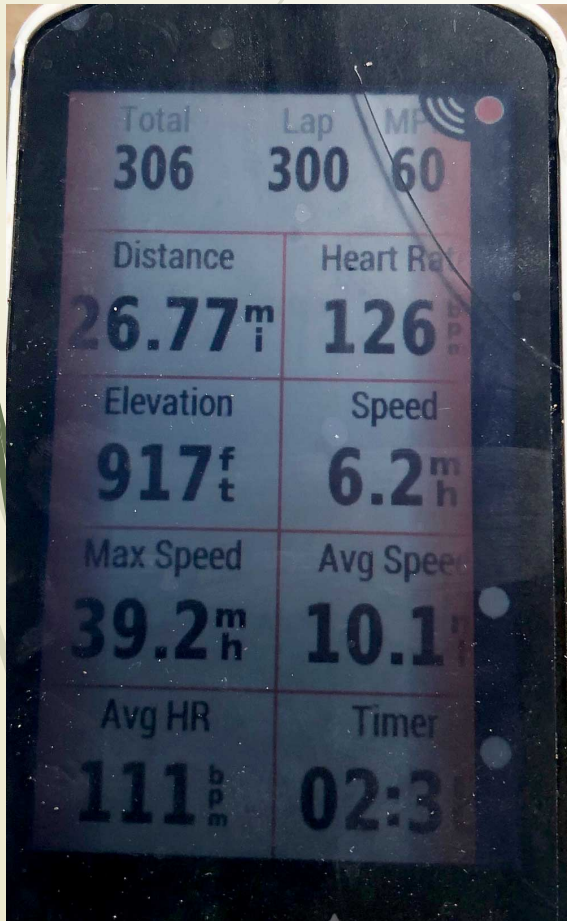# Version 2.0

- Too difficult

Garmin Varia Radar

- Rear taillight
- Radar tracks cars
- One dot per car

EQUIPMENT and SOFTWARE
https://www.mybiketraffic.com/about/

Garmin 520+, 820, 1030

Garmin Varia Radar
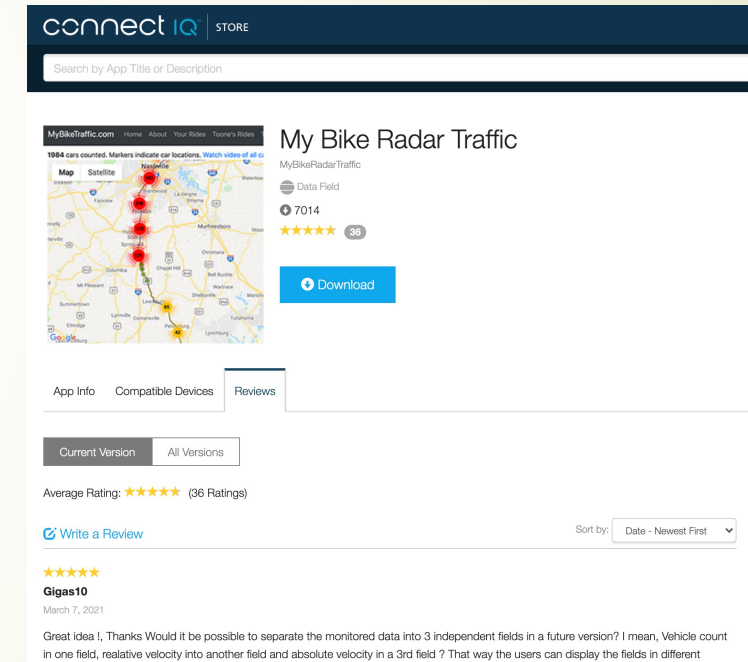
ConnectIQ APP

Garmin Varia Radar

- Connect IQ App

- Install on newer Garmins ... 520+, 820, 1030

- Saves the data that is otherwise being thrown away

Search by App Title or Description

MyBikeTraffic.com Home About Your Rides Toone's Rides

1984 cars counted. Markers indicate car locations. Watch video of all ca

Map Satellite
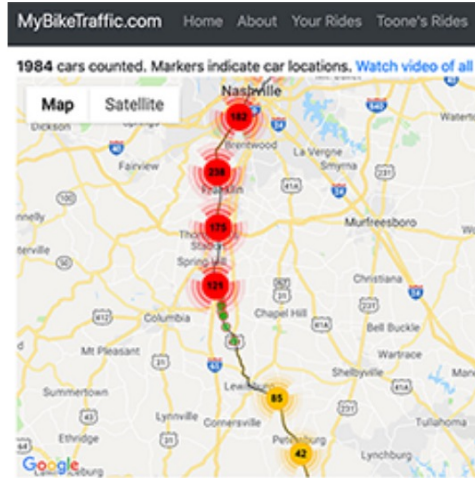
My Bike Radar Traffic

MyBikeRadarTraffic

Data Field

7014

★★★★★ 36

⬇ Download

App Info   Compatible Devices   Reviews

Current Version | All Versions

Average Rating: ★★★★★ (36 Ratings)

✏ Write a Review

Sort by: | Date - Newest First ▾

★★★★★

Gigas10

March 7, 2021

Great idea !, Thanks Would it be possible to separate the monitored data into 3 independent fields in a future version? I mean, Vehicle count in one field, realative velocity into another field and absolute velocity in a 3rd field ? That way the users can display the fields in different

Viewing the data – mybiketraffic.com

Summary stats

- LOTS of data
- My summary info just from 12/2018 (2.25 years)

Welcome back BrianToone

○ Imperial ○ Metric   Save units preference

You have uploaded **723** ride(s). Use the date range slider below to adjust date range and see updated stats below. Thank you! Click the import lir

All time | T

2018-12-03

Vehicle and Ride S

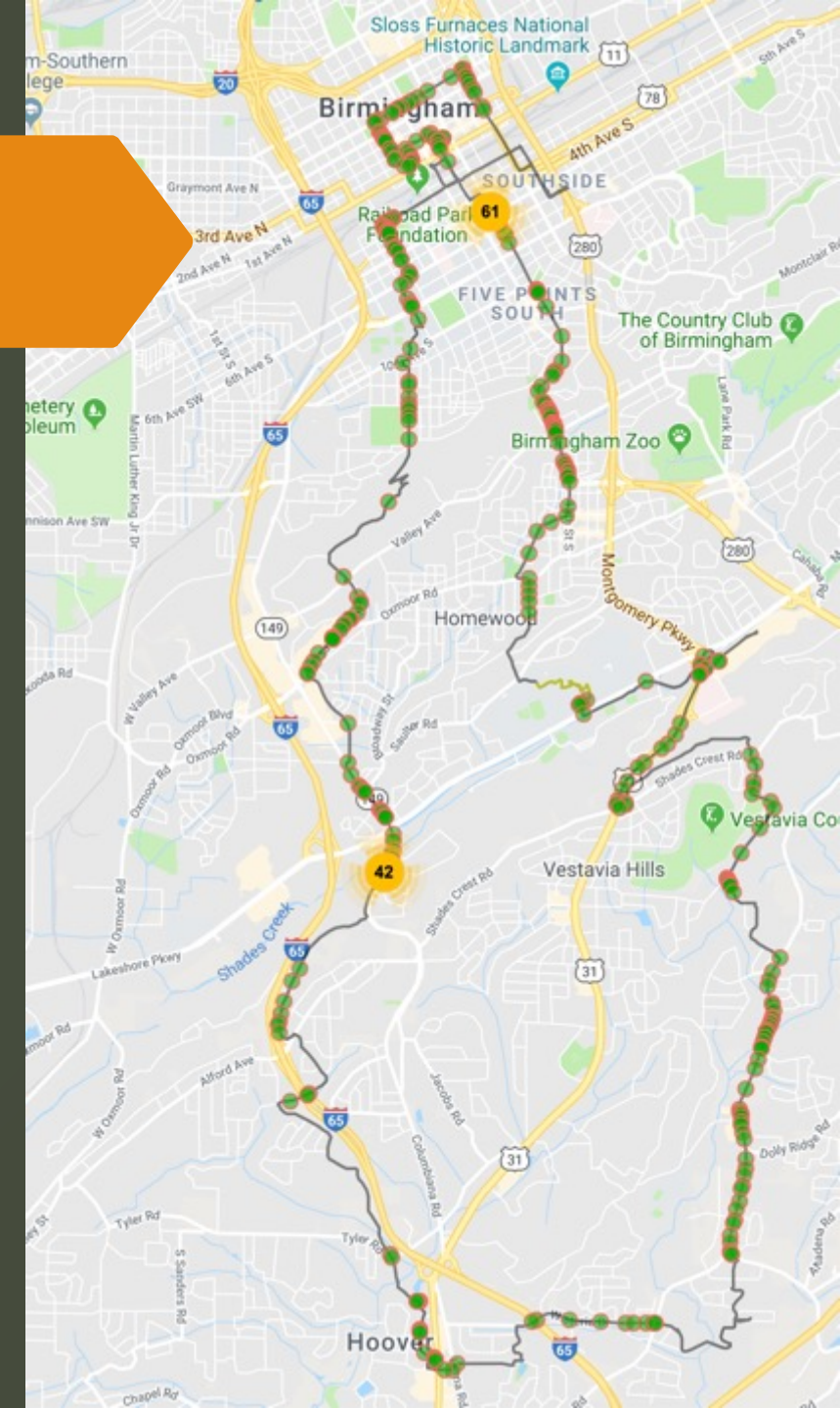You have been approached by reload the page, but PASSING refresh link so that you don't t

VEHICLE STATS

Total vehicles	avg per ride	avg per mile	avg per minute
220318	305	6	1.4

RIDE STATS (while radar enabled)

Total rides	Total miles	Total moving time	Overall avg speed
723	36652	2696 hours	13.6 MPH

PASSING STATS Last refresh: Just now ↻

See this **important note about speeds**. The speeds on this page are RELATIVE to the rider. Add overall average rider speed to approximate ABSOLUTE vehicle speeds.

#cars on radar	Total vehicle count	Avg pass time	Avg approach speed	Avg pass speed	Avg slowdown amount
1	60151	11 seconds	34.7 MPH	30 MPH	4.7 MPH
2	73088	11 seconds	35.8 MPH	29.8 MPH	6 MPH
3	51352	12 seconds	36.7 MPH	30.2 MPH	6.5 MPH
8	63	2661 seconds	29.8 MPH	25.9 MPH	3.8 MPH
OVERALL	220318	12 seconds	35.1 MPH	30.2 MPH	4.9 MPH

What about data for ALL riders collecting data (currently > 7000)?

- **Mingwei Sun** - helping me analyze all the data from all the users
  - R statistical analysis

Stats research data

In this section, you will find links to download CSV file of selected stats. Changing the input parameter automatically updates the link to download the appropriate data.

Statistic	Time period (seconds)	CSV Download
Number of cars passing per fixed time period along with average rider speed over that time	60	download csv
Passing speed stats for all individual cars (length of time(s), approach spd(m/s), passing spd(m/s))		download csv
All raw passing data for all vehicles (timestamps, ranges, speeds)		download csv
Other stats coming soon...		

Segment stats

➤ Time-of-day heat map

➤ Slider loads hourly data

Last refresh: Just now ↻

Rocky Ridge - Vesclub ✎

Segment Info

Distance:	3.6 mi.
Ascent:	666 ft.
Descent:	138 ft.
Grade:	3.26

Riding Stats [48 times ridden]

	Min	Max	Avg
Time of day:	00:50 AM	23:00 PM	09:23 AM
Avg speed (MPH):	10.6	13.4	11.8

Vehicle Stats [2013 total vehicles]

	Min	Max	Avg
Segment vehicle count:	1	100	42
AVERAGE passing time:	3s	46s	14s
MAXIMUM passing time:	3s	72s	37s
AVERAGE vehicle speed (MPH):	3.4	36.1	23.6
MAXIMUM vehicle speed (MPH):	13.6	80.5	59.7

Select Units

◉ Imperial ◯ Metric

Time of Day Analysis

AM	# rides	avg # vehicles	PM	# rides	avg # vehicles
12-1AM	1	2	12-1PM	3	25
1-2AM	1	1	1-2PM	3	29
2-3AM	0	0	2-3PM	0	0
3-4AM	2	1	3-4PM	1	35
4-5AM	1	1	4-5PM	2	34
5-6AM	1	5	5-6PM	1	34
6-7AM	2	44	6-7PM	0	0
7-8AM	19	70	7-8PM	0	0
8-9AM	2	39	8-9PM	0	0
9-10AM	2	20	9-10PM	0	0
10-11AM	3	28	10-11PM	1	2
11AM-12PM	2	32	11PM-12AM	1	9

Map | Satellite

7:00AM

Google — Map data ©2019 Google   Terms of Use   Report a map error
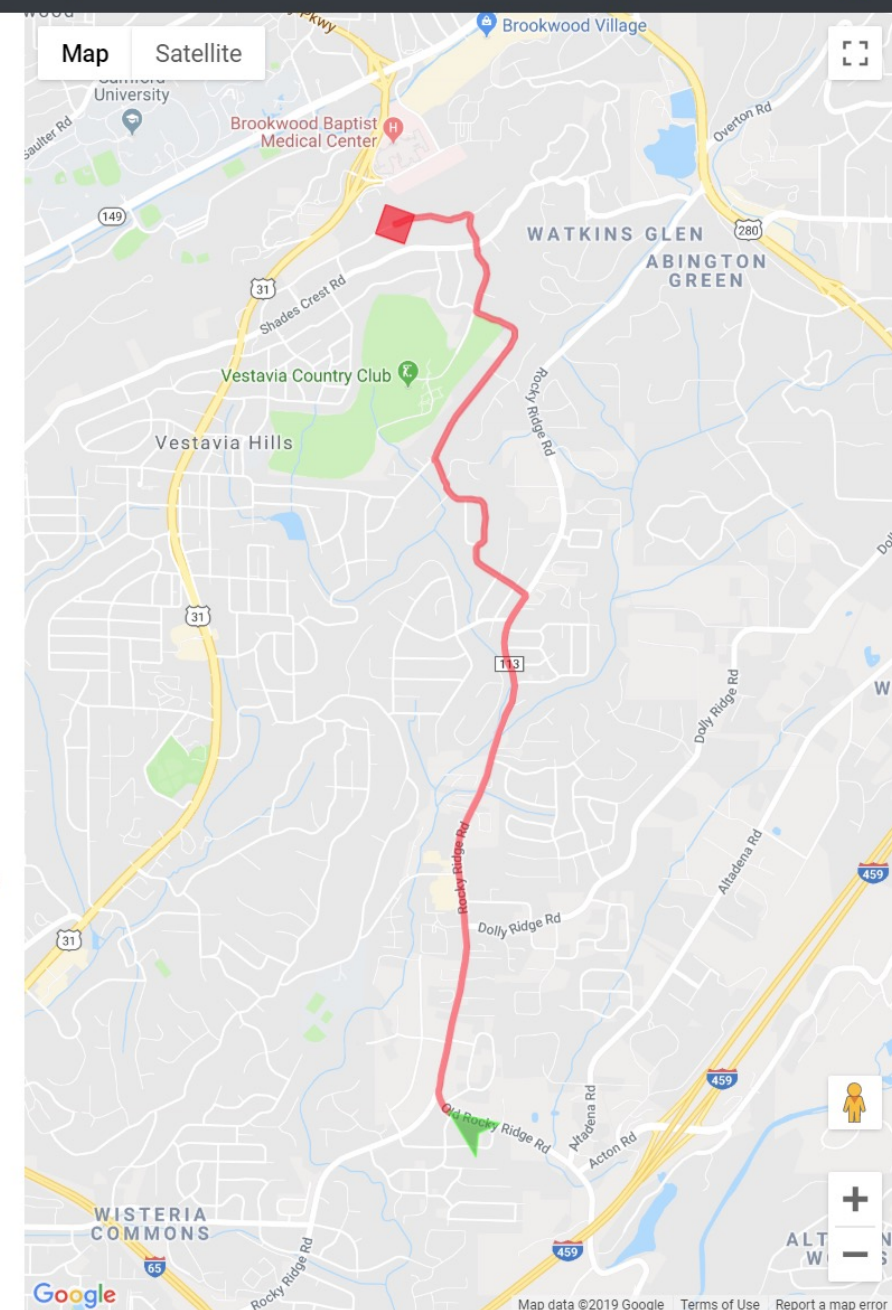
Motivated student wanted to help!

- Sheng Gao
  - Graduating senior from my Artificial Intelligence class
  - Applying to grad schools and wanted more research experience
  - Accepted to and started this semester at Columbia University (NY)!

Current work (Starting from Summer 2020)

ML automatic road classification from rear-facing video

Tiny shoulder with no rumble strip

Medium shoulder with rumble strip

Current work (Starting from Summer 2020)

Additional ML task – object recognition and distance measurements as illustrated below
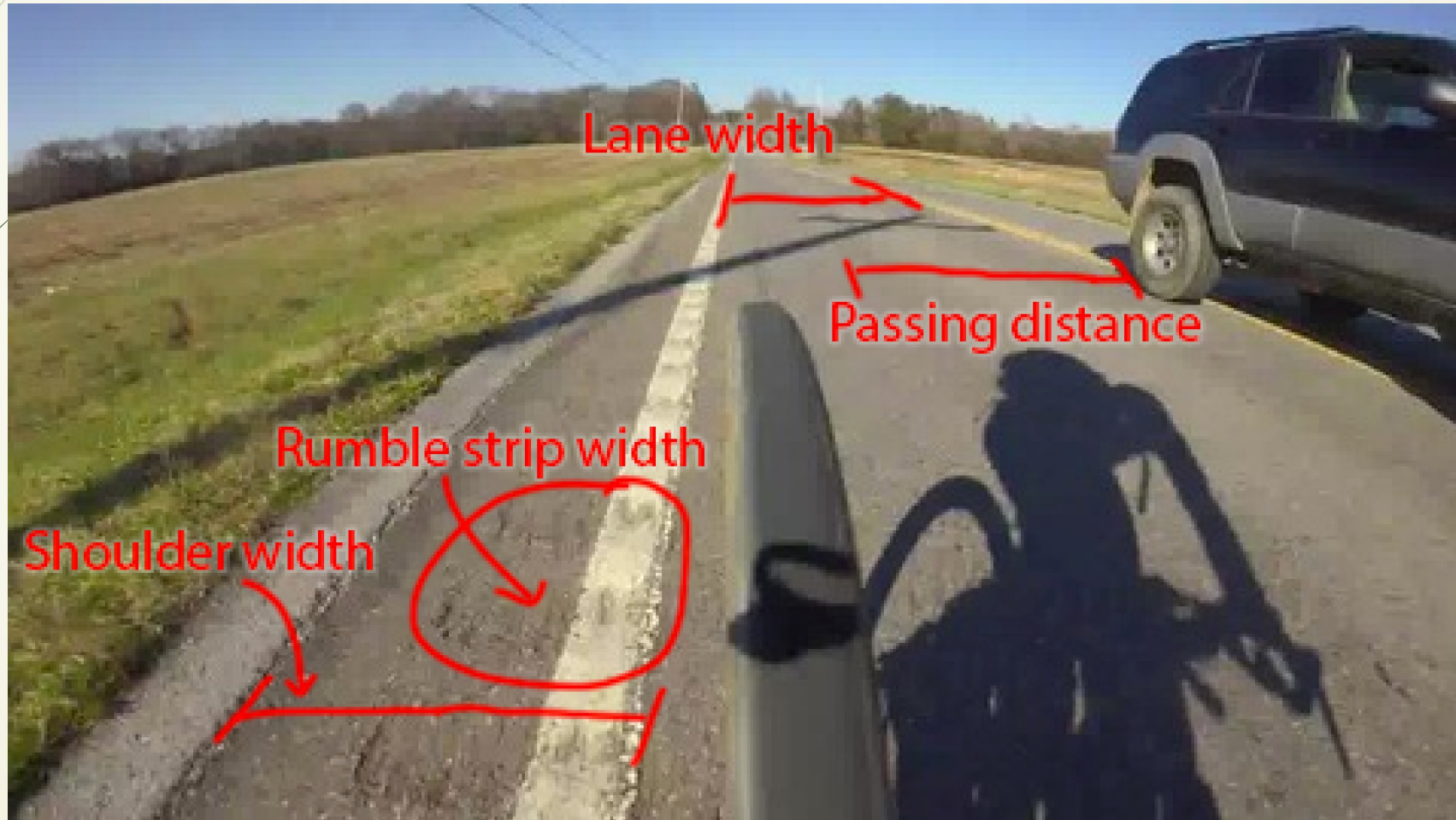
Current work (Starting from Summer 2020)

GOAL: establish correlation between road design and vehicle passing statistics

Road design classification
- Presence of bike lane, width of bike lane
- Presence of rumble strip
- Width of rumble strip
- Type of rumble strip (continuous or intermittent)
- Width of shoulder on either side of rumble strip
- Total width of shoulder
- Type of shoulder (smooth or rough)
- Total width of travel lane
- Number of travel lanes
- Passing/no passing zone

Vehicle passing statistics
- Count of vehicles that pass
- Average passing speed
- Average total time for vehicle to pass
- Slowdown (or speedup) amount
- Passing distance (lateral) between cyclist and vehicle

Video Processing

Small video | Normal video | Large video

0:16 / 3:01

Step Back | Step Forward | Half speed | Normal speed | Double speed

Map | Satellite
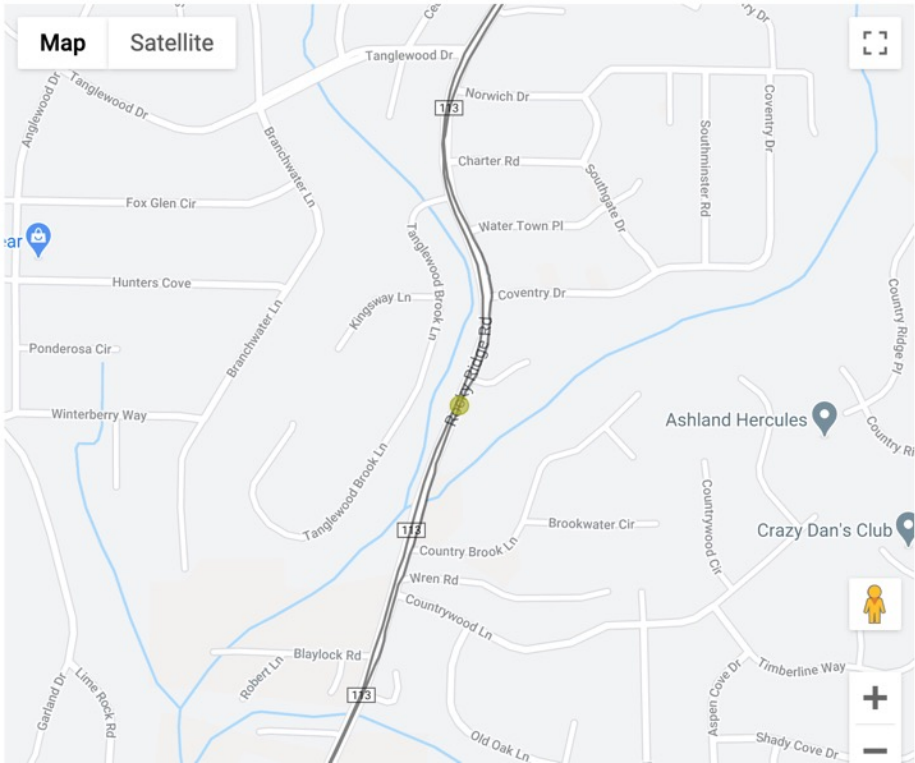
Road Info

Name:	**Rocky Ridge Road**
Neighborhood:	
Hamlet:	
City:	**Vestavia Hills**
County:	**Jefferson County**
State:	**Alabama**
Country:	**US**
OSM ID:	**W751507798**

Rider/Vehicle Info

Timer(seconds):	**501**
Distance(miles):	**2.12**
Altitude(feet):	**527.6**
Speed(mph):	**10.44**
Vehicles:	**Car 1: 3m,3m/s**
	Car 2: 28m,9m/s
	Car 3: 68m,6m/s
	Car 4: 106m,6m/s

Road Attribute List for the Selected Video

#	Start	Finish	Attributes						Actions
	time/frame/dist	time/frame/dist	shoulder	rumble	bikelane	lanes	center		
1	0/0/19	2.67807/80/563	IGNORE						edit | delete
2	00:02.678 / 80 / 563	00:16.048 / 481 / 3404.47	○None ○Tiny [0.25m/10in] ○Small [0.5m/20in] ○Medium [1.0m/3ft] ○Large [1.5m/5ft]	○None ○Broken ○Continuous	○Yes ○No	○1 ○2 ○3 ○4+	○Turn lane ○Divider ○Separated ○Yellow line ○Nothing	☑IGNORE Save	

Show/hide instructions

Video Processing

Small video | Normal video | Large video

▶ 0:12 / 3:01

Step Back | Step Forward | Half speed | Normal speed | Double speed

Road Info

Name:	**Rocky Ridge Road**
Neighborhood:	**Tangle Creek**
Hamlet:	**Twin Bridge**
City:	**Vestavia Hills**
County:	**Jefferson County**
State:	**Alabama**
Country:	**US**
OSM ID:	**W751507798**

Rider/Vehicle Info

Timer(seconds):	**409**
Distance(miles):	**1.70**
Altitude(feet):	**488.2**
Speed(mph):	**20.18**
Vehicles:	**Car 1: 65m,9m/s**
	Car 2: 96m,12m/s

Road Attribute List for the Selected Video

#	Start	Finish	Attributes					Actions
	time/frame/dist	time/frame/dist	shoulder	rumble	bikelane	lanes	center	
1	0/0/19	0.519996/16/28			IGNORE			edit | dele
2	0.519996/16/28	0.996203/30/144	0	None	0	1	Nothing	edit | dele
3	0.996203/30/144	1.83412/55/361			IGNORE			edit | dele
4	1.83412/55/361	2.33412/70/495	0	None	0	1	Nothing	edit | dele
5	2.33412/70/495	2.51412/75/529			IGNORE			edit | dele
6	2.51412/75/529	2.81443/84/591	0	None	0	1	Nothing	edit | dele
7	2.81443/84/591	3.45519/104/666			IGNORE			edit | dele

62

00:12.545	00:12.965
376	389
2612	2738.39

○ None
○ Tiny [0.25m/10in]
○ Small [0.5m/20in]
○ Medium [1.0m/3ft]
○ Large [1.5m/5ft]

STYLE
○ None
○ Broken
○ Continuous
WIDTH
○ Tiny [0.25m/10in]
○ Small [0.5m/20in]
○ Medium [1.0m/3ft]
○ Large [1.5m/5ft]

○ Yes
○ No

○ 1
○ 2
○ 3
○ 4+

○ Turn lane
○ Divider
○ Separated
○ Yellow line
○ Nothing

☑ IGNORE
Save

27	8.40724/252/1462	8.44724/253/1473			IGNORE			edit | dele
28	8.44724/253/1473	8.60724/258/1527	0	None	0	1	Yellow line	edit | dele
29	8.60724/258/1527	8.68724/260/1548			IGNORE			edit | dele
30	8.68724/260/1548	8.90724/267/1625	0.25	None	0	1	Yellow line	edit | dele
31	8.90724/267/1625	9.02724/271/1671			IGNORE			

The Ridge Eat & Drink | Twisted Root Burger Co | Appliance

Map data ©2021 Google | Terms of Use | Report a map error

Current work (Starting from Summer 2020)
Expand framework

- Currently 7000+ users of app collecting radar data
- Very few users posting video data
  - Tricky to post
  - Very specific video camera and timelapse setup required
  - Expand to make it easier to collect video data

Current work (Starting from Summer 2020)
Ultimate goal

- Make impact on future road designs

  - SAFER for cyclists

  - FACILITATE vehicle passings
    (i.e., easier, quicker for vehicles to pass cyclists)

- Reverse research

  - Self-driving cars could pull from this data

  - Object recognition from cyclist POV analogous to Self-driving car POV – extensive research already performed in this area (frequently proprietary info)

Thank you!

- Brian Toone
- brtoone@samford.edu
- http://mybiketraffic.com
- http://toonecycling.com