



Why Traffic Signals Need Richer Detection Inputs

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About us

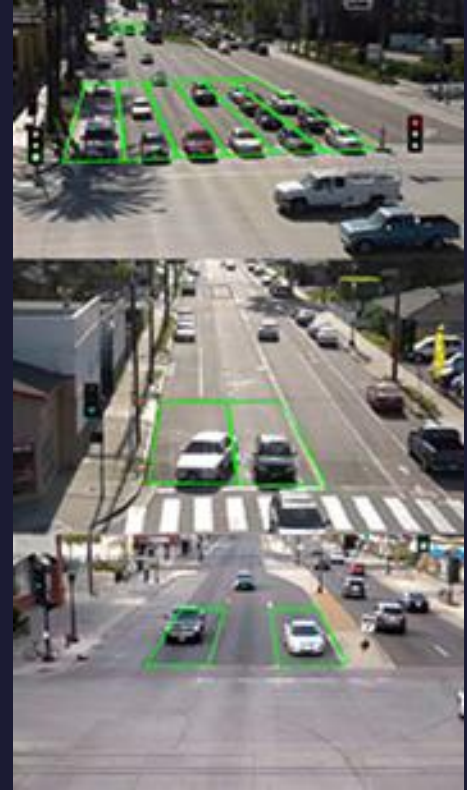
- Founded 2 years ago in San Francisco
- Backed by Y Combinator
- Live with three jurisdictions in the Bay Area
- Founding team has extensive safety-critical experience
 - Collin has shipped GPU-enabled IoT camera devices at Verily and written software that runs on devices implanted in humans
 - Sabeek has worked on perception stacks at 3 self-driving car companies, and his software has been deployed on public roads in fully driverless vehicles



The Problem: Existing Detection Systems

Existing Detection Systems

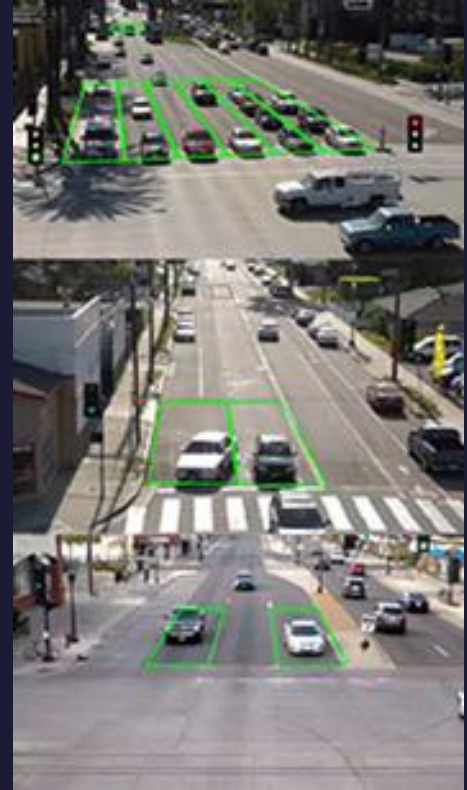
- Detect the presence or absence of cars in fixed locations
 - Sometimes bikes
 - Very occasionally peds
- To make use of this input, timing plans need embedded assumptions from traffic studies



Existing Detection Systems

So what's the problem?

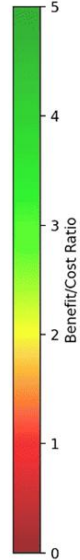
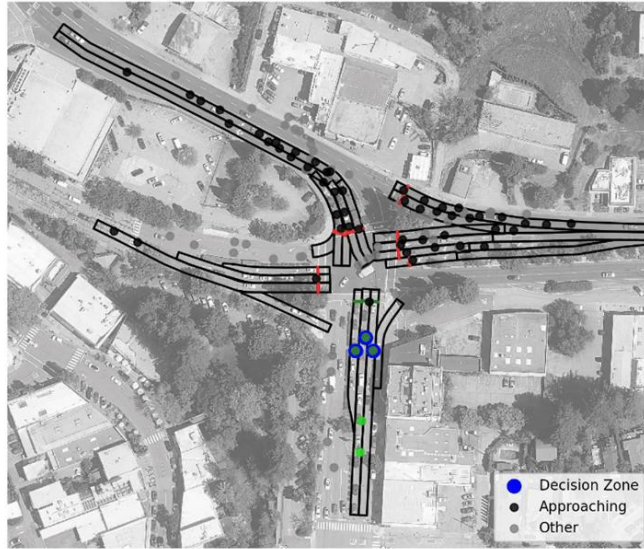
- Can't differentiate between high and low demand regions
- Require extension times that degrade utilization
- Limited ability to support safety interventions



Roundabout

Sees all road
users in 3D

Continuously
quantifies wait
times and
tradeoffs

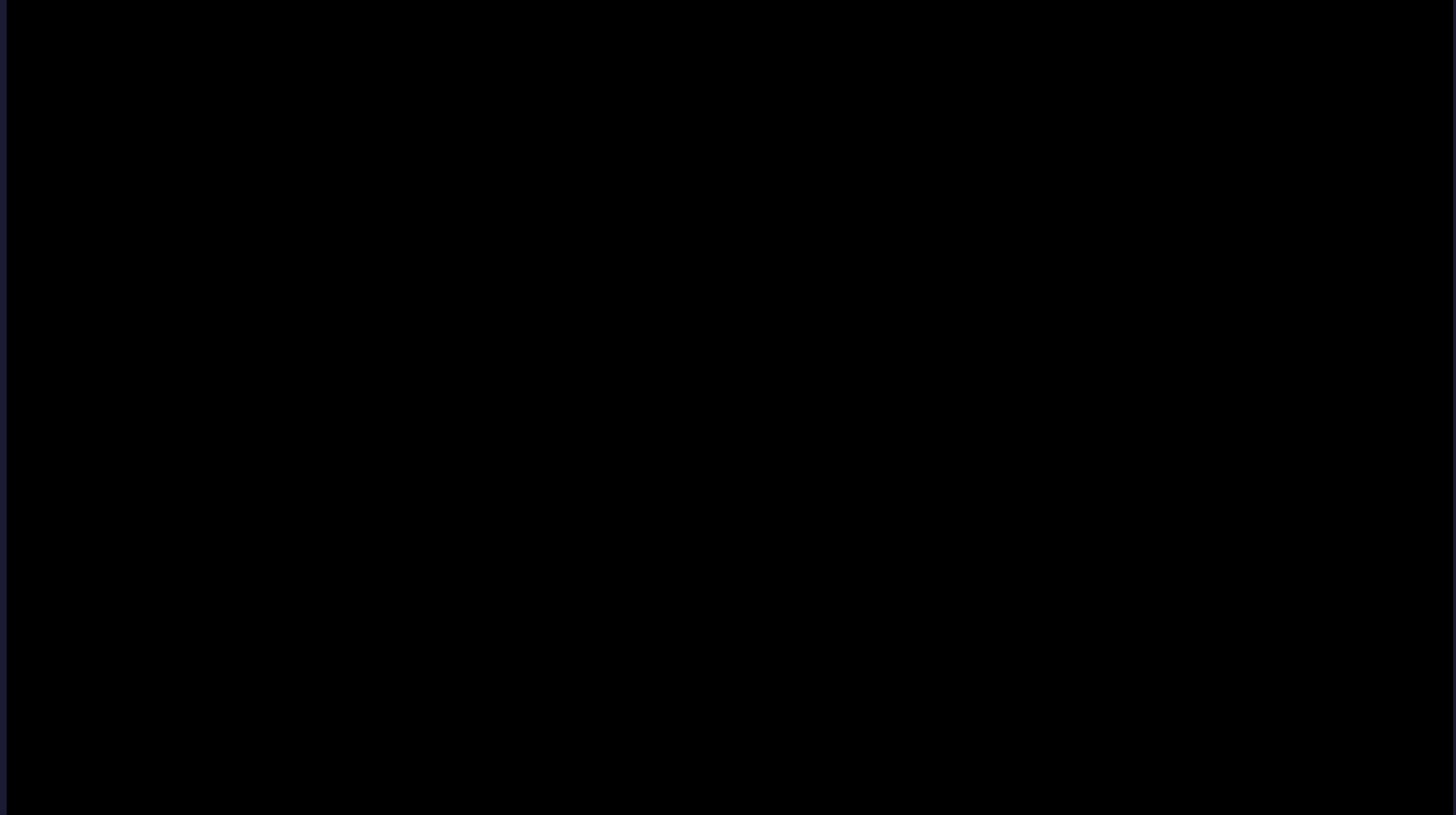


Improving Safety

Dynamic Red Clearance Extensions for Cyclists

Crosswalk Protection for Pedestrians

Dilemma Zone Prevention



Results

Vehicle Wait Times

Intersection	Before (s)	After (s)	Δ
Aspen Ct & Sir Francis Drake Blvd	10.3	9.7	-5.8%
Bank St & Sir Francis Drake Blvd	14.4	14.2	-1.4%
Bella Vista Ave & Sir Francis Drake Blvd	18.6	15.4	-17.2%
Bolinas Ave & Sir Francis Drake Blvd	26.0	20.7	-20.4%
Broadmoor Ave & Sierra Ave & Sir Francis Drake Blvd	16.2	14.7	-9.3%
Butterfield Rd & Sir Francis Drake Blvd	18.7	17.4	-7.0%
Kent Ave & Suffield Ave & Sir Francis Drake Blvd	21.9	22.5	2.7%
Red Hill Ave & Sir Francis Drake Blvd (The Hub)	47.1	42.3	-10.2%
Ross Ave & Barber Ave & Sir Francis Drake Blvd	27.8	19.8	-28.8%
San Francisco Blvd & Tamal Ave & Sir Francis Drake Blvd	22.0	17.7	-19.5%
Sequoia Dr & Red Hill Ave	25.3	19.9	-21.3%
Sir Francis Drake Blvd & College Ave	36.7	29.3	-20.2%
Tunstead Ave & Sir Francis Drake Blvd	14.6	13.3	-8.9%
Willow Ave & Pastori Ave & Sir Francis Drake Blvd	30.4	30.2	-0.7%

Pedestrian Wait Times

Intersection	Before (s)	After (s)	Δ
Aspen Ct & Sir Francis Drake Blvd	68.4	33.0	-51.8%
Bank St & Sir Francis Drake Blvd	-----	-----	-----
Bella Vista Ave & Sir Francis Drake Blvd	42.7	36.5	-14.5%
Bolinas Ave & Sir Francis Drake Blvd	53.2	51.7	-2.8%
Broadmoor Ave & Sierra Ave & Sir Francis Drake Blvd	49.9	39.4	-21.0%
Butterfield Rd & Sir Francis Drake Blvd	57.9	42.2	-27.1%
Kent Ave & Suffield Ave & Sir Francis Drake Blvd	38.0	47.0	23.7%
Red Hill Ave & Sir Francis Drake Blvd (The Hub)	-----	-----	-----
Ross Ave & Barber Ave & Sir Francis Drake Blvd	49.3	43.4	-12.0%
San Francisco Blvd & Tamal Ave & Sir Francis Drake Blvd	34.5	46.6	35.1%
Sequoia Dr & Red Hill Ave	62.5	45.9	-26.6%
Sir Francis Drake Blvd & College Ave	53.3	47.0	-11.8%
Tunstead Ave & Sir Francis Drake Blvd	30.8	29.7	-3.6%
Willow Ave & Pastori Ave & Sir Francis Drake Blvd	43.1	49.4	14.6%

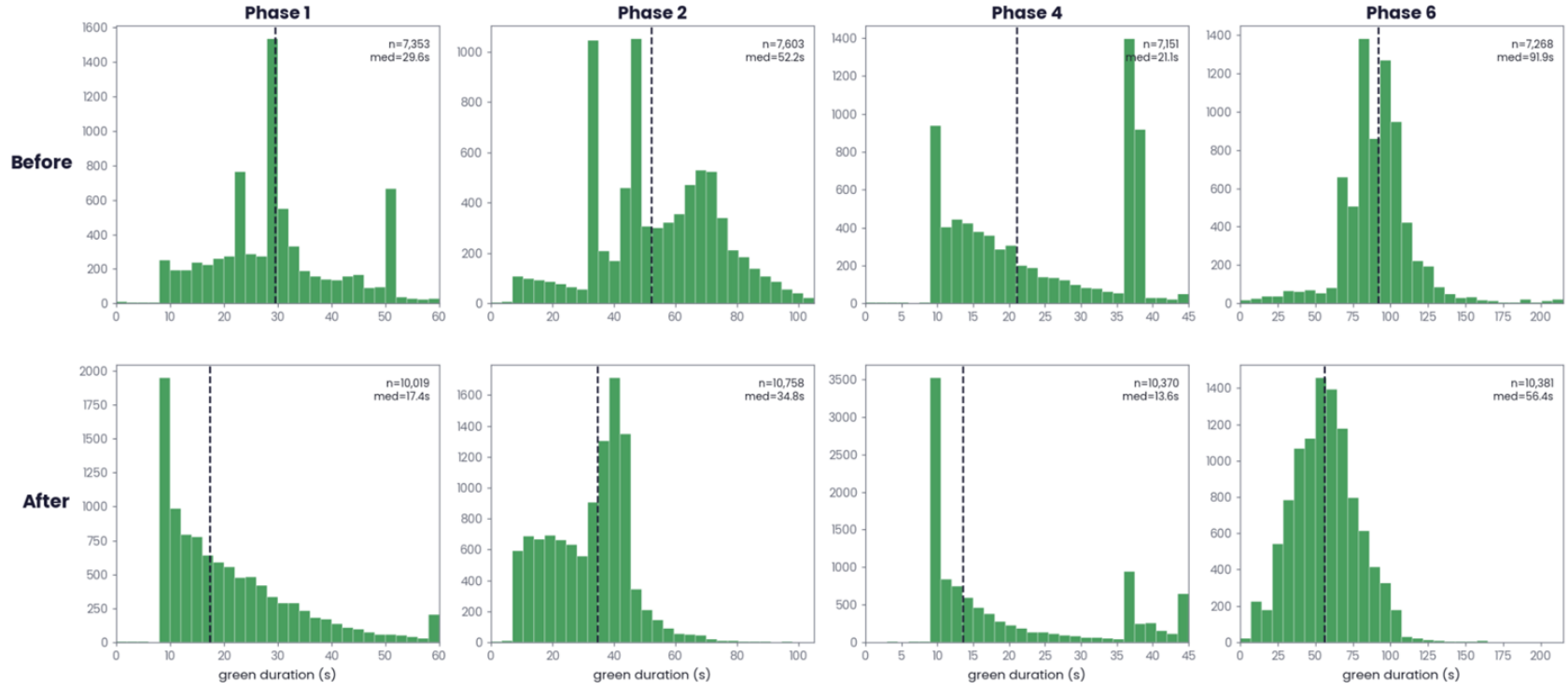
Red Light Running

Intersection	Before (/day)	After (/day)	Δ
Aspen Ct & Sir Francis Drake Blvd	56.0	47.2	-15.7%
Bank St & Sir Francis Drake Blvd	29.7	32.1	8.1%
Bella Vista Ave & Sir Francis Drake Blvd	114.4	121.1	5.9%
Bolinas Ave & Sir Francis Drake Blvd	53.1	28.8	-45.8%
Broadmoor Ave & Sierra Ave & Sir Francis Drake Blvd	83.8	64.8	-22.7%
Butterfield Rd & Sir Francis Drake Blvd	125.2	81.0	-35.3%
Kent Ave & Suffield Ave & Sir Francis Drake Blvd	61.3	23.8	-61.2%
Red Hill Ave & Sir Francis Drake Blvd (The Hub)	-----	-----	-----
Ross Ave & Barber Ave & Sir Francis Drake Blvd	-----	-----	-----
San Francisco Blvd & Tamal Ave & Sir Francis Drake Blvd	139.7	43.2	-69.1%
Sequoia Dr & Red Hill Ave	71.1	59.7	-16.0%
Sir Francis Drake Blvd & College Ave	54.7	37.4	-31.6%
Tunstead Ave & Sir Francis Drake Blvd	32.9	15.0	-54.4%
Willow Ave & Pastori Ave & Sir Francis Drake Blvd	79.8	72.9	-8.6%

Green Durations

Shorter cycles lead to better utilization and shorter wait times

Green Durations by Phase



Data Visibility



ROUNDABOUT
TECHNOLOGIES

Questions?

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