

Application for AI Technology in School Zones

Boulder AI is changing the way multi-modal data is collected, analyzed and utilized for future planning.



- ✓ Edge to cloud; no additional hardware.
- ✓ Privacy first sensors. Metadata anonymized at the source.
- High compute. General purpose deep learning. Continuously improving detection



Safety in Crosswalks



- Determine ped crosswalk occupancy.
- Count and track peds (anonymously).
- Make live data available to signal controller.

Video Link

Holding the light red while pedestrians are in a crosswalk.

The light will be released and turn green only after all pedestrians have cleared the crosswalk.



Video Link





How Data is Displayed using AI and GPS Coordinates

The GIS view gives traffic ops the real time view of the city without compromising citizen privacy or freedom of information act rules. Objects in view of Boulder AI cameras are classified and translated to their real-world coordinates automatically. The display updates in real time 10 times per second. Once this data is in the cloud, it can be stored for later report generation, recall of events for planning purposes, and even analyzed in real time for anomaly detection.



- **Red DOTS are vehicles**
- Blue DOTS are pedestrians
- Green DOTS are bikes
 - This data can be used for near miss detection on school zones by calculating proximity of pedestrians and bikes to vehicles.



Sample Report 10 minute intervals

timecollected	PED_01_South	PED_01_North	BIKE_01_South	BIKE_01_North
2020-01-10 00:00:00+00:00	6	4	0	0
2020-01-10 00:05:00+00:00	3	2	0	0
2020-01-10 00:10:00+00:00	7	3	0	0
2020-01-10 00:15:00+00:00	8	1	0	0
2020-01-10 00:20:00+00:00	3	2	0	0
2020-01-10 00:25:00+00:00	3	4	0	0
2020-01-10 00:30:00+00:00	3	2	0	0
2020-01-10 00:35:00+00:00	0	4	1	0
2020-01-10 00:40:00+00:00	4	1	0	0
2020-01-10 00:45:00+00:00	3	1	0	0
2020-01-10 00:50:00+00:00	1	3	1	0
2020-01-10 00:55:00+00:00	1	2	0	0
2020-01-10 01:00:00+00:00	4	5	1	0
2020-01-10 01:05:00+00:00	0	5	0	0
2020-01-10 01:10:00+00:00	0	2	0	0
2020-01-10 01:15:00+00:00	4	2	0	0
2020-01-10 01:20:00+00:00	7	2	0	0
2020-01-10 01:25:00+00:00	4	3	1	0
2020-01-10 01:30:00+00:00	0	0	0	0
2020-01-10 01:35:00+00:00	1	1	0	0
2020-01-10 01:40:00+00:00	1	4	0	0
2020-01-10 01:45:00+00:00	2	5	0	0
2020-01-10 01:50:00+00:00	1	1	0	0
2020-01-10 01:55:00+00:00	0	0	0	0
2020-01-10 02:00:00+00:00	2	1	0	0
2020-01-10 02:05:00+00:00	3	7	0	0
2020-01-10 02:10:00+00:00	2	0	0	0
2020-01-10 02:15:00+00:00	1	1	0	0

✓ All Data is stored on the BoulderAI Cloud.

✓ Reports available via Web, table and csv export:



DENNIS LEBLANC / National Sales Director / dennis.leblanc@roadsys.com / www.roadsys.com / 480-289-0081

	PED_01_South	PED_01_North	BIKE_01_South	BIKE_01_North
timecollected				
2020-01-10 00:00:00+00:00	42	29	2	0.0
2020-01-10 01:00:00+00:00	24	30	2	0.0
2020-01-10 02:00:00+00:00	15	35	0	0.0
2020-01-10 03:00:00+00:00	5	24	1	0.0
2020-01-10 04:00:00+00:00	2	1	1	0.0
2020-01-10 05:00:00+00:00	1	1	2	0.0
2020-01-10 06:00:00+00:00	0	3	1	0.0
2020-01-10 07:00:00+00:00	0	0	0	0.0
2020-01-10 08:00:00+00:00	0	0	0	0.0
2020-01-10 09:00:00+00:00	1	1	0	0.0
2020-01-10 10:00:00+00:00	13	4	0	1.0
2020-01-10 11:00:00+00:00	61	37	3	1.0
2020-01-10 12:00:00+00:00	92	69	8	1.0
2020-01-10 13:00:00+00:00	122	152	20	2.0
2020-01-10 14:00:00+00:00	76	78	11	0.0
2020-01-10 15:00:00+00:00	68	42	4	0.0

Hourly Report for 24 Hour Period

	PED_01_South	PED_01_North	BIKE_01_South	BIKE_01_North
timecollected				
2020-01-10 16:00:00+00:00	50	61	3	0.0
2020-01-10 17:00:00+00:00	100	128	9	1.0
2020-01-10 18:00:00+00:00	102	63	5	1.0
2020-01-10 19:00:00+00:00	62	58	7	0.0
2020-01-10 20:00:00+00:00	98	54	5	0.0
2020-01-10 21:00:00+00:00	171	83	33	0.0
2020-01-10 22:00:00+00:00	148	69	20	1.0
2020-01-10 23:00:00+00:00	80	51	10	1.0

Daily Report

REST API Output

```
{"Date":"2020-01-01", "TIME":"12:00 - 12:15",
"sensor_name":"PED_01","COUNT_SOUTH":15,"COUNT_NORTH": 10},
        {"Date":"2020-01-01", "TIME":"12:00 - 12:15",
"sensor_name":"BIKE_01","COUNT_SOUTH":1,"COUNT_NORTH": 0}
    ]
```



Summary

Al cameras in school zones will allow you to gather real time data that allows you to track exactly how pedestrians, bikes and vehicles are using the school zone.

With GIS technology you can get reports of where kids are crossing the street, at mid-block, crosswalks or even the sidewalks. Everything in view of the camera will be counted with 95% accuracy.

The DNNCam will count:

- ✓ Pedestrians
- ✓ Bikes
- ✓ Vehicles
- ✓ Scooters
- ✓ Public Transit
- ✓ Freight
- ✓ Carts
- ✓ Strollers

The DNNCam is a data collection solution for school zones that can be tailored to reach your objectives.

The data gathered with DNNCam will allow you to get accurate data of all moving objects in a school zone and will allow you to make educated decisions to make school zones safer.

