

Traffic counter

Design project team 11



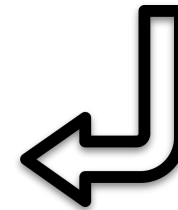


Introduction

- Mindhash
- Existing solution
- The project



Mindhash

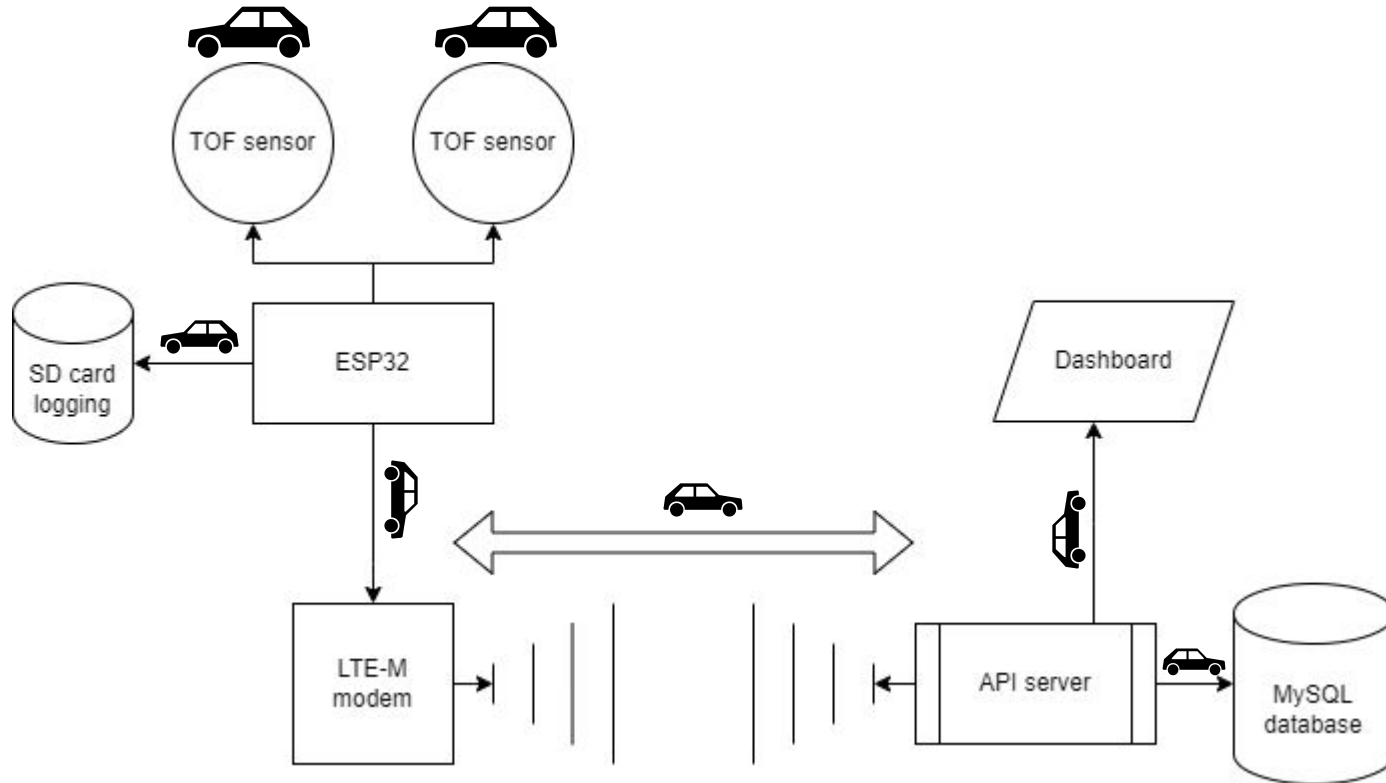




Requirements (abbreviated)

- Key functional requirements
 - Detect speed, direction, and length class
 - Display detection statistics
 - Communicate hardware state to backend
 - Log detections to SD card
- Quality Requirements
 - Less than 500MB over 10 years with 8000 cars/day
 - Correctly detect 90% of cars

Global design

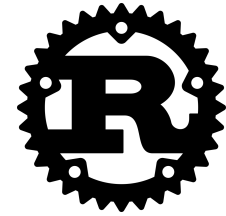
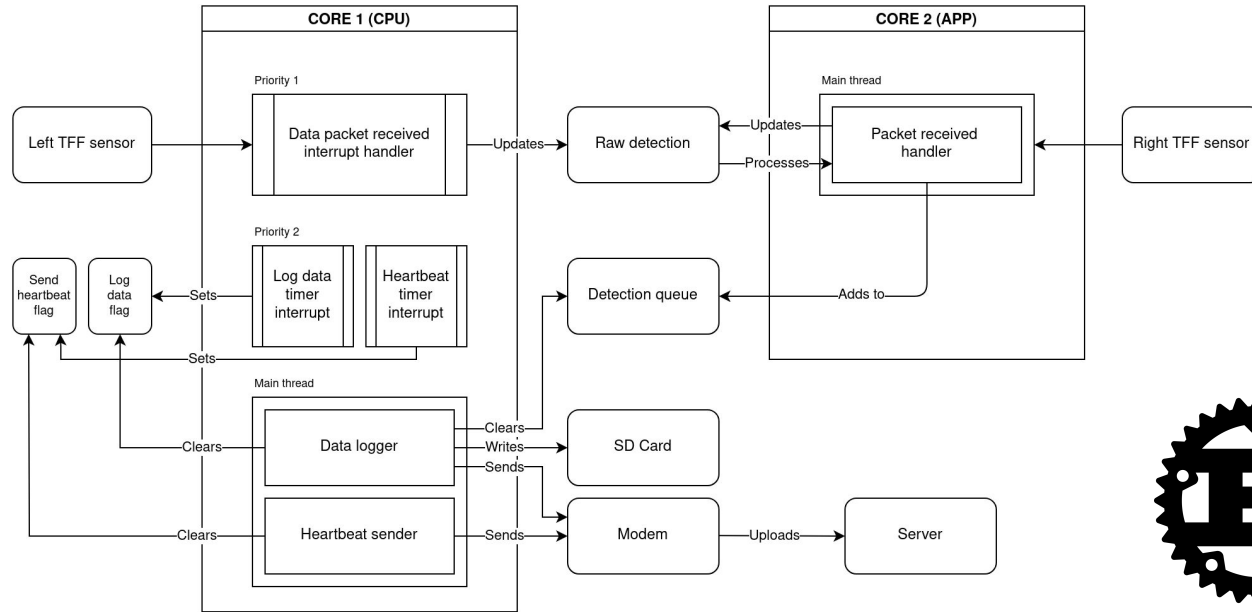


Detailed design

Counter (hardware)

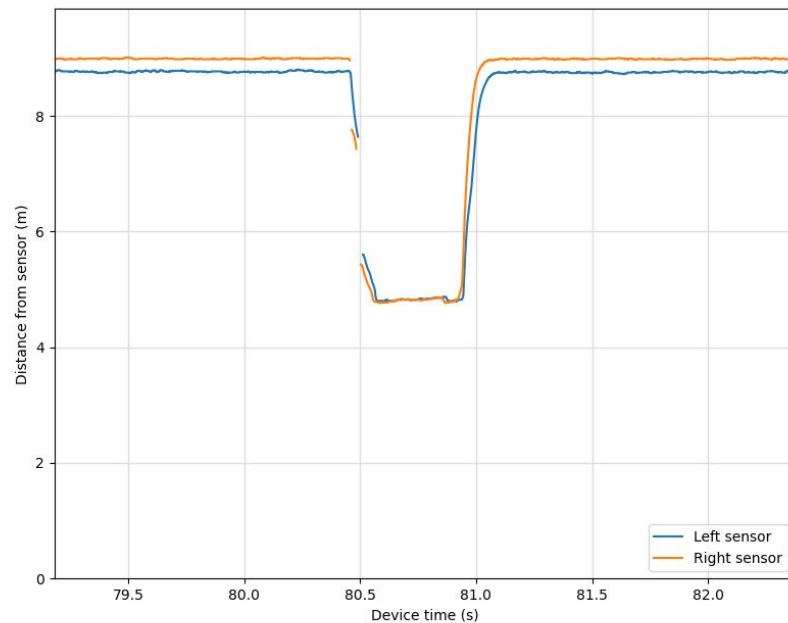
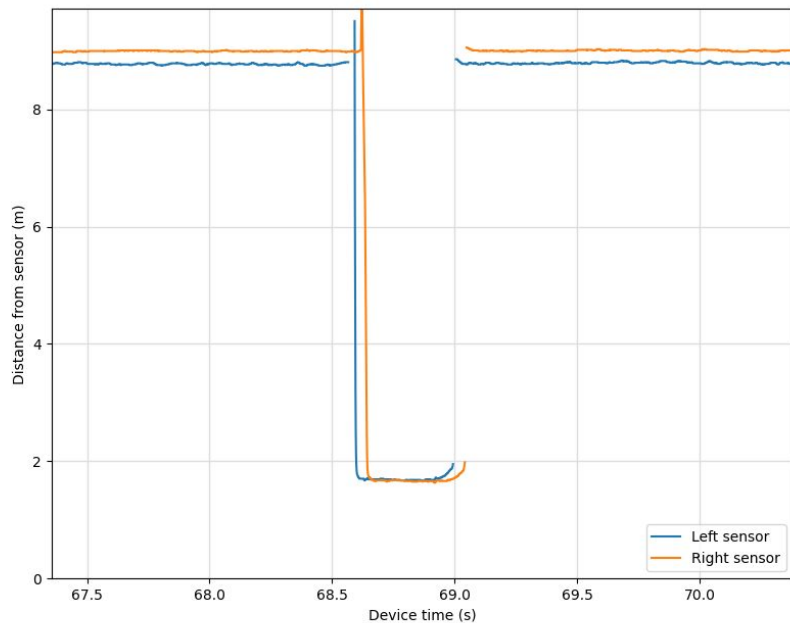


Counter (firmware)





Counter (firmware)





API server

- HTTP RESTful API
- Dockerized Flask app
- OpenAPI specification
- Swagger documentation
- Pytest

detections Access to detections

GET `/detections/` Returns all detections

GET `/detections/{device_id}` Finds Detections by device ID

POST `/detections/{device_id}` Adds a batch detections to a device using raw bytes

GET `/detections/{device_id}/month/{month}` Finds all days in a month that have detections for a device

GET `/detections/{device_id}/day/{day}` Finds all detections for a given day for a given device

Coverage report: 99%

coverage.py v7.3.2, created at 2023-11-08 17:54 +0100



Module	statements	missing	excluded	coverage
C:\School\Module 11\project\traffic-counter-monorepo\api-server\src\app.py	18	0	2	100%
C:\School\Module 11\project\traffic-counter-monorepo\api-server\src\auth.py	25	0	0	100%
C:\School\Module 11\project\traffic-counter-monorepo\api-server\src\counts.py	41	0	0	100%
C:\School\Module 11\project\traffic-counter-monorepo\api-server\src\database.py	27	0	3	100%
C:\School\Module 11\project\traffic-counter-monorepo\api-server\src\detections.py	61	0	4	100%
C:\School\Module 11\project\traffic-counter-monorepo\api-server\src\devices.py	102	0	0	100%
C:\School\Module 11\project\traffic-counter-monorepo\api-server\src\errors.py	8	0	6	100%
C:\School\Module 11\project\traffic-counter-monorepo\api-server\src\keys.py	37	0	0	100%
C:\School\Module 11\project\traffic-counter-monorepo\api-server\src\routes.py	11	0	11	100%
C:\School\Module 11\project\traffic-counter-monorepo\api-server\src\speeds.py	45	0	0	100%
C:\School\Module 11\project\traffic-counter-monorepo\api-server\src\swagger.py	4	0	0	100%
C:\School\Module 11\project\traffic-counter-monorepo\api-server\src\utils.py	7	0	0	100%



Dashboard

- Devices overview
- Quality of life
 - New
 - Edit
 - Delete

Matthijs ✎
Last online: 2023-11-04 16:11:24
Device ID: 2

Traffic Counter

Devices: 6

Reload Add devices Device name: _____

Device Name	Last Online	Device ID	Warning	Key	Trash
Matthijs ✎	2023-11-04 16:11:24	2			
Attempt 2 ✎	2023-11-03 13:10:13	4			
Attempt 3 ✎	2023-11-03 19:05:50	5			
N+1th time is the charm ✎	2023-11-04 16:34:31	7			
Leo #2 ✎	2023-11-13 16:33:44	8			
RandomTestDevice123 ✎	Unknown	10			

Each device card includes a line graph showing traffic over time (7:00 to 12:00).

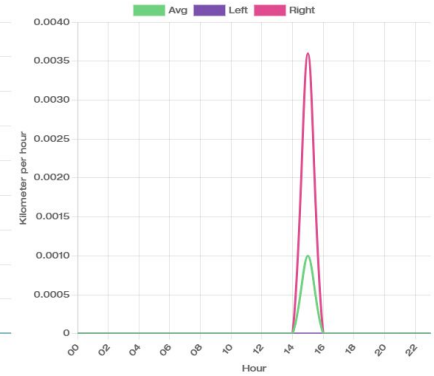
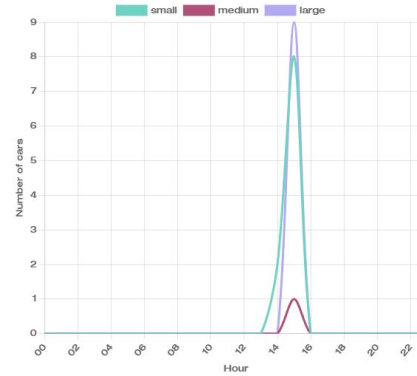


Device page

- Charts
 - Type of vehicles
 - Vehicle speed
 - Datepicker
- Map
 - System location

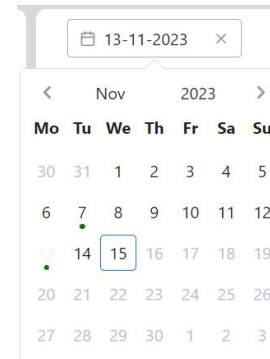
13-11-2023 x

Showing stats for device: 8

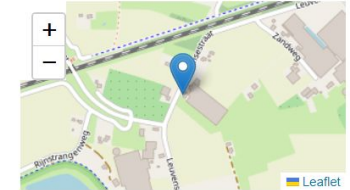


VehicleType	Number	Percentage
Small	10	50.00%
Medium	1	5.00%
Large	9	45.00%

Individual detections



Traffic device 8



Location
Leuvenestraat, 6923 BN

Coordinates
Lat: 51.9231 Long: 6.0267

Status
SoC: 0
firmwareID: 0.0.1
Last online: 2023-11-05 15:18:36

Evaluation



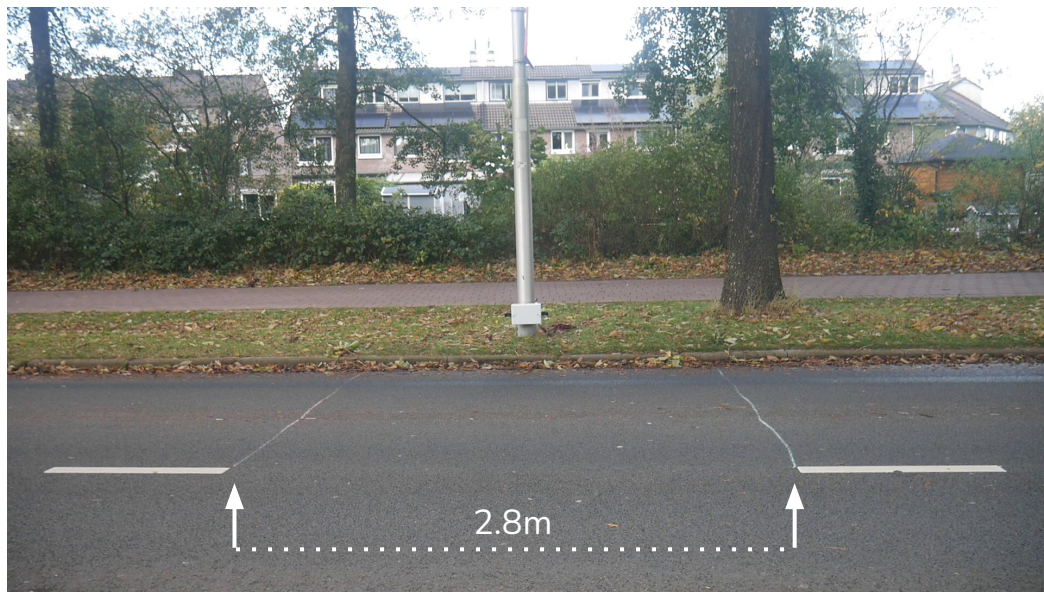


Detection accuracy

- Recall: "Correctly detect 90% of passing cars"
- Methodology
- Results

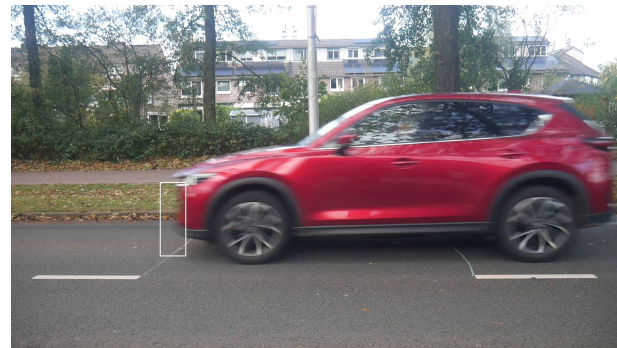
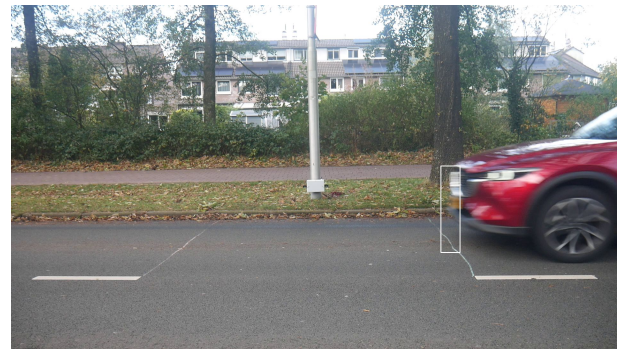
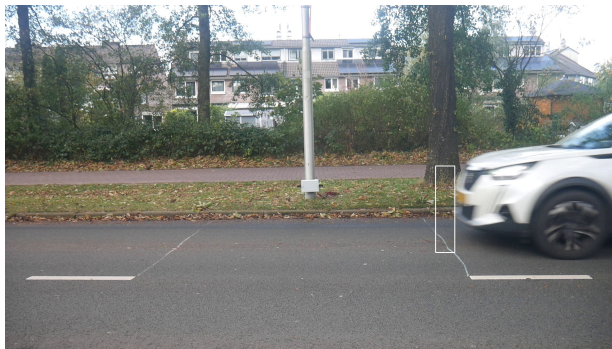


Detection accuracy



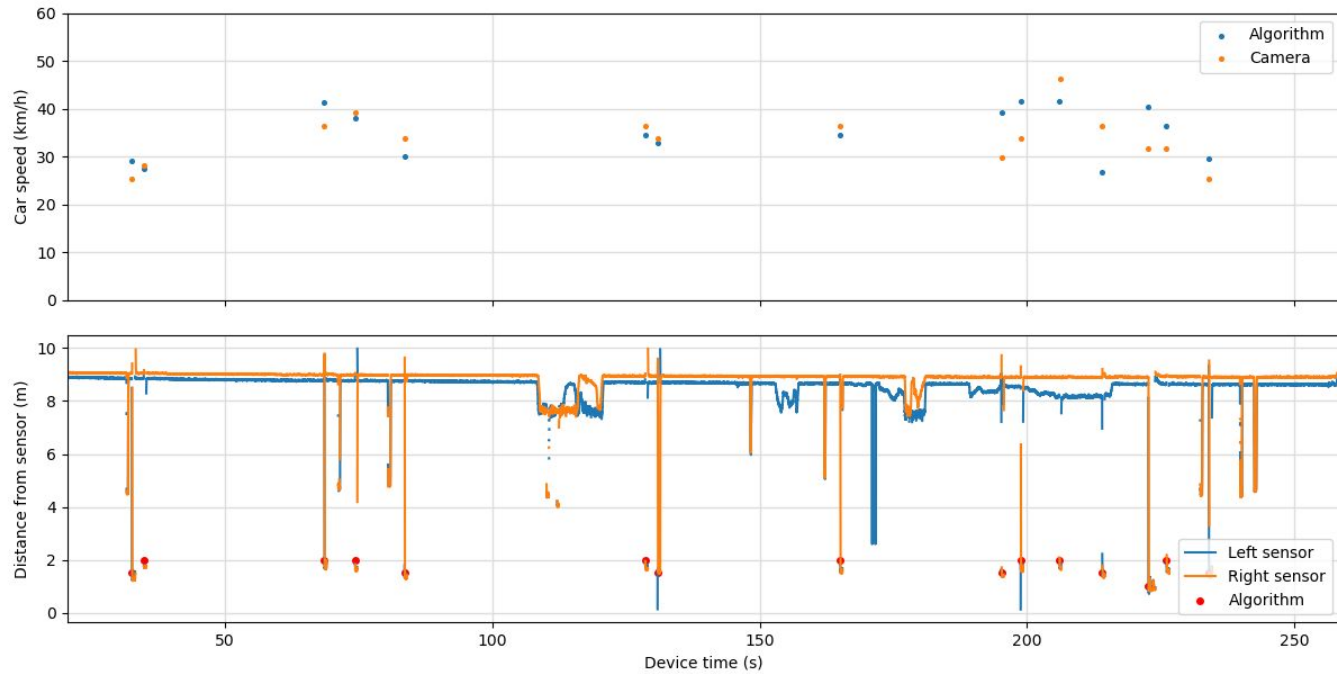


Detection accuracy





Detection accuracy





Detection accuracy

- Results
 - 100% cars detected
 - Speed error: 1.20 ± 5.26 km/h



Detection accuracy

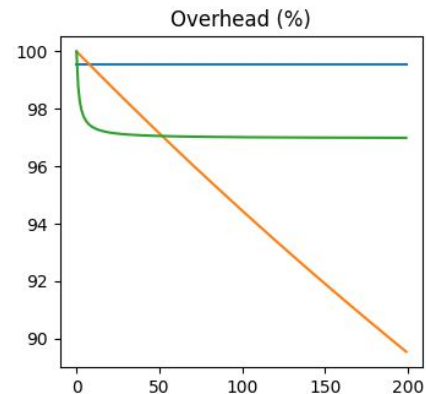
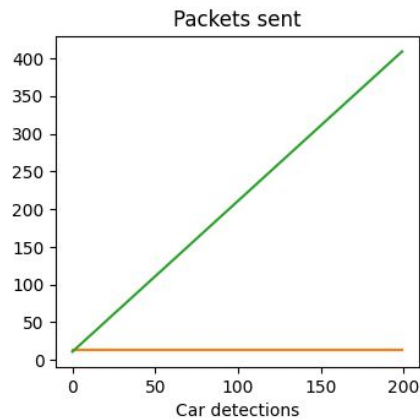
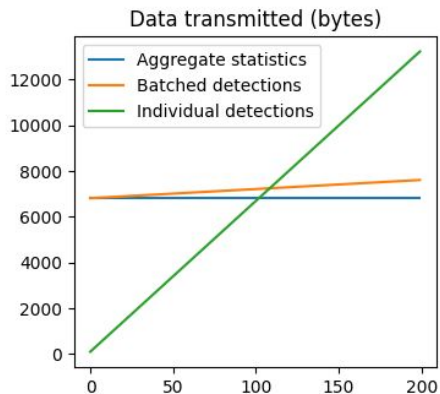
- Results
 - Avg 9 detections:
 - Counter: 34.86 ± 5.18 km/h
 - Camera: 33.67 ± 5.26 km/h



Data usage

500 MB - 10 years

Detections
HTTP
TLS
TCP



Questions?

