

Impact analysis of additional ambulance vehicle beacons

A preliminary study on ambulance vehicles of the Bavarian Red Cross (BRK)



Fig. 1: Ambulance vehicle of BRK with additional beacon next to the headlights (left), additional beacon in close-up view (right)

Motivation and Objective

- Emergency vehicles more often than average involved in crashes
- Most crashes appear at intersections in urban areas
- Optical conspicuousness implies higher safety [1]

- **Purpose of study:** Examine Additional beacon (fig. 1.) regarding the effect on safety of maneuvering of conflicting drivers

[1] Berufsgenossenschaft für Gesundheitsdienst und Wohlfahrtspflege (2007): Verkehrsunfallanalyse bei der Nutzung von Sonder- und Wegerechten gemäß StVO: Konzeptionelle Vorschläge zur Verbesserung der Aus- und Fortbildung

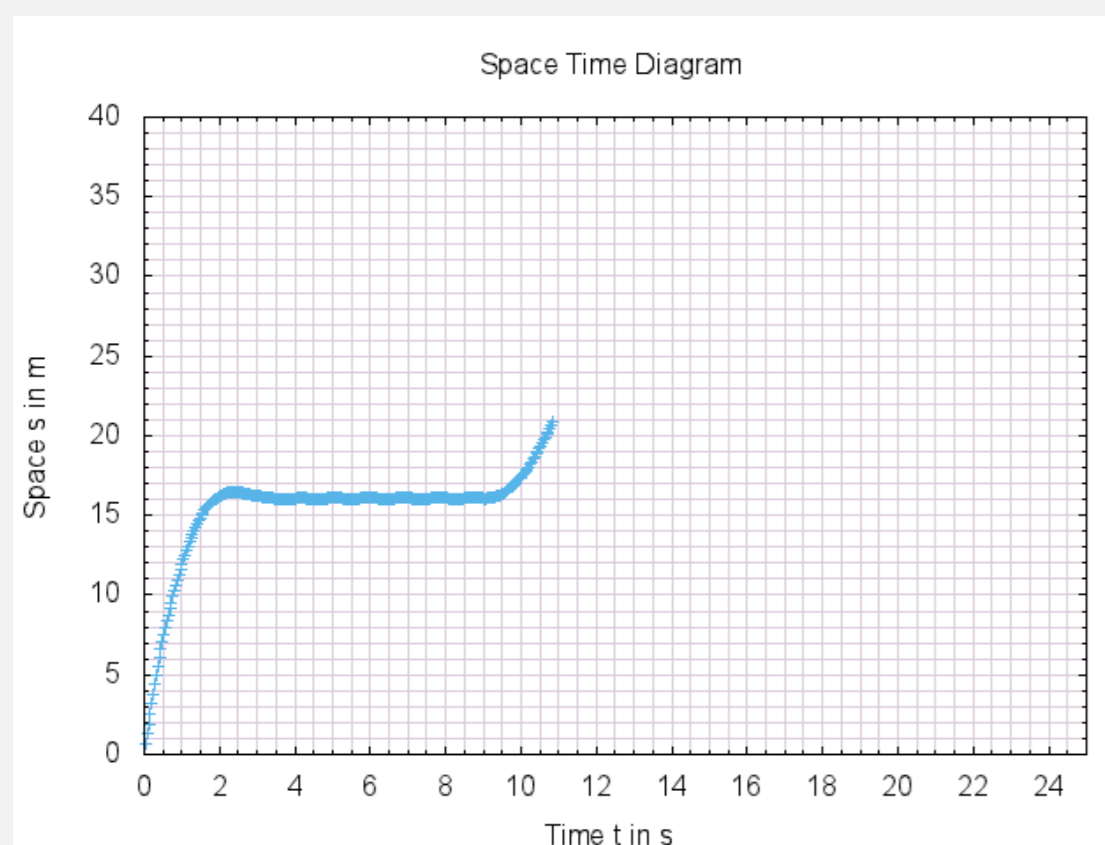
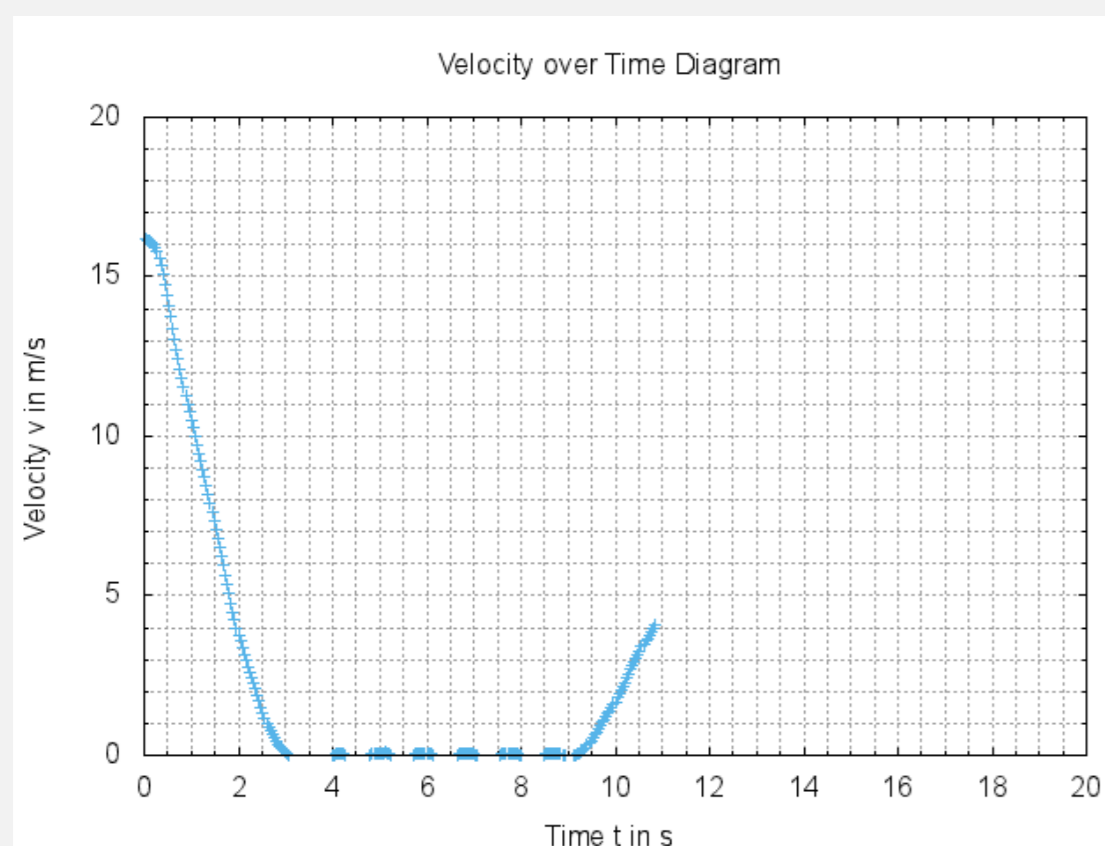


Fig. 2: Different views of a passenger vehicle trajectory in conflict with upcoming rescue vehicle



Fig. 3: camera view (35m viewing area) and tracking

Approach and Implementation

Camera-based traffic observation

- Fixed look at exit of station, 14 days (4-5 h/d)
- In total 51 emergency drives, thereof 13 with additional beacons

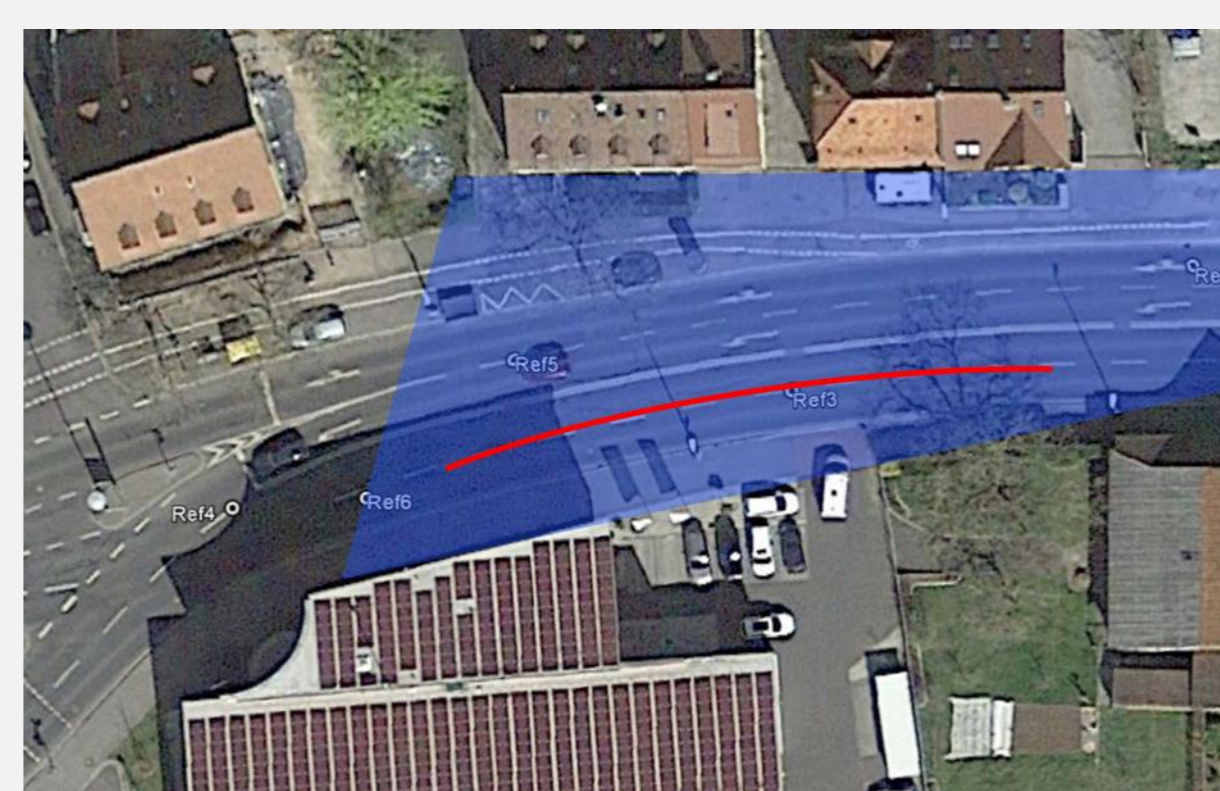


Fig. 4: Map View: Detection range (blue), Region of Interest observed (red)

Trajectory-based analysis of behaviour of road users. Indicators:

- Maximum deceleration
- Position and time of braking
- Velocity on entering detection area
- Position and time, when vehicle has reached walking speed

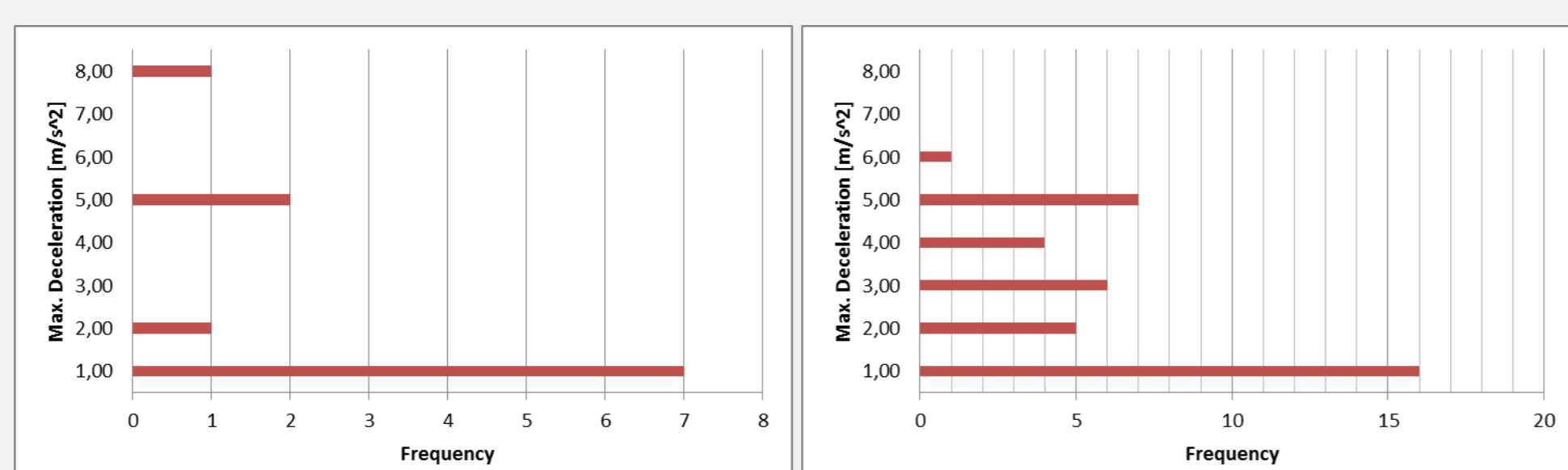


Fig. 5: Histograms max. deceleration: with add. Beacon (left) and without (right)

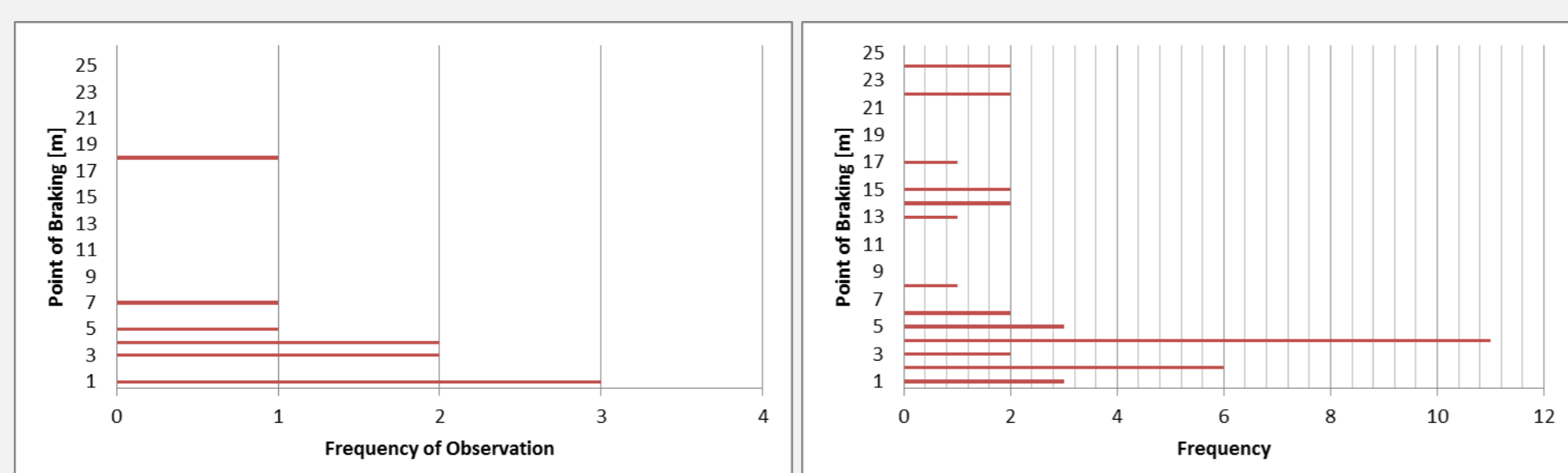


Fig. 6: Histograms of pos. of braking entry: with add. Beacon (left) and without (right)

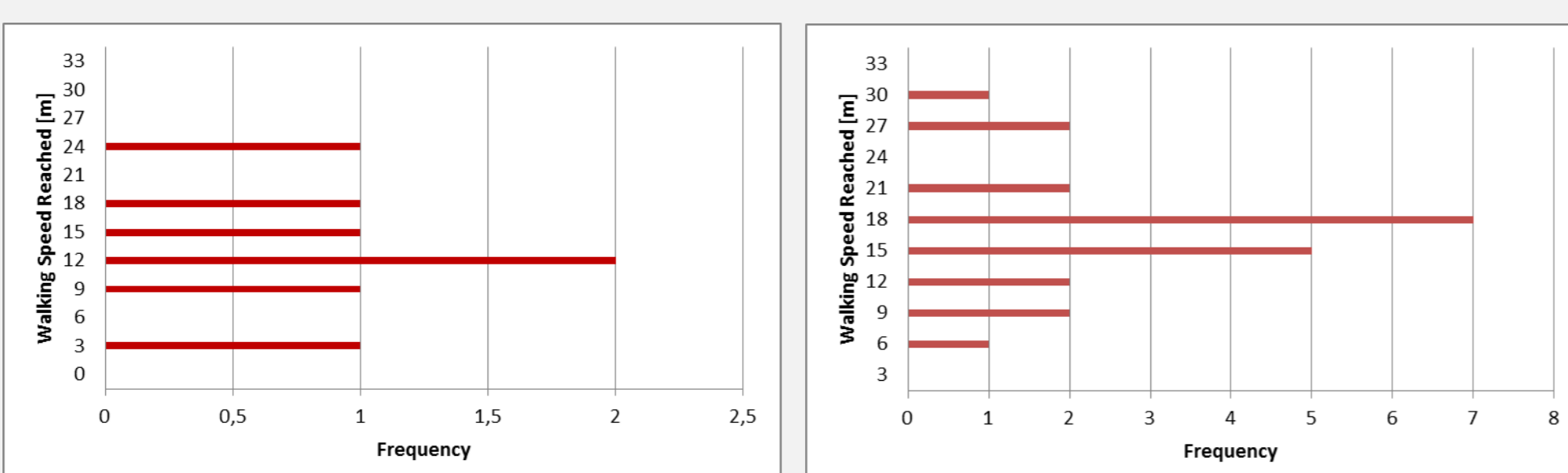


Fig. 7: Histograms of pos. of reaching walking pace: with add. Beacon (left) and without (right)

Results

- Data indicates earlier perception of ambulance vehicle with additional beacons:
 - Road users enter detection range slower, probably due to prior braking
 - Road users on average brake 3.5 m earlier, less intensely and reach walking speed 4 m earlier

Additional beacon	v_0 [m/s]	Max deceleration [m/s ²]	Position of braking entry [m]	Position of reaching walking pace [m]
no	9.22	2.18	8.10	15.95
yes	8.16	2.03	4.60	12.21

Tab. 1: Mean values of indicators

Outlook

- Larger samples for more statistical significant results
- Use of Surrogate Safety Measures considered (interactions with ambulance vehicle)
- Urban intersections as observation sites