ΕΘΝΙΚΟ ΚΕΝΤΡΟ ΕΡΕΥΝΑΣ ΚΑΙ ΤΕΧΝΟΛΟΓΙΚΗΣ ΑΝΑΠΤΥΞΗΣ
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Από την πρωτογενή έρευνα στις καινοτόμες εφαρμογές
From basic research to innovative applications
7th INTERNATIONAL CONGRESS ON TRANSPORTATION RESEARCH

Efficient Management of PARking under COnstraints

Vasileia Papathanasopoulou, Ioulia Markou, Constantinos Antoniou, Vassilis Gikas, Athanasios Mpimis, Harris Perakis, George Yannis

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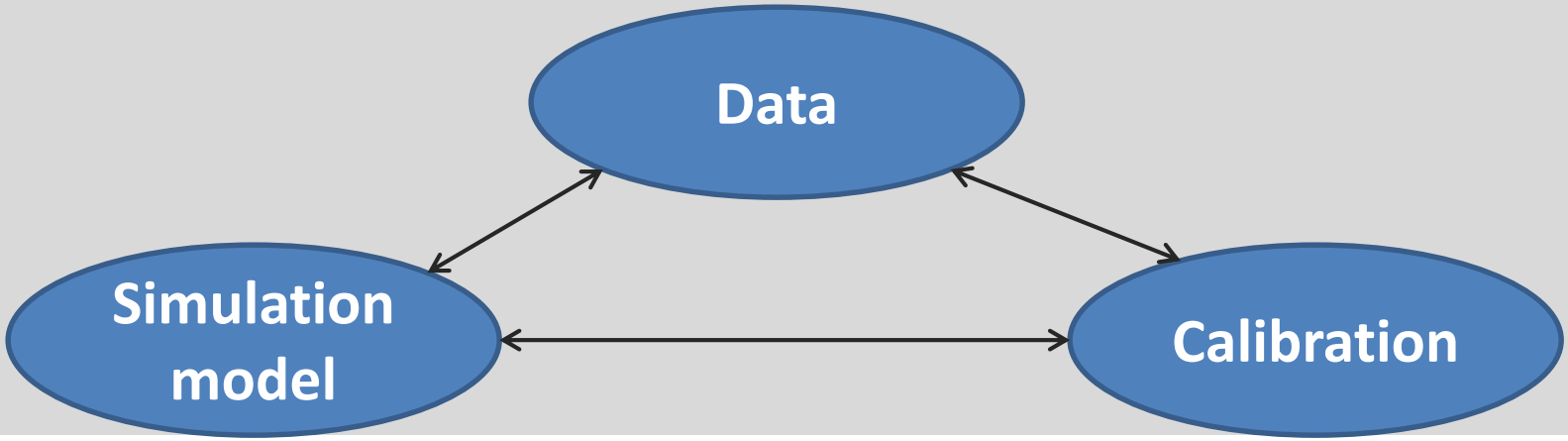
Co-financed by Greece and the European Union

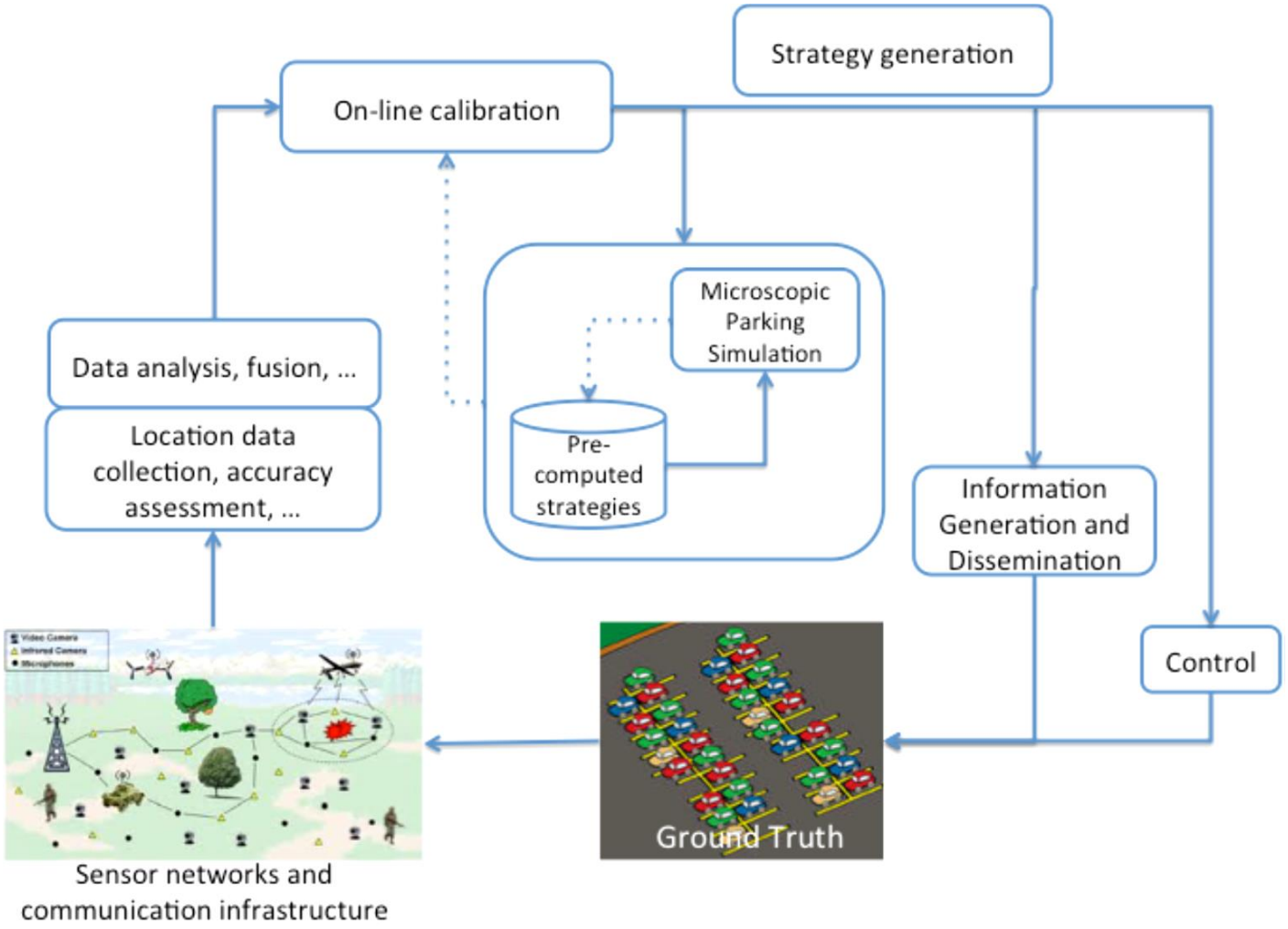
MOTIVATION AND OVERVIEW

CHALLENGES

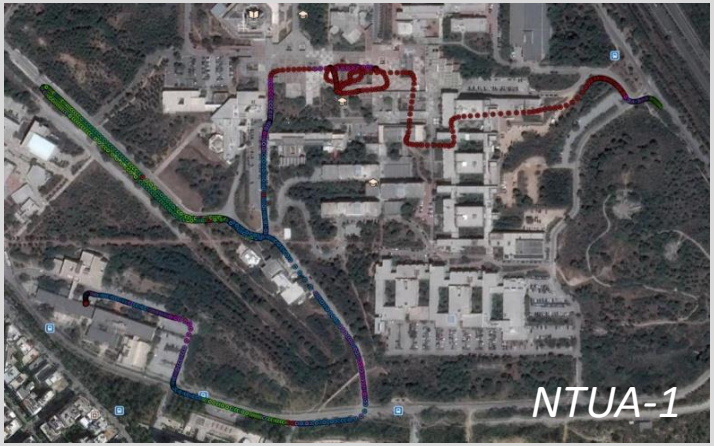
- Near- capacity demand
- Temporally concentrated arrivals/ departures
- Need for emergency evacuation
- Indoor environment
- Heterogeneity in driving behavior

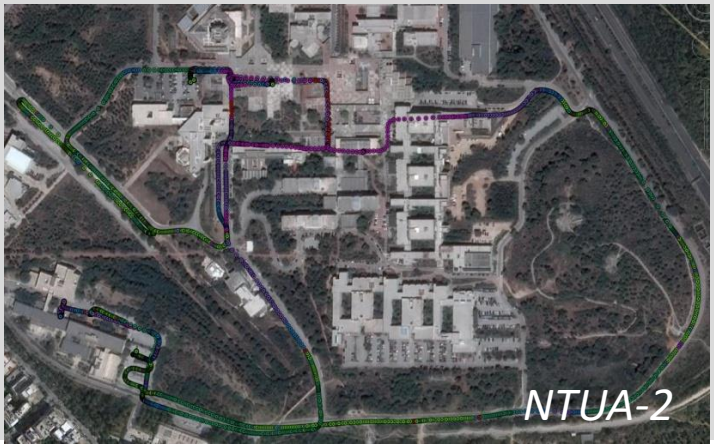


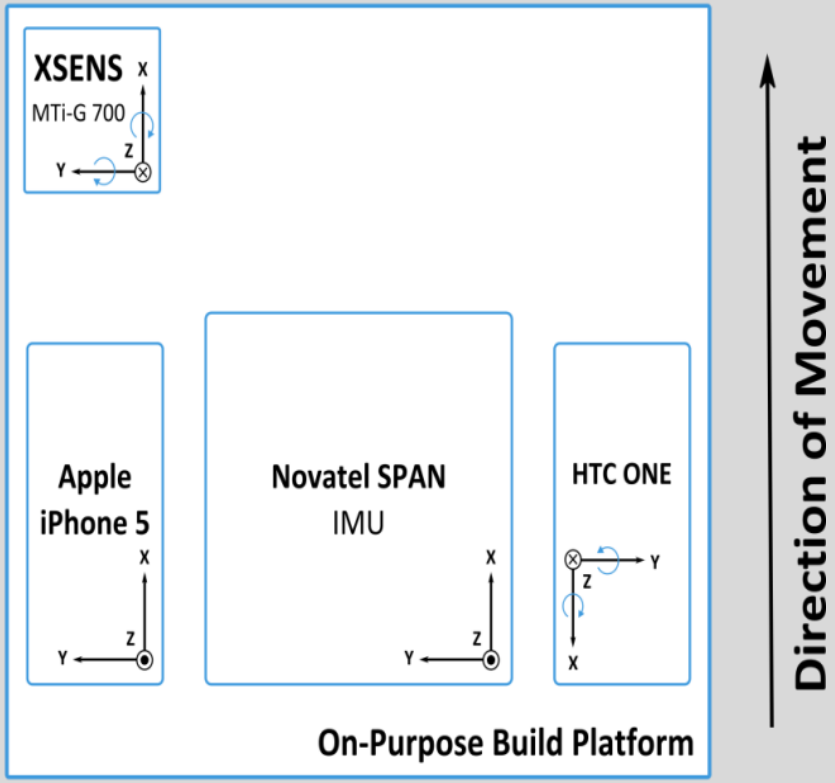
METHODOLOGY



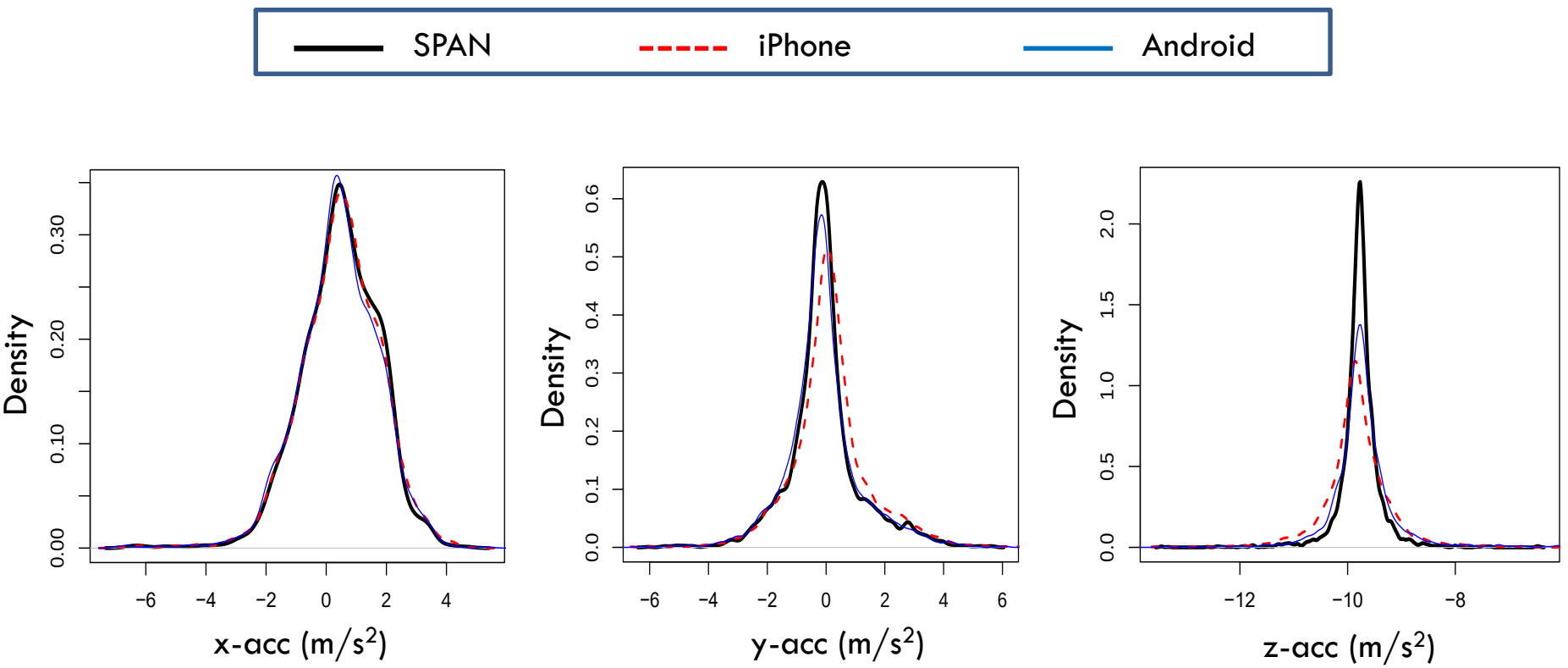
EXPERIMENTAL SET-UP



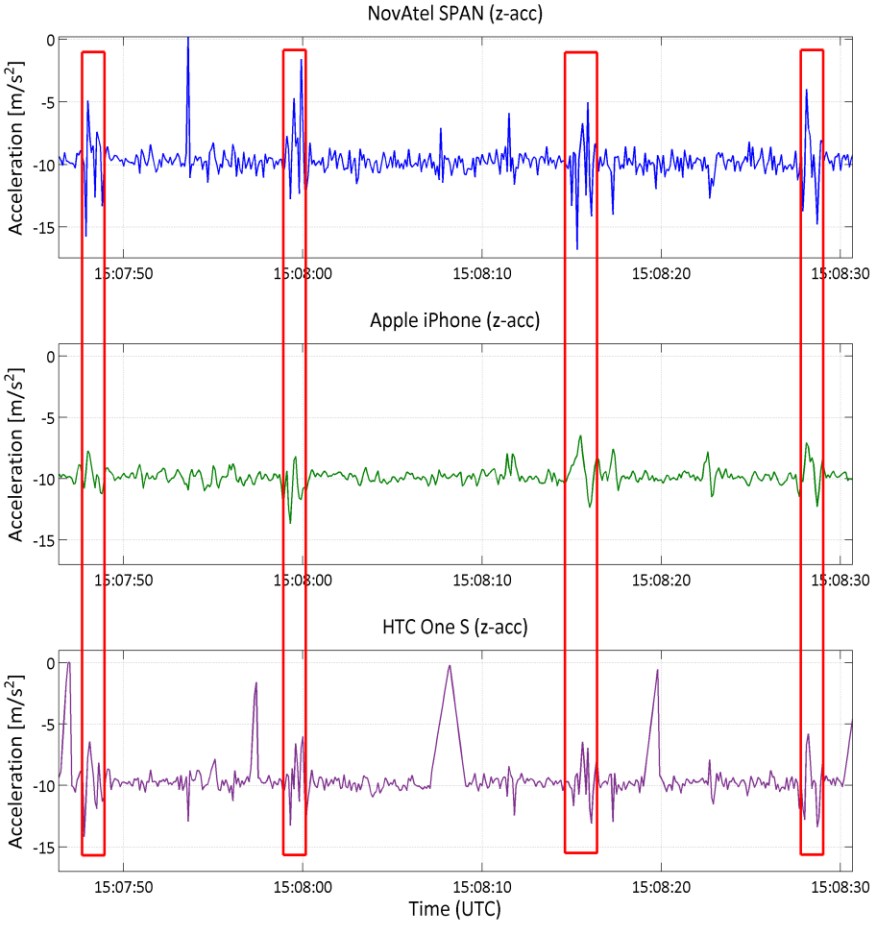


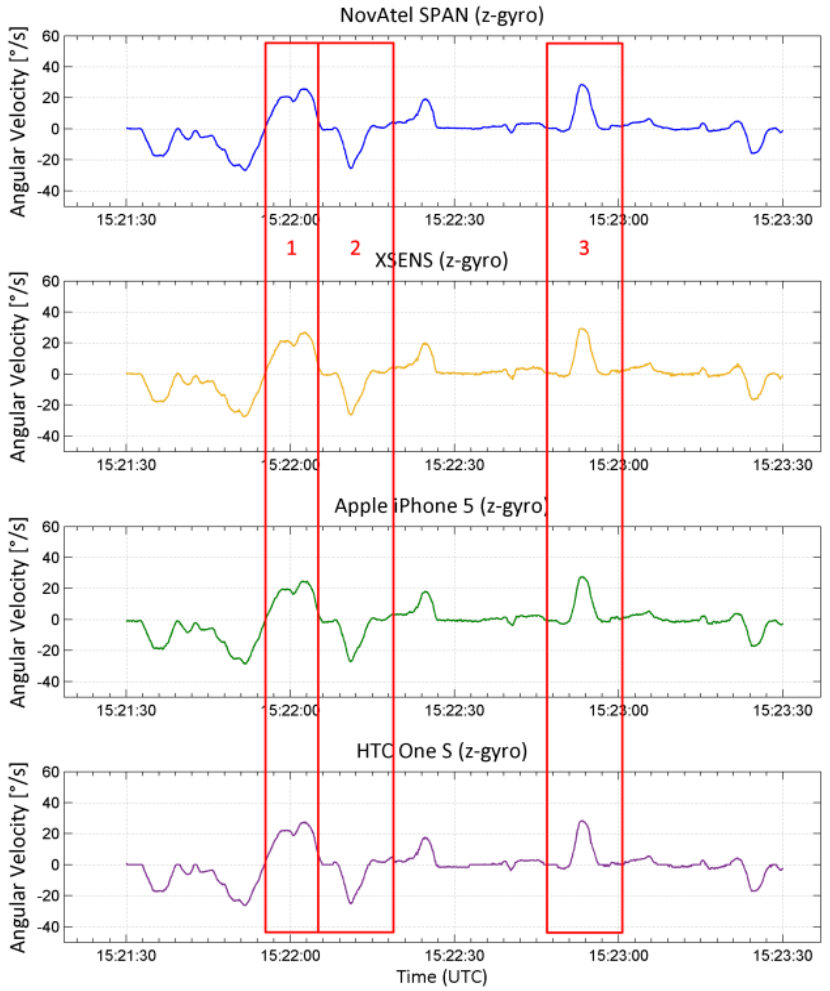


LOCALIZATION

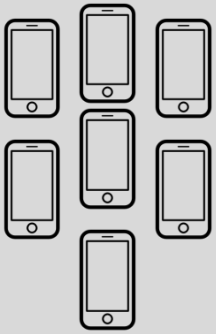


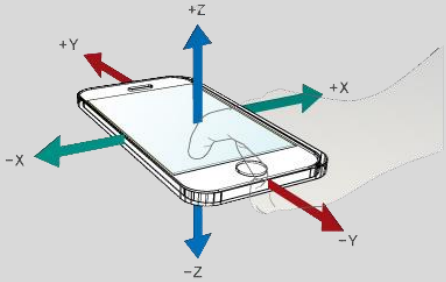
ANOMALY DETECTION

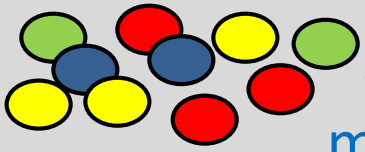




CAPTURING HETEROGENEITY



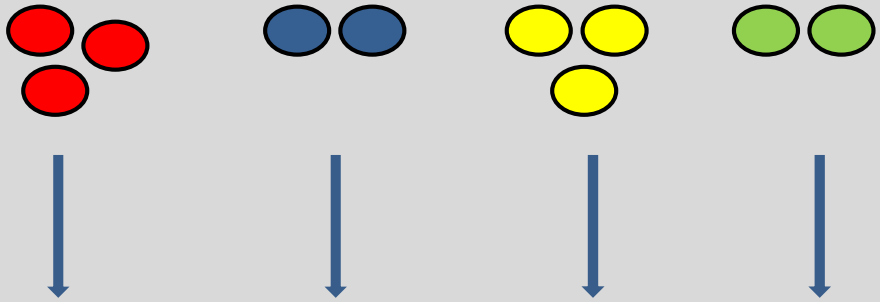




x-/y-/z-acceleration measurements

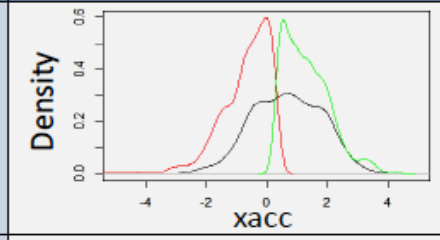
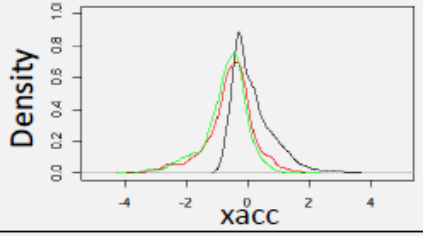
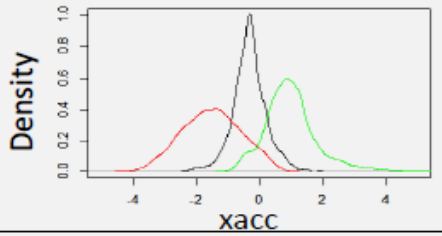
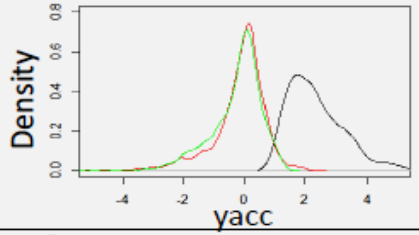
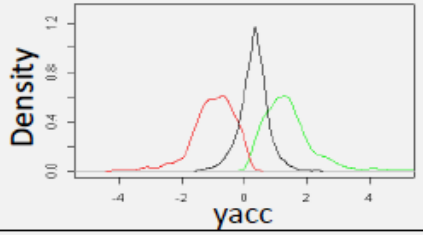
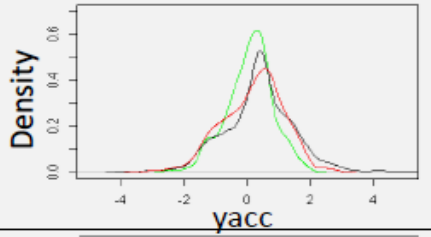
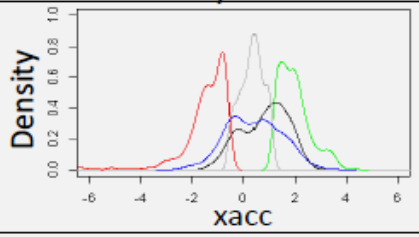
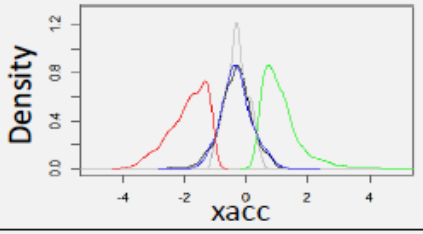
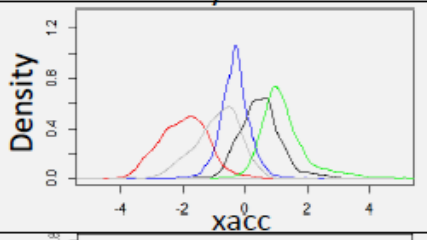
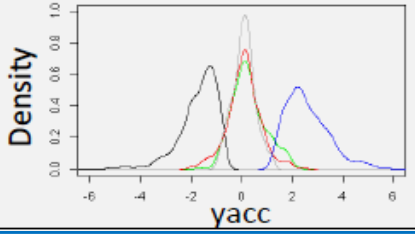
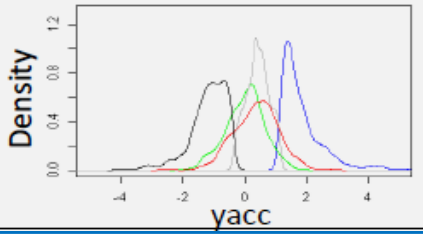
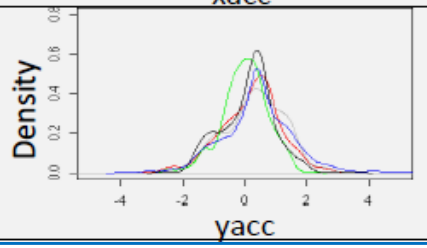
K-means algorithm

Driving behavior clustering



Calibration for each cluster separately

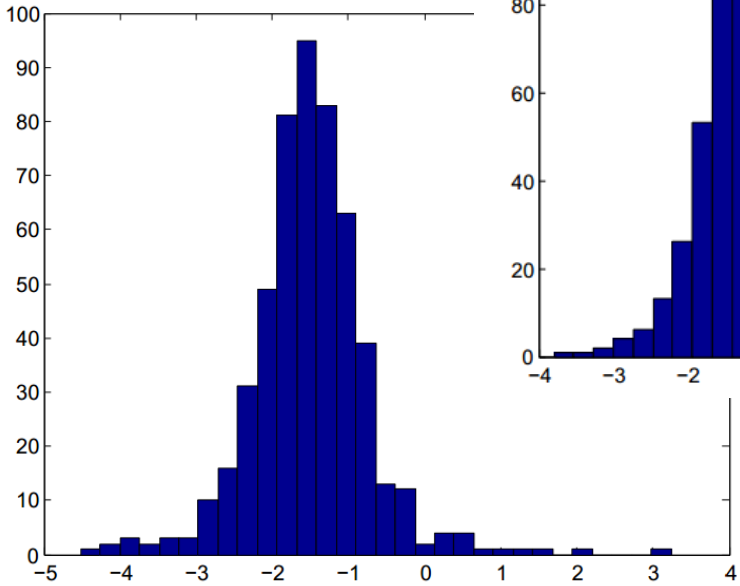
CLUSTERING

		NTUA-1 (accelerometers)	NTUA-2 (accelerometers)	NTUA-2 (accelerometers & gyros)
3 clusters	xacc			
	yacc			
5 clusters	xacc			
	yacc			

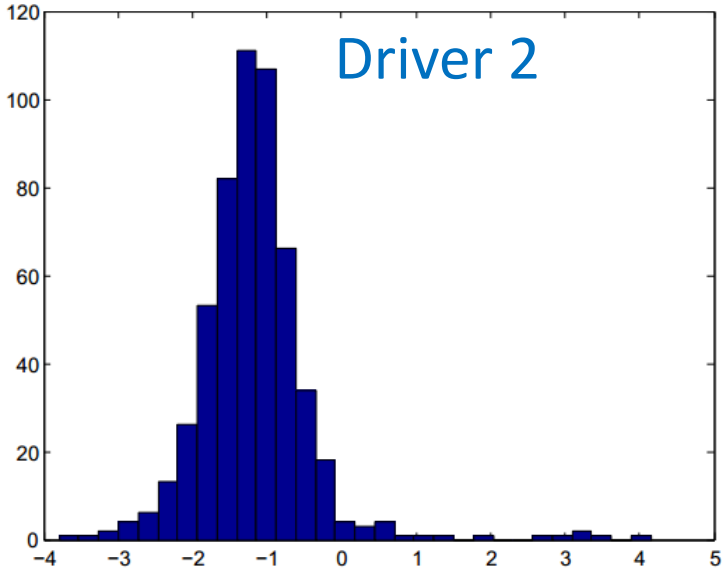
HETEROGENEITY OF DRIVING BEHAVIOR

$$A_j^{\pm}[t+\Delta t] = alpha^{\pm} \frac{V_j^{beta\pm}[t]}{D_{j,j-1}^{gamma\pm}[t]}(V_{j-1}[t]-V_j[t])+\varepsilon_j^{CF}$$

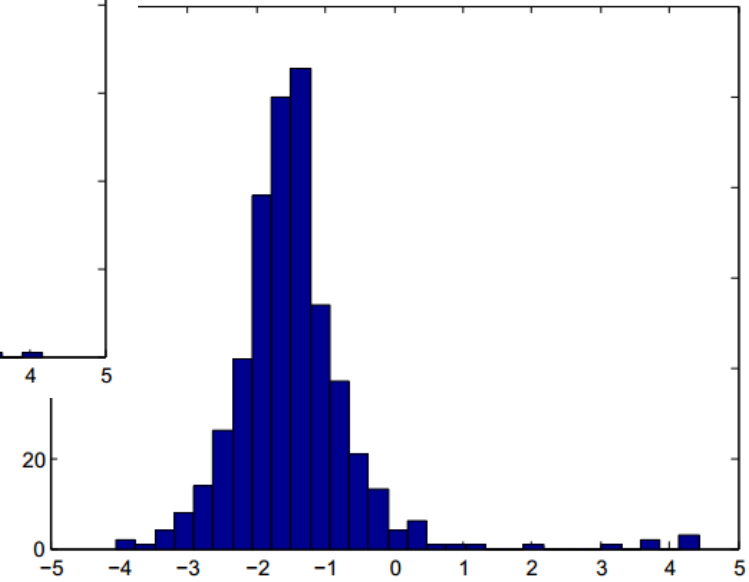
Driver 1



Driver 2



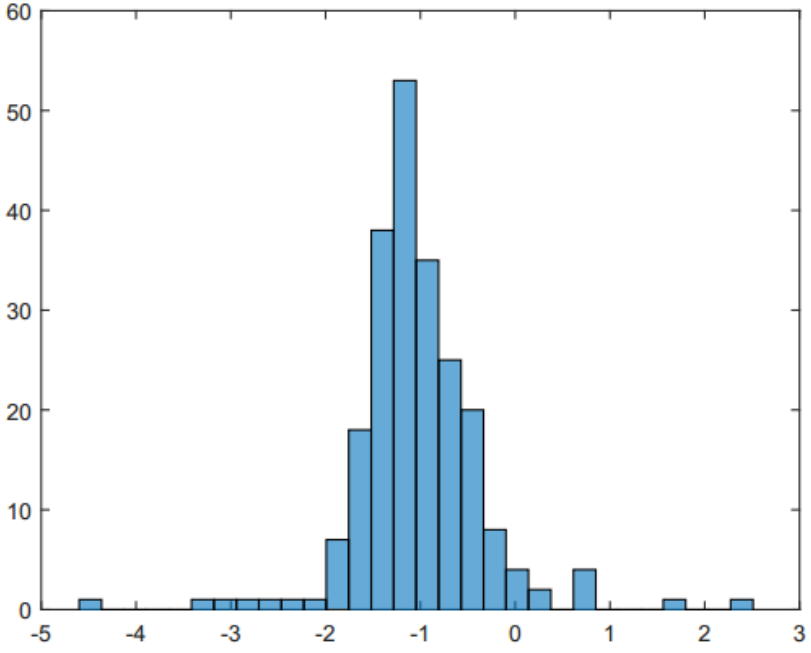
Driver 3



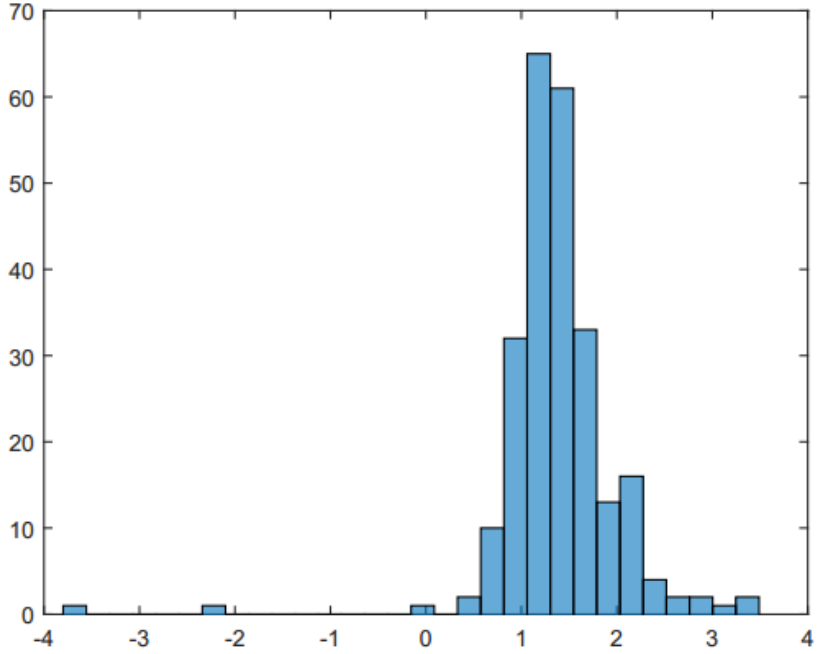
DISTRIBUTION-BASED CALIBRATION

$$A_j^{\pm}[t+\Delta t] = alpha^{\pm} \frac{V_j^{beta\pm}[t]}{D_{j,j-1}^{gamma\pm}[t]} (V_{j-1}[t] - V_j[t]) + \varepsilon_j^{CF}$$

Acceleration



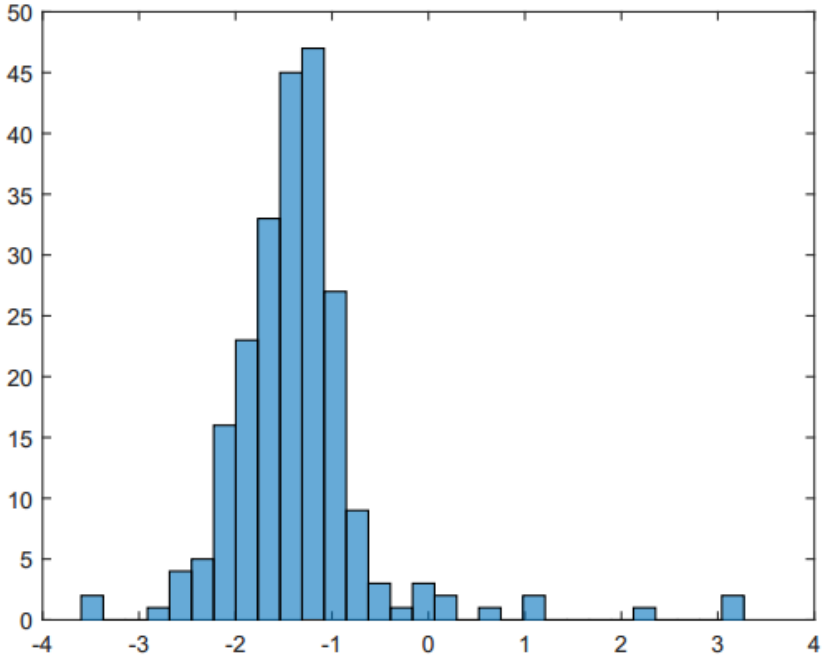
Deceleration



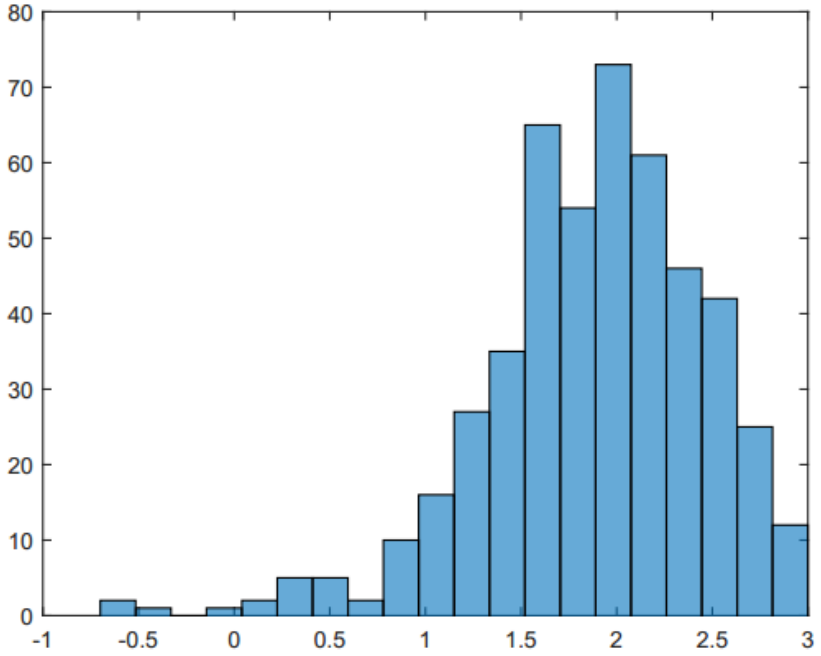
DISTRIBUTION-BASED CALIBRATION

$$A_j^{\pm}[t+\Delta t] = alpha^{\pm} \frac{V_j^{beta\pm}[t]}{D_{j,j-1}^{gamma\pm}[t]}(V_{j-1}[t]-V_j[t])+\varepsilon_j^{CF}$$

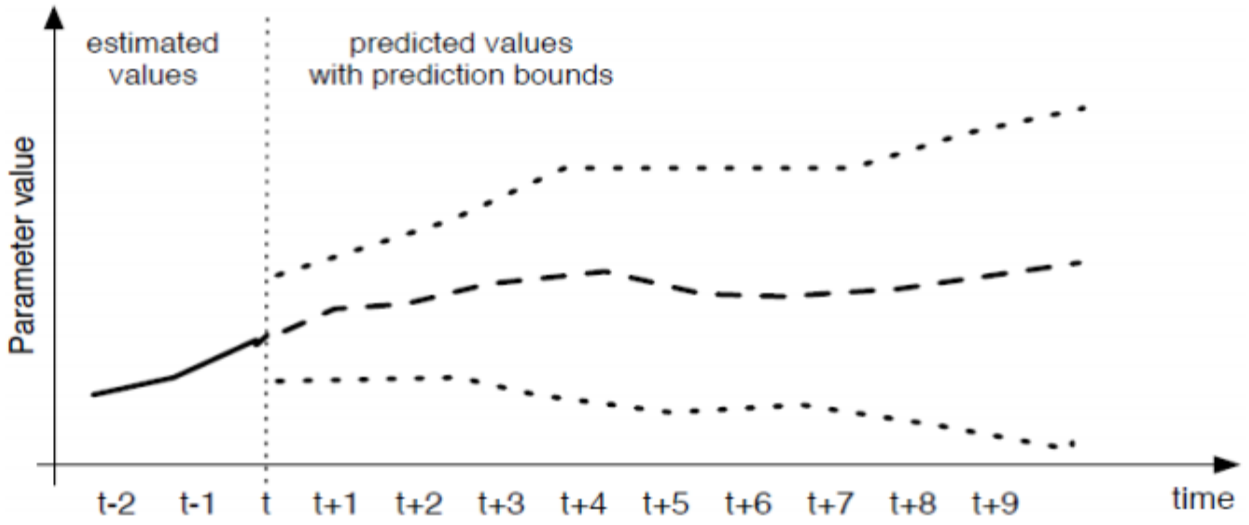
Acceleration

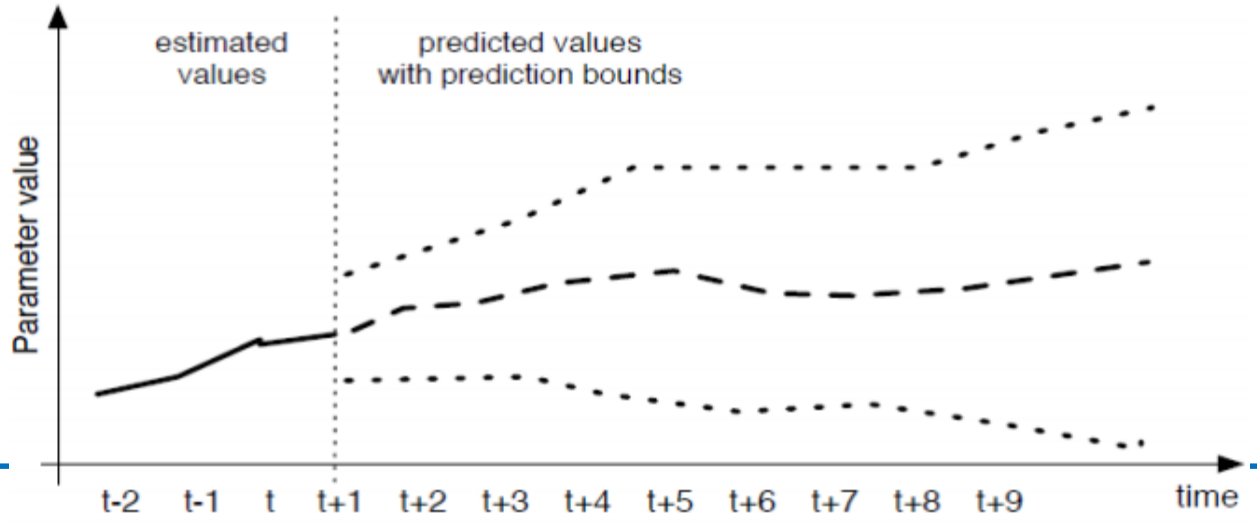


Deceleration



DYNAMIC CALIBRATION

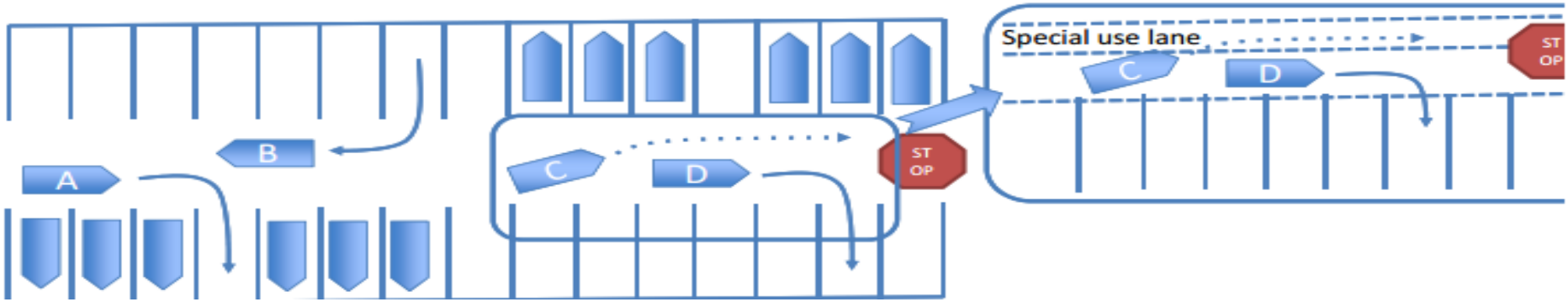




MODELING AND SIMULATION

AIMSUN

TRANSMODELER



AGGREGATE EVACUATION RESULTS

Scenario	Evacuation Time (min)	Reduction
1) Normal Case	21	-
2) Contraflow- Ramps	19	9.5 %
3) Contraflow- Entrances	18	14.3 %
4) Contraflow- Entrances	11	47.6 %

FOR MORE INFORMATION…

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