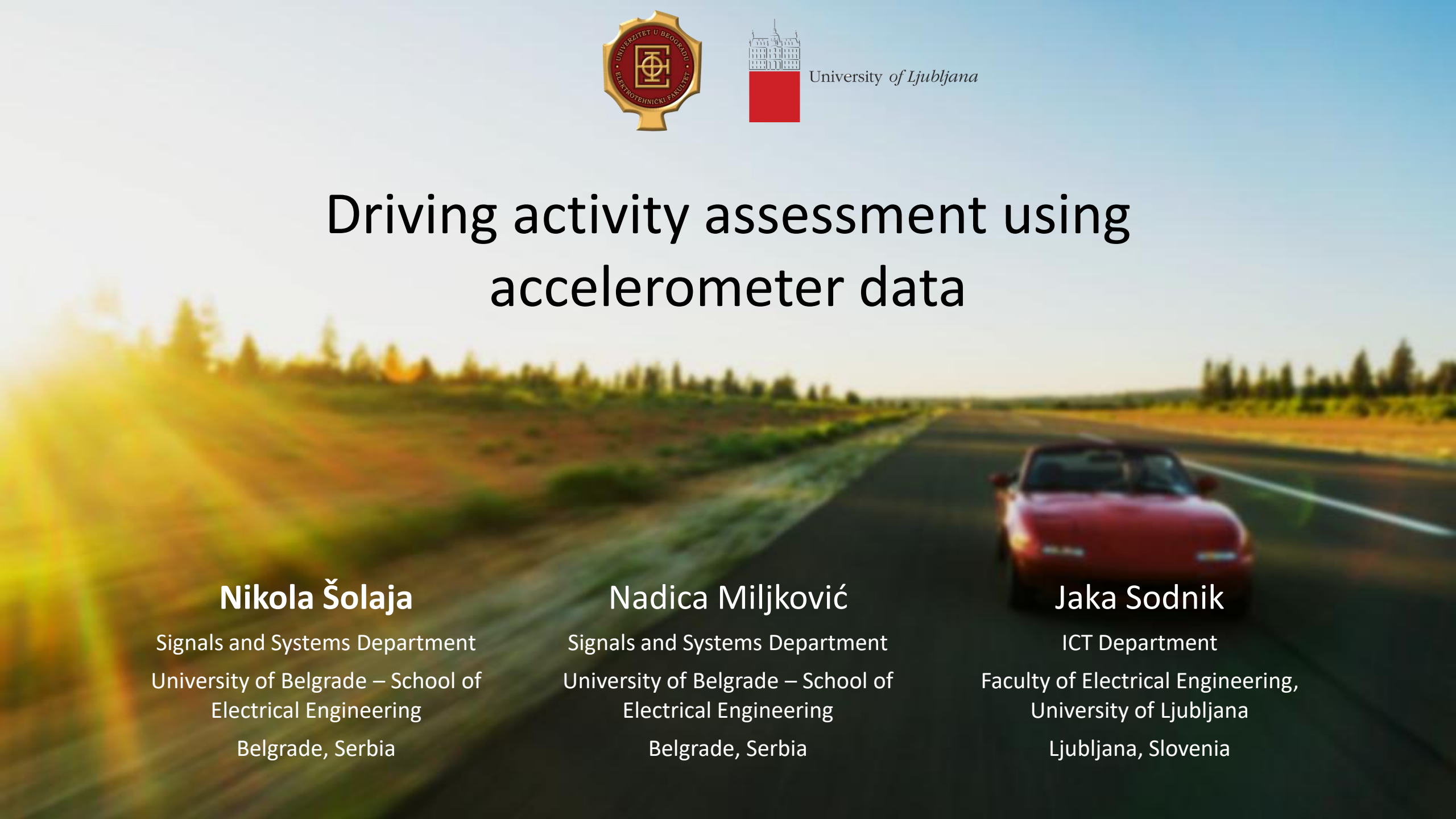

Driving activity assessment using accelerometer data

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Plan

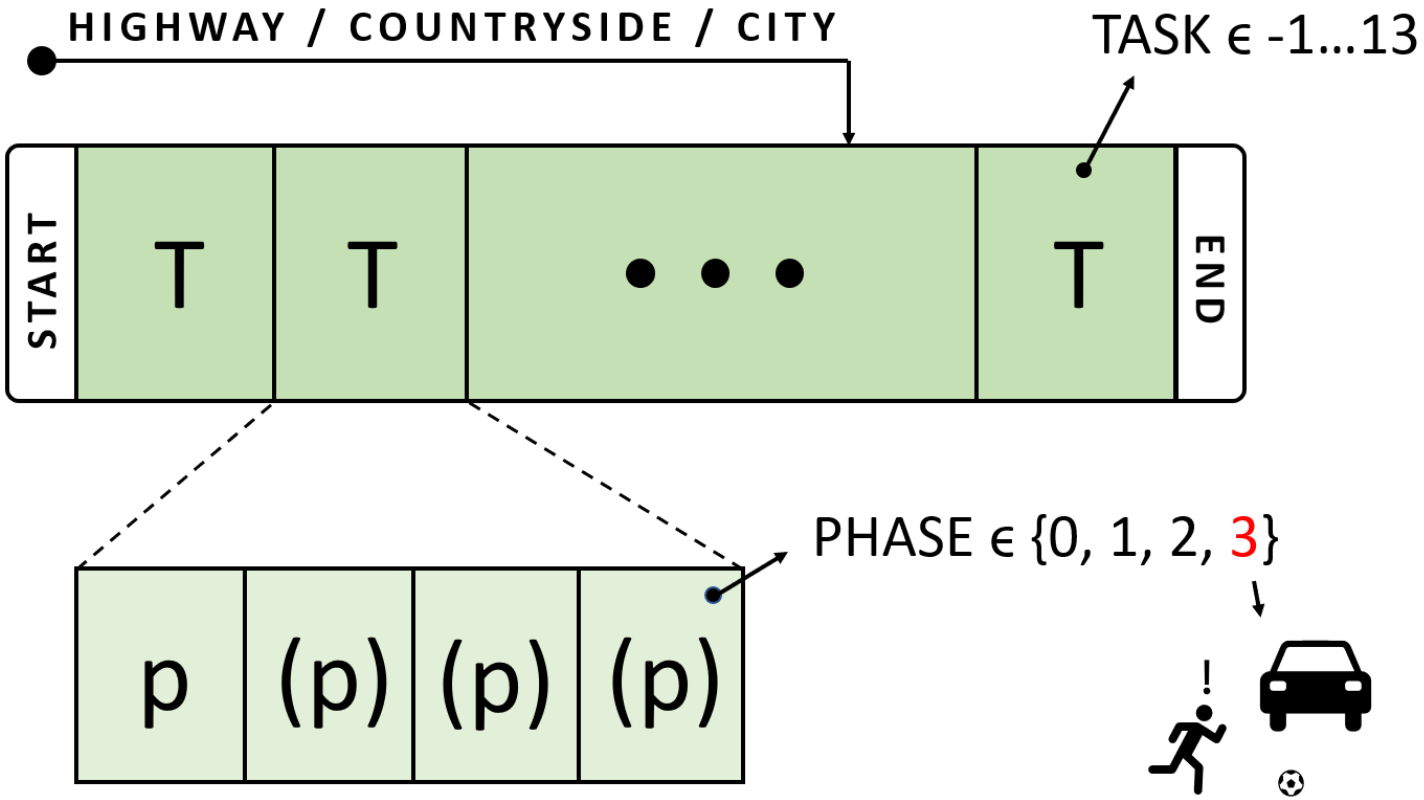
Aim ⟶ Motivation ⟶ Data ⟶ Features ⟶ Results ⟶ Discussion

Aim

- data collected during driving simulation
- to find features that could discern among driving simulation parts
- driver’s wrist acceleration

Motivation

- dangerous situations experience
- driver profiling
- accelerometers in human activity recognition – over 88% accuracy



Data

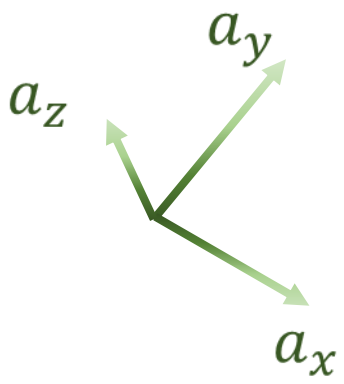
- Empatica E4 wristband
- 12 experienced drivers
- Goal: separate both tasks and phases!
- Expectations?

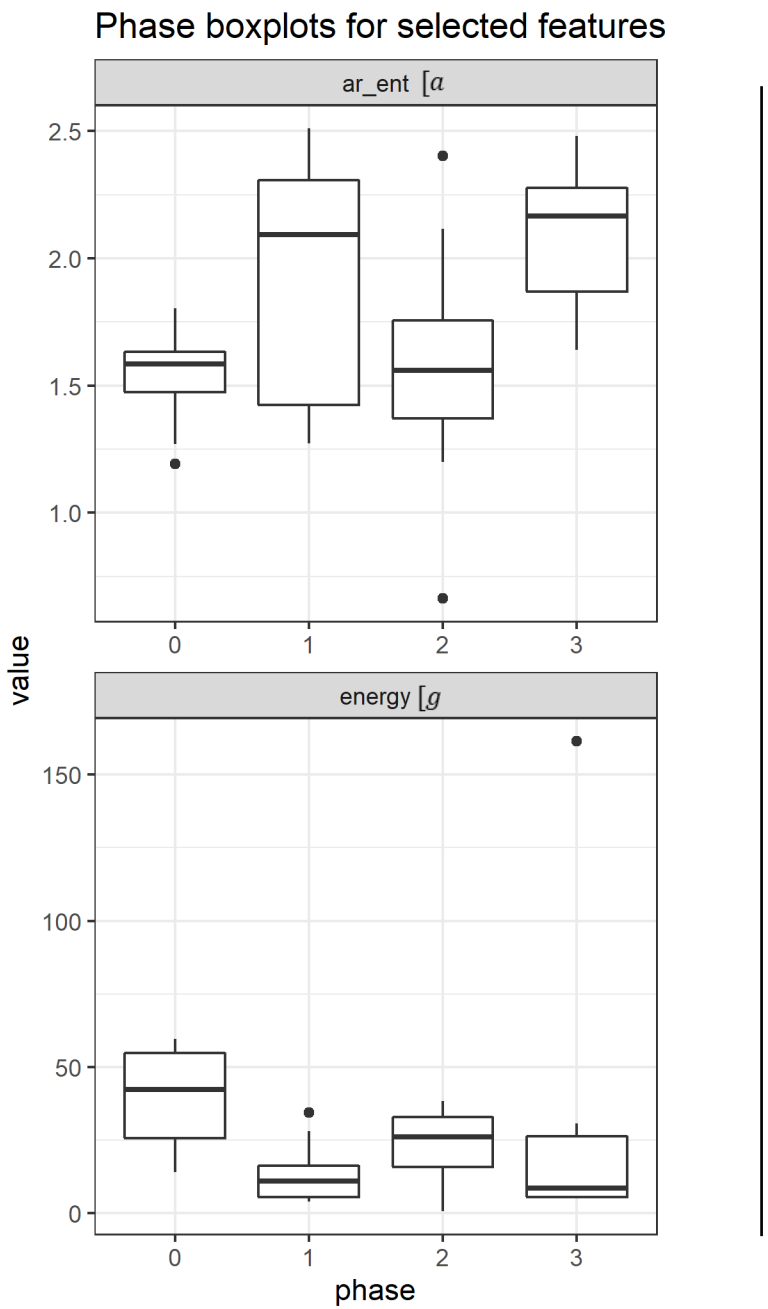
Feature	Description
standard deviation of a_r	activity quantifier
absolute maximum value of a_r	indicator of fast reactions
Shannon entropy of a_r	degree of randomness
zero-crossing rate of a_r	frequency content estimator
SD of the first derivative of roll angle	indicator of turnings
average spectral energy density of a_r	periodicity

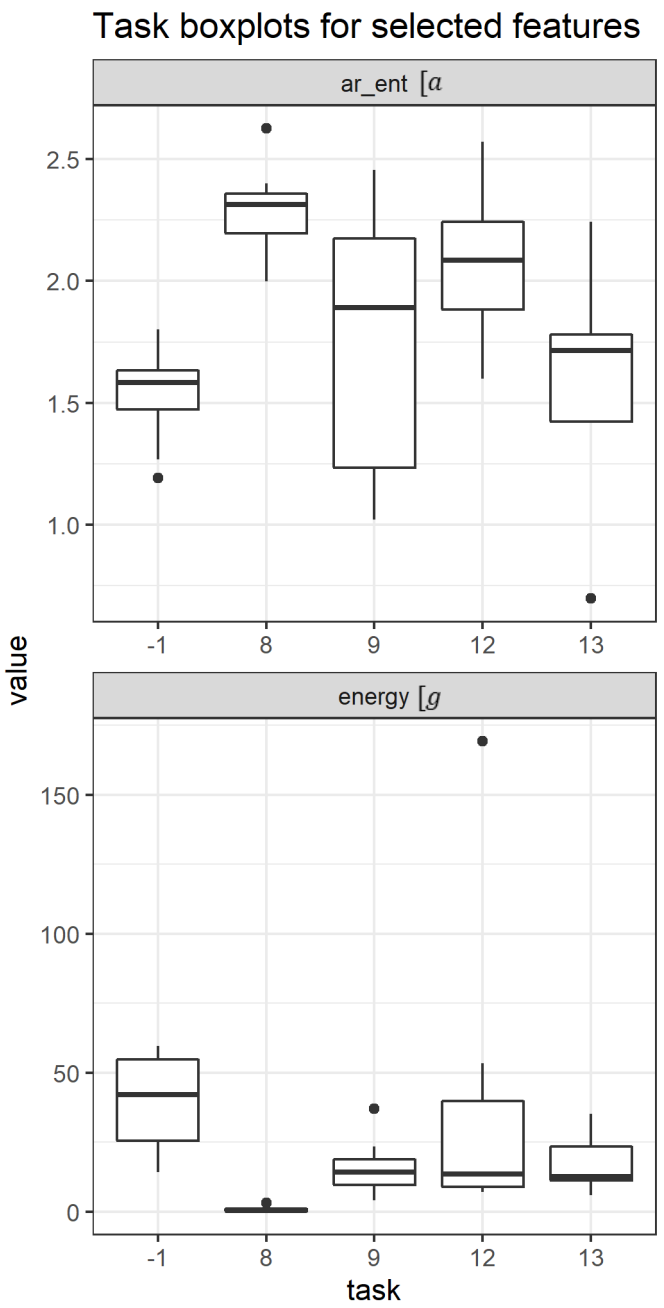
Features

- time and frequency domain

$$a_r = \sqrt{{a_x}^2 + {a_y}^2 + {a_z}^2}$$

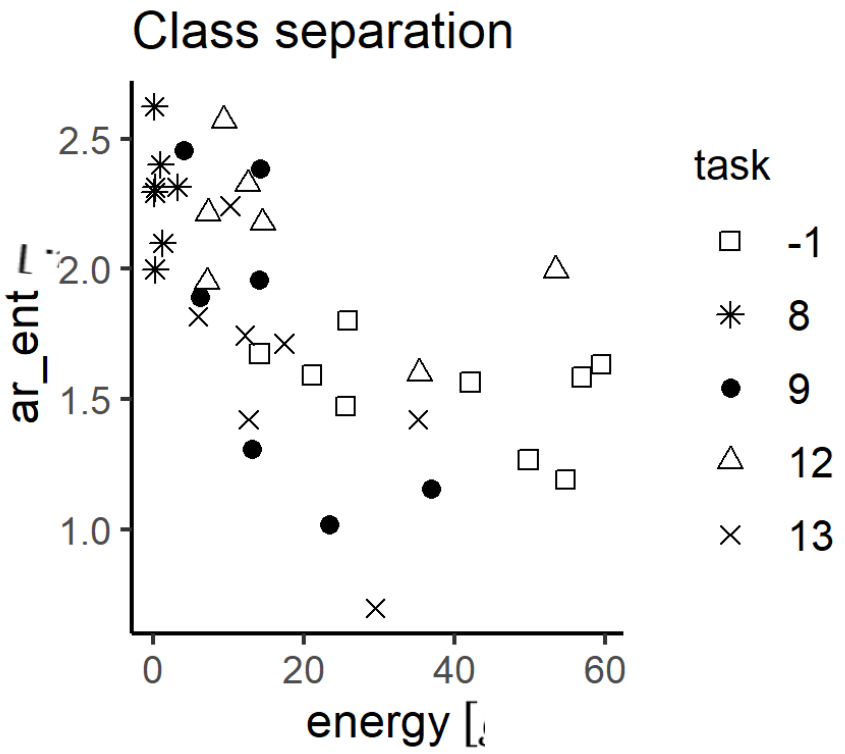


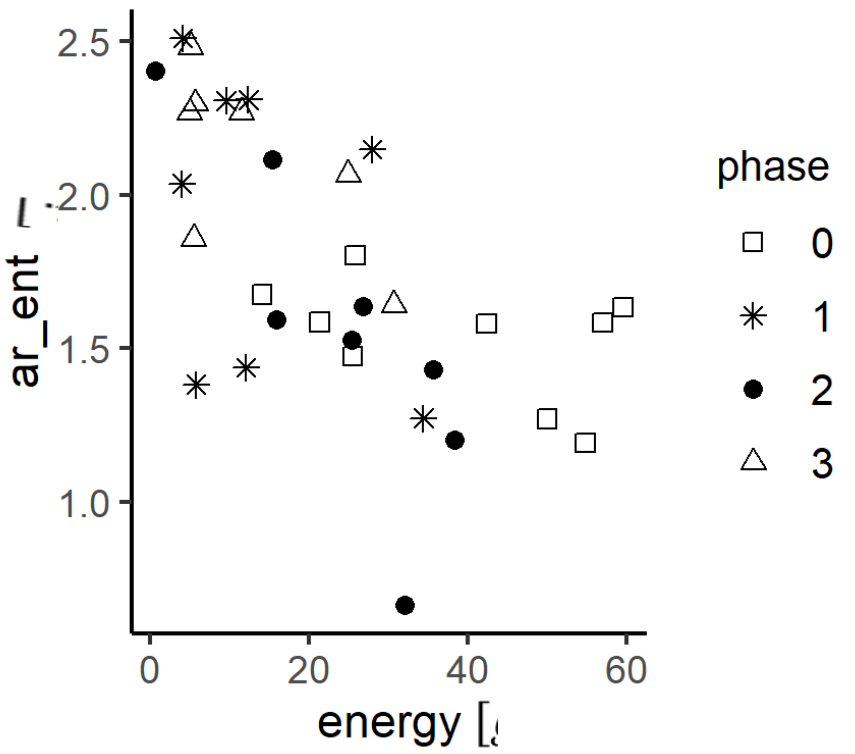




Results

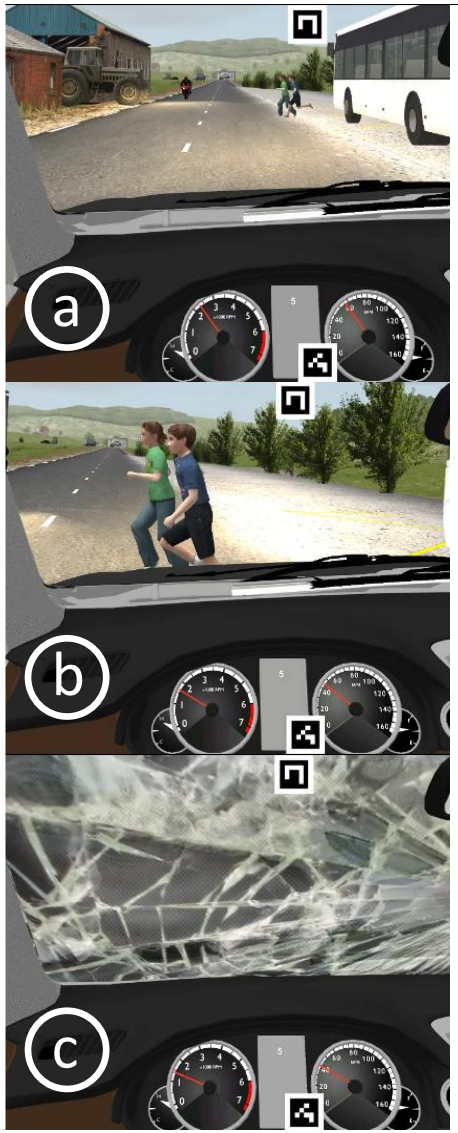
- visual inspection for feature evaluation
- only two features were selected:
  - **Shannon entropy (*ar_ent*)**
  - **average spectral energy density (*energy*)**

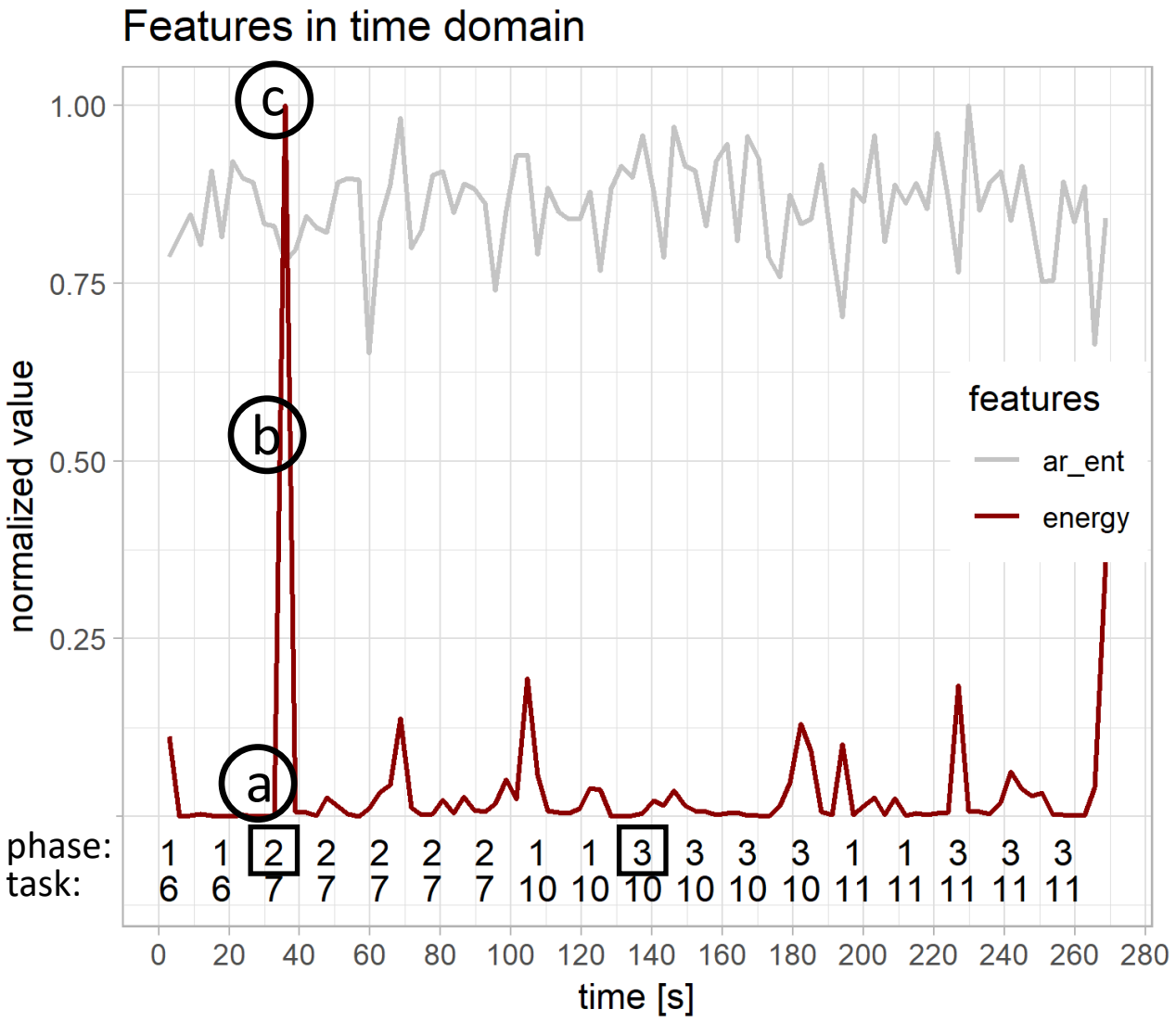




Discussion

- separability – not good enough
- harsh visualization





Discussion

- good sensitivity to critical events
- subjective labeling
- differences

Conclusion and future work

- new method
- needs improvement
- subjective criteria
- small data set

- more sensors
- statistical methods
- larger sample
- demographics

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