SAFE BICYCLING – PROBLEMS AND SOLUTIONS

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Key words: cyclist, communication, wearable electronics, motion capture, accelerometer.

Bicycle is considered a beneficial transport and cycling is 5 times more effective than any type of travelling – hiking, distance walking. Everyday active walks and bicycling give a valuable physical activity for the health of youth and elder people. Herewith an increasing number of cyclists, the safety problems of cyclists are researched. They are connected with infrastructure, the riding culture of the road participants and the choice of cyclist's suit, which is defined by cyclist's style, the type of bicycle, the functional features and construction of corresponding clothes, and also by the use of light reflective and emissive elements, what can remarkably improve the cyclist's visibility during day and night time.

The aim of the study – to clarify the road participants' mutual communication problems in the traffic and opportunities solving them with integrating light reflective and emissive elements in cyclist's suit and also to define the placement of electronic components for the action of designed clothing.

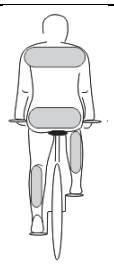
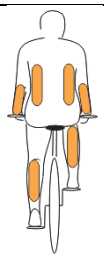
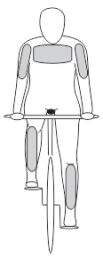
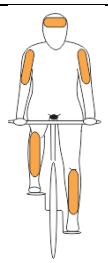
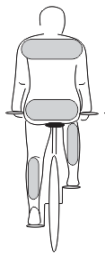
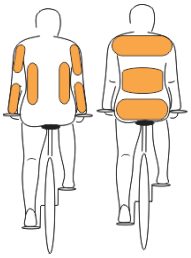
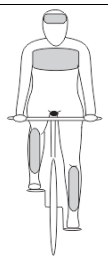
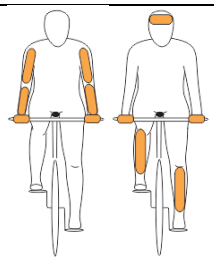
Overall, 382 respondents (159 cyclists, 119 drivers, 104 pedestrians) were involved in the survey. The most part of cyclists ride mountain bike in city at daytime during the period spring-autumn. Most often, the bicycles are used for active recreation, riding to/from studies/work and daily rides, wearing comfortable daily or sporty clothing with reflective elements.

Although, the majority of riders' bicycles are equipped accordingly to the rules of Cabinet of Ministers, part of the cyclist's happened to get in road accidents. In cyclist's opinion, the features of clothing with light emissive elements must be analogical with the ones of daily clothing.

The drivers could better notice the cyclists, if their suit would be in a bright color and with light emissive and reflective elements, but pedestrians – if cyclists would use warning sound signals. The opinions of road participants about the placement of light emissive and reflective elements in cyclist's clothing were clarified (Table).

Table

Placement of light emissive and reflective elements in cyclist's clothing

Nr.	Group	Light elements			
		Reflective	Emissive	Reflective	Emissive
		Back		Front	
1.	Cyclists				
2.	Drivers		 T S		 T B

T – turn direction identification
S – stop signals
B – boundary lights

There is drawn up the prototype of cyclist's belt with pockets and light emissive elements. While cyclist is riding with a constant speed or is in the rest state, the LEDs are blinking, but when braking - the

LEDs light up constantly (like stop signals), which are activated by a signal coming from the sensor (accelerometer), placed in the central back pocket. During the time of approbation it was defined, that the placement of sensor, does not provide a proper activity of stop signals, due to high level of addition movements of cyclist during the riding.

The research of oscillation of the anthropometrical points on the body back was carried out to clarify the most appropriate placement of accelerometer for the design of cycling jacket. The motion capture technology and cycling exercise equipment for cycling imitation were used. The motion trajectory of the back points in 3 dimensions were registered with special program and coordinates in time of reflective markers were calculated. The cyclist has biked using different speeds and two slopping positions of the bodice.

The least mobile part of the body back was chosen for the placement of accelerometer.

The results of the research show, that motion sensor must be placed in the middle of the back upper part (in the scapular or above scapular level) of the designing cyclist's jacket with light reflective and light emissive elements for turn on and off stopping signals.

ACKNOWLEDGEMENT

European Social Fund co-financed project "Establishment of interdisciplinary research groups for a new functional properties of smart textiles development and integrating in innovative products" ESF Nr 2009/0198/1DP/1.1.1.2.0./09/APIA/VIAA/148 (PVS ID 1372)

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