

## HUPERLOOP AS AN EXAMPLE OF INNOVATIVE TRANSPORT SYSTEM

SERHII RADIUKOV, student

OLGA SLATOVA, Senior Teacher, Scientific Adviser

OLHA HNATYSHEVA, English Teacher, Language Adviser

*O. M. Beketov National University of Urban Economy in Kharkiv*

Since the beginning of electric transport systems, there have existed two actual problems to overcome while engineering them. The first problem is connected with increasing the speed limit, and the second one is linked with maintaining safety for the passengers at the same time.

Modern transport systems are constantly developing, although it is becoming hard to cope with increasing air pressure and friction. Moreover, new problems occur, as for higher speed you need to use more energy resources, and if the system is located near blocks of houses, it should be quiet enough to provide comfortable living for the residents.

Hyperloop is claimed to be a revolutionary way of transportation aimed to cope with all the points mentioned below. The project called 'Hyperloop Alpha' was first introduced in August 2013 by an entrepreneur Elon Musk, and it still remains a project. It is a system of pneumatic tubes equipped with motors and compressors where special round pods moves with passengers inside. The pods do not touch any ground or rails. Instead, they should generate air cushion for movement or, in alternative versions of the project, use magnetic levitation. Initial impulse could be gained from external linear electric motor, and after that the pod would move in vacuum. The tube could be installed either below or above the ground.

The main difference from the regular railway is that there is almost no friction in the tunnel, as air is removed from the tube. The expected speed of Hyperloop is up to 1500 kilometers an hour, which, according to Musk, should be almost like instant teleportation. Other significant feature is that the system causes little noise pollution which enables to install it near houses or other buildings. Its weather-proof features should also be mentioned among the other benefits.

However, the idea of using pneumatic tubes as the means of transport is not entirely new. The Crystal Palace pneumatic railway, which was presented in London in 1864, used air pressure in order to push a wagon uphill. In the late nineteenth century there appeared a system of pneumatic tubes for sending mail between buildings that still can be seen in such establishments as banks.

In 2016 a contract was signed with Slovakia to build the system which will connect the city of Vienna and the city of Bratislava. Besides, a route across the USA was also planned, and lots of other countries showed great interest in the project. Four prototypes are now under construction in Toulouse, Abu Dhabi, Hamburg and Great Lakes. However, the main problem of construction

is its high price: for example, to build the tube from LA to San Francisco will cost about 6 billion dollars.

The future of Hyperloop is still debatable, as it would be extremely difficult to cover the expenses (considering the fact that the project was introduced as a cheap alternative to long-distance trips by already existing means of transportation). That is why the system was proclaimed an open-source design, and now basically anyone could use it for further developing.

#### **References:**

1. Lynda Applegate, Terri L. Griffith, and Ann Majchrzak. Hyperloop Transportation Technologies: Building Breakthrough Innovations in Crowd-Powered Ecosystems. Harvard Business School Case 817-134, May 2017. (Revised October 2017.)
2. <https://www.hyperlooptt.com>

## **CURRICULUM HARMONIZATION OF THE TRANSPORTATION ENGINEERING BETWEEN EUROPEAN UNION AND UKRAINE**

DMYTRO ROSLAVTSEV, Associate Professor, PhD in Engineering

*O. M. Beketov National University of Urban Economy in Kharkiv*

ANASTASIA AZARKO, PhD in Engineering

*Research Centre for Transport and Logistics of "Sapienza", University of Rome (Rome, Italy)*

The development of cooperation in the field of education of the European Union and Ukraine in most cases is carried out within the framework of Erasmus + projects. A large number of projects have already been implemented at different levels in various areas. At the same time, there are more and more educational projects related to the training of transport specialists are implemented. Thus, one of the crucial projects is the implementation of the Master program in Smart Transport and Logistics for Cities in four higher educational institutions of Ukraine and two universities in Georgia. In addition to developing a master's program, the project provides for the development of the fundamentals of PhD in Smart Transport and Logistics for Cities. The general objective is to contribute to the harmonization of the Higher Education Systems between the European Union and the Partner Countries Ukraine and Georgia, by introducing a PhD program on Smart Transport and Logistics in Ukrainian and Georgian Universities and providing methodological and technological support of the theoretical fundamentals.

There is created a conceptual framework for the implementation of PhD content. The overall approach of the PhD program development is to combine best practices of PhD programs from leading universities in the world with the current PhD courses delivered in European Union and Ukrainian universities. To develop an overarching PhD course several steps are foreseen to be undertaken: