Challenges in Traffic Flow Measurement using Anisotropic Magneto-Resistive Sensors

It is expected that around 2.8 billion vehicles in the world will appear in 2036. This numerous growing of the carpark from 1.4 billion in 2016 to aforementioned number make sense to a system of transportation control and initial aim of it which was designed to. Continuous development because of challenging tasks and situations led to the growth of the system and become Intelligent Transportation System (ITS) which must solve more complicated issues than ever before. Over the last decade ITS has been developed continuously, but problems related to traffic control, traffic jams, vehicles’ parking and many more remain relevant. In terms of improving traffic conditions on the roads, accurate detection of traffic flow and the ability to estimate it are vital tasks for solving the issues of traffic control. The precise estimation of traffic flow is strongly related to plans of an infrastructure, design, development and tasks for control. Moreover, mass gathering places are linked with an increased risk of dangerous situations, which also can be reduced with the help of ITS. Effective, integrated, unitedly working ITS are needed for the smooth and rapid movement of traffic flows.

The current development of electronic technologies and the possibility to apply them for traffic control enables additional opportunities: increasing safety, reduction of fuel consumption and air pollution, etc. In major cases, an installation of advanced transportation control systems requires fewer expenses comparing to previous ones.

Vehicles detection becomes a key task of ITS for further processing and a source for a decision making system. Since there are no cheaper and more reliable alternatives, technologies based on image analysis are used widely, although they are expensive, not secure and require many calculations. Simple car detection methods and ordinary cameras in ITS don’t always ensure precise vehicle detection, especially during severe weather or night-time. It becomes complicated to collect and process data from cameras in real time. As alternative, various types of sensors can be applied, like magneto-resistive sensors. Considering that each vehicle has metal parts, analysis of interaction of the Earth’s magnetic field and a vehicle could be performed with less resources. However, measurement system sensitivity, stability, temperature dependency and other parameters of the magnetic field sensors make sense to vehicles detection as there is no unique signal shape for each vehicle.