Environmental Monitoring Probe Based on Intel Edison Platform

Saetchnikov, Ivan

Permanent environmental degradation caused by the global climate change, natural and technogenic factors is one of the greatest challenges of the 21 century. A global multiparameter environmental monitoring system based on multifunctional probe units can enable to permanently and effectively control ecological environment. The purpose of this project is to develop a multifunctional easily recustomized environmental monitoring probe unit for a global monitoring system carried by midget spacecrafts, drones, copters, etc. To test the probe, I developed a CanSat, multifunctional payload for complex monitoring of the atmosphere and Earth's surface with 4 gas sensors: ozone, carbon dioxide, carbon monoxide and methane, and 2 video cameras with red and infrared filters. I used Intel Edison Platform for quick prototyping, testing and producing. I developed a combined autonomous positioning system based on non-inertial system of location determination for permanent trajectory control of the probe. The system consists of commercial GPS gyroscope, magnetometer, accelerometer, temperature and pressure sensors also operated from the base platform. During a test start of the nanosatellite, the 3D positioning system enabled to calculate vertical profiles of atmospheric gas structure and vegetative index maps of the Earth's surface on the height up to 2km. The results prove that the developed multifunctional probe unit is effective for express ecological monitoring. I plan to improve the payload with more precise and energy-efficient gas, UV, ozone and ionizing radiation sensors and test it on the height up to 30km for complex estimation of ecological environment, including dynamics of ozone gaps and radiation.

Awards Won:

Fourth Award of $500