Researchers study collective behavior of nanosatellites
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Scientists from the Skoltech Space Center (SSC) have developed nanosatellite interaction algorithms for scientific measurements using a tetrahedral orbital formation of CubeSats that exchange data and apply interpolation algorithms to create local maps of physical measurements in real time. The study presents an example of geomagnetic field measurement, which shows that these data can be used by other satellites for attitude control and, therefore, provided on a data-as-a-service basis. The research was published in the journal *Advances in Space Research*.

The study demonstrated that the Kriging interpolator is a universal tool when it comes to processing data from small satellites. Satellites exchange data about their positions and measurements to create a self-organizing system capable of demonstrating collective behavior and performing tasks common for the constellation, which constitutes the key goal of the "Roy MKA" project.

"An important practical outcome of this study is that it can improve the performance of the attitude control and station-keeping systems that use magnetometers (magnetic field sensors). Notably, improved attitude control can also be used by other spacecraft that happen to be in close proximity to the constellation of the satellites that exchange magnetic field data and make them more accurate using the Kriging algorithms. Processing swarm
measurements can evolve into a GPS-type service, which will enable distributing magnetic field values rather than object velocities and coordinates," Anton adds.

The new method can be used to build large constellations at a lower total cost by using less expensive sensors.


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