MIRCE Science: Solar Storm as a Mechanism of Motion of Autonomous Systems through MIRCE Space

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Abstract

Recent developments of digital technologies, which enables immense amounts of information to be compressed on small storage devices that can be easily preserved and transported, have made fundamental changes to many aspects of human lives, including the creation of autonomous systems. Autonomous ships, trains, cars and similar systems operate independently of human interactions, by receiving inputs information from the range of physical sensors that are processed in accordance to establish algorithms. Most frequently used sensors to control autonomous functions, include: global positioning system, inertial navigation system, optical and infra-red, light detection and ranging, radio detecting and ranging, microphones, including wind and pressure sensors. As the ability to continuously exchange information is essential for their functionality, these sensors are an integral part of a functionable system, as conceived by MIRCE Science. The research conducted and published have shown that space weather, in general, and solar storm, in particular, have been impacting reliability and safety of a large number of modern technological systems, like power networks, aviation, satellite services, radio communication and pipelines, as documented in the paper. Hence, the main objective of this paper is to show that solar storm could have similar impacts on in-service reliability and safety of all autonomous systems that are using digital technology for the provision of the operational autonomy. The lessons learned should be a "wake up call" to their designers as solar storm is as an active and constantly driving mechanism of their motion through MIRCE Space. Then and only then, accurate and meaningful reliability and safety predictions could be possible, enabling the achievement of the ultimate goal of increasing the probability of the prevention and protection of occurrence of undesirable consequences of naturally occurring solar storms on functionability performances of autonomous systems.

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