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## Using thermal vision cameras for remote location of caves on Mars for immediate shelters for astronauts and storage chambers

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Mars has much weaker magnetic field and lower density of atmosphere regarding the Earth. These results in very high cosmic radiation dose rate on the surface of Mars. Radiation measurements on the surface of Mars demonstrated that dose rate which will receive an astronaut there is around 15 times higher than dose limits for Radiation workers and 750 times higher than dose limits for general public. Therefore, manned exploration of Mars requires using of immediate shelters of astronauts during the initial stages of the planet exploration. Only natural shelters, which can be found there are caves. Daily variations of the surface temperature on Mars reach 110-120 degrees of Celcium. Temperature inside caves does not vary during day-and-night. It is constant (in the frames of one degree) even during the year. So location of caves on Mars can be of vital importance for future manned exploration of the planet, because such caves are appropriate for storage chambers and shelters of astronauts. We develop a new technique for remote location of cave entrances using thermal vision technique. It aims to locate new unknown caves using thermal vision camera, which visualize temperature difference on the air coming from the cave and that of the surrounding areas. During Martian nights temperature on the surface of the planet is tens of degrees of Celcium colder than that in the caves below. Therefore, cave entrances can be easily located by a thermal vision camera located on space probes or ROVs. We successfully performed preliminary remote locations of cave entrances on Earth to optimize this technique for work on Mars. So far, there are no any cave known on Mars, but there are sure indirect indicators of their existence.

### Biography

Yavor Yossifov Shopov has completed his PhD at Sofia University, Bulgaria and Post-doctoral studies at McMaster University, Canada. He is the Head of University Centre for Space Research & Technologies, Sofia University. He is Supervisor of Master programme on Aerospace engineering of small satellites of Sofia University. He has published more than 100 papers in reputed journals and has been serving as an Editorial Board Member of repute. His field of research includes "Applications of satellites in applied and fundamental research, space physics and solar-terrestrial physics, design and development of optical and spectral equipment for photographic observations and photometry in different regions of the spectrum".

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