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DAILYVISION@1M: LOW-COST SUBMETER EARTH OBSERVATOIN MICROSAT CONSTELLATION

Abstract

The Earth observation (EO) market which has been driven by the era of smallsat development is expected to have 1,800 smallsats with the majority being 50 kg in the next decade. Future EO system is all about getting smaller, more compact with Very High Resolution (VHR) sensor at accessible cost.

This paper will introduce the new generation of a VHR microsatellite constellation developed by CGSTL and commercialized by HEAD. Currently, the DailyVision@1m constellation are composed of six on-orbit JL1-GF03B satellites providing daily revisit globally at 1m resolution. The constellation will be expanded: 35 JL satellites with confirmed launch schedule in 2021 and the full constellation with 138 satellites in 2023, offering global daily revisit of every 14 minutes at 1m resolution.

This microsat constellation will be composed of 45 kg State-Of-Art satellites. It is the first 1m microsatellite and the only one in the market using linear push-boom sensor instead of frame sensors, offering wide swath at 18km instead of market standard at 5 to 6km. The satellite has long strip continuous imaging capacity while traditional satellite imaging processing method is still applicable. This future EO constellation introduces technical improvements in optical sensor, propulsion system, deployable solar panels and array antenna.

This new generation of small EO satellites allow a low-cost access to space making EO missions attainable to non-governmental organizations as well as traditional users. The satellite manufacturing price is kept at an accessible level given its 45 kg mass. The fact that the satellite is very light, it is designed to be launched with a single launch. This business model offers cost-effective solution to operate a satellite constellation. The very compact satellite is 10 times lighter in weight comparing with the satellites having the similar performance.

In the case of a user which will operate only three such satellites in 120 degree phasing. This constellation is already capable of targeting any point at equator once per day while the satellites off-pointing around 35 degree that is the worst case; so that the constellation can target anywhere on the Earth once per day. This satellite is a proven technology based on mature and flight-proven with current 10 on-orbit satellites.