# FOREST FIRE DETECTION USING NANOSATELLITES

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## ABSTRACT

This paper reports on the basic design and analysis of system to detect forest fires by means of Nanosatellite(s) in low Earth orbit equipped with a Thermal Infrared Camera being developed by Thapar University, India in collaboration with INO, Canada. The purpose of the system is to develop a mechanism so as to identify forest fires from space and provide near real time data to ground stations from where it can be relayed to other concerned authorities so as to act accordingly. Implementation of such a system using nanosatellites is realistically feasible only now due to continuous advancement of miniaturization technologies especially in uncooled micro bolometer focal plane arrays which forms the heart of our infrared camera. It has become possible to make complete infrared cameras with a total size of 95 X 95 X 150 $mm^3$ with a power consumption of less than 5W and a maximum mass of 1kg. The infrared camera is intended for use in 8-12 µm spectral range and will be based on push broom imaging. The sensor will consist of a linear 256 X 1 array whose absorptance characteristics will be tailored to the working spectral band. We hope to detect fires as small as .5 $km^2$ with the present system. The ground sampling distance will be 5.5km so as to have a swath of 1408km. The satellite will be placed in a sun synchronous orbit with a revisit time of 2 days. Such a configuration makes complete coverage of the earth possible however currently the data acquisition is planned to take place only over southern Asia due to constraints in the on board memory and in downlink capacity of the nanosatellite. We have intended the use of Cubesat technology and will try to follow 3U cubesat standard, which utilizes commercially-off-the-shelf (COTS) components originally used in non-space applications and using them for scientific experiments and payloads, providing a low cost alternative to launch space missions.