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SPACE SCIENCE AND TECHNOLOGY CAPACITY BUILDING THROUGH INDIGENOUS
AI-BASED MULTISPECTRAL CAMERA PAYLOAD DESIGN

Abstract

The location, terrain features, variety of rivers, and monsoon climate of Bangladesh make it vulnerable to natural disasters such floods, cyclones, storm surges, riverbank erosion, earthquakes, droughts, saline intrusion, fires, and tsunamis. It is feasible to monitor changes in land and atmospheric data using satellites. Bangladesh lacks its satellite to monitor this data, thus it must purchase pricey satellite data from other nations. As we utilize satellites from different nations, it is feasible to obtain accessible data. Earth data requirements for remote sensing products are often highly stringent in terms of data quality and coverage/revisit frequency. Brac University initiated its second satellite and first domestically-made satellite project in response to public demand. As part of this project, research has been undertaken and an AI-based camera payload for multispectral earth observation employing commercially available off-the-shelf (COTS) equipment has been built. Our solution improved image classification and finer image-finding methods. The hardware systems are designed and built domestically without altering the 1U CubeSat's size, power, volume, and mass restrictions. Raspberry pi Zero is utilized with a MAPIR camera with red, green, and near-infrared band filters for image capturing and processing. SPI (Serial Peripheral Interface) allows the entire system to interact with another system. For communication and data management, a microcontroller based on STM32 is employed. The global space industry has devoted its workforce to creating cutting-edge technology for space exploration in novel and interesting ways. Bangladesh, in comparison, is extremely new to satellite programs. By teaching students from the Brac University, this effort focuses on capacity building to construct a sustainable space program in Bangladesh.