

ABSTRACT

Indonesia is highly vulnerable to natural disasters such as earthquakes, floods, and tsunamis, which often disrupt terrestrial communication infrastructures. To address this challenge, PocketQube—a low-cost mini satellite—offers an alternative communication solution based on low Earth orbit (LEO). This study aims to design and implement an On-Board Computer (OBC) system integrated with LoRa as the primary communication medium, optimized for limited space and power constraints.

The OBC prototype was developed using an Atmega328 microcontroller, an MPU6050 inertial sensor, and an SD card for data storage. The system was designed to record acceleration and angular velocity data from the sensor and store it in text format on the SD card. A series of tests were conducted to evaluate system performance in terms of power consumption, sensor reading stability, resistance to extreme temperatures ($-19.75\text{ }^{\circ}\text{C}$ to $70\text{ }^{\circ}\text{C}$), as well as vibration and drop tests.

The results show that the OBC system can operate reliably in acquiring and storing sensor data without data loss. The system also maintained functionality under extreme temperatures and withstood vibrations and impacts within acceptable limits. Power consumption ranging from 0.25 W to 0.34 W demonstrates good efficiency for mini-satellite applications. Therefore, the proposed OBC system is feasible to support basic communication and data acquisition functions in PocketQube-based satellite missions.

Keywords: PocketQube, On-Board Computer (OBC), MicroSD, Atmega328, MPU6050, PCB, Power Efficiency.