

ABSTRACT

Satellite technology is a technology whose application is developing very rapidly. This development can be seen through various kinds of missions, dimensions, and satellite configurations, one of which is the nano satellite. One of the driving factors for the development of nanosatellites is the complex and erratic space conditions, so a system that can respond to these conditions is needed. In running the nano satellite system, there are several subsystems needed, including On Board Data Handling (OBDH). This subsystem serves as the main control for the nano satellite system.

In the design of this final project, the OBDH subsystem has been designed with an Arm Cortex M4-based microcontroller with the STM32F446RE type as the main controller. In this subsystem, a Mbed OS based RTOS (Real Time Operating System) is implemented as an Operating System (OS), this OS is chosen so that the system can run more efficiently in accordance with the advantages of RTOS. This subsystem will handle some of the data processing, including monitoring housekeeping data to determine the performance of nano satellites, processing data between sensors so that it can be output.

As a result of this design, the OBDH subsystem that has been designed and implemented with the Mbed OS-based RTOS can run well. Several tests have been carried out, including testing data transmission based on cable transmission media (Universal Serial Bus) USB and Holybro telemetry with various baudrate values obtained by an error rate of 0% for the two-transmission media. OBDH can monitor housekeeping data which consists of gyroscope data (x-y-z, roll, pitch), temperature, magnetometer (x-y-z) and provides responses in the form of pitch and roll commands so that the attitude of the nano satellites matches its trajectory. The implementation of RTOS can improve the performance of the OBDH subsystem based on data processing time, within 10 seconds it can produce 165 housekeeping data samples with a computation speed of 60.6 ms while non-RTOS produces only 45 housekeeping data samples.

Keywords: Nano satellite, OBDH, RTOS, Housekeeping data, sensors.