Developing software for Kanazawa-SAT3

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Kanazawa University is developing the first Kanazawa University’ s microsatellite, named as Kanazawa-SAT3. The mission is to detect the occurrence time and arrival direction of gamma rays and X-rays observed simultaneously with gravity waves.

In this research, we are developing software of OBC (Onboard Computer) for Kanazawa-SAT3. OBC controls all components abord the satellite and edits the telemetry data to transmit the house keeping (HK) data and observation data to send to the earth. OBC is powered by Toppers, a real-time operating system. Toppers is developed in the ITRON specification and connected with OBC via RS 422 and GPIO interfaces.

The application part of onboard software consists of a Main function and eight tasks. OBC operates by periodically calling eight tasks.
Each task waits to be started in hibernation, and executes a process defined as being invoked by the Main function, and then repeats the loop that goes into hibernation again. Task1 performs management of commands. Task2 executes commands. Task3 sends telemetry data to the earth, collects data edits HK. Task4 controls and constantly processes bus components that require communication in a fast cycle. Task 5 controls other bus components. Task 6 performs recording and reading of the data recorder. Task 7 controls mission equipment. Task 8 is a reserve.

Related to developing the software, we held functional tests for components of FSS, GPS and BAT. Each test is composed unit and engagement with OBC. We confirmed the operation and output data of each component in the unit test, and confirmed that component control from the OBC and data reading by the OBC were possible in the engagement test with the OBC.

As a future work, we have to test other component and whole combination will be conducted on FM models, Also, it is necessary to develop an attitude control system needs to be implemented.

