

IAF SPACE EDUCATION AND OUTREACH SYMPOSIUM (E1)
Lift Off - Secondary Space Education (2)

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A DIGITAL MODEL ROCKET CURRICULUM DEVELOPED FOR QUZHOU NO.2 HIGH SCHOOL

Abstract

Space education has drawn all sectors of the community's wide attention in China as the development of space industries. To promote and inspire space-related education in Quzhou No.2 High School, which is one of the 18 top-rated high schools in Zhejiang province of China, We have developed a series of space courses for the students and teachers based on digital model rocket.

At first of the courses, an introduction to space will be given, the students can study some principles of space science, such as the history of the rocket, the basic flight dynamics, and communications between the rocket and ground terminal. Some outreach content, such as the great contributions that China has made to space exploration and science will also be learned about, which is effective in inspiring students.

Then, the digital model rocket will be designed and launched under the supervisor or teacher's direction. The digital model rocket is composed of rocket structure, motor, ignition device, parachute recovery module, and the crucial avionics system, which include a micro camera with fixed focus and a navigation module integrated with an accelerometer and a gyro. The avionics system is mounted after the nose cone using a specially designed 3D printed device. During flight, the first-person perspective video will be recorded and transmitted to ground terminal via a low power transmitter, while the electronic data such as the acceleration, attitude, speed as well as altitude during flight will be collected and archived by the navigation module. Due to the limited carrying capacity of the model rocket, the avionics system can also be identified as the payload together with the battery.

After recovery, the electronic data can be extracted from the avionics system and analysed by students. The state of the model rocket will be recovered from the position and attitude data. Besides, learning assessment can be concluded from the data. For instance, the altitude can be taken as the evaluation criteria of the practicing ability.

In a word, students can investigate and problem solve real world problems by studying and creating their own digital model rocket, and the experiential learning course connects curriculum from many areas such as STEM, Engineering, Science, Math and more.

We believe that the state of the art digital model rocket curriculum can draw great interest of the K-12 students, benefit to their STEM education, and eventually, open the glorious space frontier for them to explore.