Submission Form

Call for Contributions, APRSAF SE4AWG

This form should be used for the submissions of contributions to the Space Education Initiative of the APRSAF SE4AWG 2022. In describing interesting case studies on space education policies or practices in your country, please avoid using acronym or national jargon that may be hard to understand for others. All the submissions will be made publicly available by the organizers.

1. Title of the contribution

The school satellite project

2. Organization and/or person submitting the contribution

Including full address and contact information (only the organization's and or person's name will be disclosed to the public)

Chidchanok Chaichuenchob

Geo-Informatics and Space Technology Development Agency (GISTDA)

[redacted]

3. Date of submission

28 October 2022

4. Short description of the space education policy or practice (max. 1000 words)

Please describe the background and origin of the policy or practice, the details of implementation, stakeholders, technical details, etc.

In Thailand, space technology is still a highly advanced technology, expensive, limitation and is not commonly taught in the university. For this reason, Thailand lacks the continuity in the development of human resource

in space technology. So that, the school satellite project is proposed that to focuses on accessible and affordable hand on experience building a low-cost satellite which transfers the knowledge by satellite engineers. Moreover, all stage of the project will be implemented to the same as philosophy of standards of satellite production. In this regard, broad range of students is able to participate in the project that can make a strong foundation of the high technology development with respect to human capacity feeds to Thailand space ecosystem in near future.

The school satellite looks like a CAN satellite which is extended performance to be able to compare with a satellite and it will be produced in Thailand. Moreover, it is aimed to design to be more flexible and for example the payload can be modified such as plug and play concept and anu sensor can be fitted in according to the assigned mission. The Commercial off-the-shelf (COTS) electronic board as Raspberry Pi board will command the other sensors such as Raspberry Pi camera, the drone Gyro, and GPS board. The structure is designed in concept of easily disassembled and lightweight by 3D printing. The communication system is used Zigbee technology that required a low power consumption and widely used in IoT technology. The power system consists of commercial battery and in house development power distribution board. The in-house development flight software is developed by the open software to reduced cost and the students easily access information. The primary payload is a camera, and the secondary payload is the Plug and play payload. The Plug and play payload is a customize payload that allows participants to propose the ideas by their own under challenging of the constraints of size and power and so on and then they can learn building payload by their own idea under the school satellite development process. However, the failure of the Plug and play payload will not cause damage to the primary payload. The school satellite will be demonstrated by launching with candy rocket when the satellite ejects from the rocket the satellite must be able to record data such as photo, location, humidity, etc., and then real time communication with ground station will be also done. Finally, once the mission has been completed that the satellite will slowly fall to the ground with parachute or propeller to be able to bring the satellite back and then reusable.

The target group of the project is 100 high school students from 10 schools in Thailand. Students will build and test the school satellites along with the satellite engineers at the Thailand National Assembly Integration and Test facility (AIT). In this regard, the students will have a chance to learn the space technology, professional framework, and teamwork along with the THEOS-2 Small Satellite engineers. This activity is expected to build inspiration and awareness until to foreseen the career which Thailand can be changed from buyer to owner technology to meet the sustainability goal of Thailand. In the meantime, the technical hands-on experience will help them to create the idea of utilizing data to solve the local community problem.

5. Successful outcomes and reasons (max. 500 words)

Please describe the successful outcomes of the project and the reasons for such successes.

The school satellite project has been granted budget from Office of the National Digital Economy and Society Commission Ministry of the Digital Economy and Society and now it is currently in the CDR phase, and engineering teams are designing, functional testing and environment testing. After that the school satellite is launched with candy rocket at 2-kilometer altitude and then the knowledge transfer workshop for 100 students will be started from June 2023.

The knowledge from school satellite project can be led to a CubeSat and also upgraded the satellite production process in Thailand. In addition, knowledge can be easily shared into the community who might always loss opportunity that it can reduce the problem of inequality issue

Fortunately, the Thai electronic board manufacturing companies are interested in this project as well. They are willing to support as a co-development project and can supplied the in-house development board. In this occurrence, the school satellite project can offset the contribution and experiment community that can help the Thai electronic board ecosystem gets improving space parts in the future.

6. Challenges of implementation and lessons learned (max. 500 words)

Please describe the main hurdles that were faced during the implementation of the policy or practice, and lessons that you would like to share with other countries or organizations willing to try the same approach.

This project is still in the initial phase. We may not yet be able to get the exact lessons learned. From our preliminary assessment of project risks, it was found that

The shortage of electronic boards and the long lead time items were a major problem for this project. The engineer had to do an in-house development board

The student does not have enough time to contribute the project and the teacher may not have a basic knowledge of software and electronic. The engineer needs to prepare a satellite building guideline document to the student and keep tracking the student. To ensure that the student will be able to build the satellite.