

IAF EARTH OBSERVATION SYMPOSIUM (B1)
Interactive Presentations - IAF EARTH OBSERVATION SYMPOSIUM (IP)

Author: Mr. Saeed Alhadhrami
United Arab Emirates, Sk.Alhadhrami@gmail.com

Mr. Abdulla Alhadhrami
United Arab Emirates, Alhadhrami.abdulla@gmail.com

ATMOSPHERIC STUDY & ITS IMPACT ON LITHIUM-ION BATTERIES

Abstract

This project aimed to study the earth atmospheric conditions and its impact on the Lithium-ion (Li-ion) battery powered payload using a locally designed high-altitude balloon (HAB). This was the first such balloon launched in United Arab Emirates (UAE). The design of this project was limited to both mass and volume. In particular, the balloon must fit in a 0.5m cubed box. Further, the project's total mass designed was limited to 2.5Kg which includes the balloon and any type of equipment in the payload, set to study the atmosphere. The payload, which consisted of camera and associated electronics, power system and communication system, was launched to almost 32km above sea level, a distance no other work has reached in the UAE. The project was a great way to get university students engage in an integrated STEM approach of learning. The students were able to gain firsthand in a number of disciplines to enable them to execute this multi-disciplinary project. The theoretical and practical skills included knowledge drawn from the mechanical engineering courses, physics, meteorology manufacturing, heat transfer, thermodynamics, programing fluid dynamics and software among others.

The payload was separated into two halves, an isolated Li-ion battery with heat resistors to maintain its temperature and a non-isolated Li-ion battery. After the device sat to the atmosphere, the payload started sending data through satellites, which then processed via a micro-controller. The data received in the form of a text file which details time, date, pressure, speed, longitude, latitude, altitude, current and temperature to study the relationship between them and the Li-ion battery. There was no significant impact recorded on the battery due to the pressure difference. The battery was appreciably affected by the temperature as it ascends.