

Development of an Open Hardware Weather Balloon Package

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Weather balloons provide atmospheric profiles during their ascent through the atmosphere. Balloon packages can include a variety of instrumentation to monitor different atmospheric characteristics such as temperature, pressure, and relative humidity. This project developed a weather balloon package by adapting elements of an open source 3D printed atmospheric weather station (3D-PAWS) for weather balloon deployment. The goal of this project is to create a balloon package that provides students with a hands-on atmospheric hardware development and weather monitoring experience which utilizes ballooning. The hardware used to build the balloon package is accessible and the code used to program the computer is open source, making for a useful educational tool. The balloon package monitors temperature, pressure, and relative humidity, recording data each second. A raspberry pi, a single board computer, is attached to a separate, battery-powered clock. A 10,000 mAh battery is used to power the computer.

The balloon package was deployed alongside a radiosonde and two mini-sondes to compare sensor efficacy. We used a spot tracker to determine the package location once it had descended. The raspberry pi-based sonde recorded data for the duration of the balloon ascent and logged accurate times for each data entry. The process of building this balloon package could be turned into a science and engineering-based lesson plan for secondary-school students. Future work on this project may focus on the educational application of an open hardware and software balloon package.

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