Around the World in Eighty Days: Small Radiosondes on a Great Mission

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More than 190 countries worldwide work together peacefully to gather crucial weather information. Every day, several thousand weather balloons are launched. They burst after a few hours and their remains continuously pollute our environment. In my project, I have developed and evaluated new approaches to conventional upper air soundings. My self-developed radiosondes have significant advantages. They weigh a fraction of conventional devices, are less expensive, are equipped with a solar power supply and can be used for long-term soundings. I have designed several schematics, custom printed circuit boards, and have assembled them. My latest radiosondes are equipped with a camera so they can send image data from all over the world. In conjunction, I have written custom microcontroller software for general control, telemetry and climate data acquisition, and transmission. I have developed my own radio data transmission protocol utilizing an open worldwide amateur radio network. For ground monitoring, I wrote additional software packages for reporting, archiving, visualization, and distribution of data in a public weather observation network. As a result of all these measures, I have tremendously increased the flight time of these devices by a factor of over 120, which leads to an enormous extension of measurement duration and quantity. Through my combination of vertical and horizontal soundings in a constant altitude, a new kind of data for climate research purposes can be acquired. As a proof of concept, my balloons have traveled around the world several times collecting crucial data on a peaceful mission for all of humanity.

Awards Won:

First Award of $5,000

Craig R. Barrett Award for Innovation

China Association for Science and Technology (CAST): Award of $1,200

American Meteorological Society: Second Award of $1,000

IEEE Foundation: All recipients of IEEE awards will receive a 4-year membership to IEEE

IEEE Foundation: The IEEE Foundation Presidents' Scholarship Award of $10,000

International Council on Systems Engineering - INCOSE: Certificate of Honorable Mention, a 1-year free student membership to the INCOSE, and free virtual admission to the 2022 International Symposium of the INCOSE