High Altitude Cosmic Radiation Measurement Using Stratospheric Balloon in Sorocaba Region – A STEM Experiment for High School Students

Tiago Ruivo Coelho
Electronics Department
Federal Institute of Education. Science and Technology of Sao Paulo - IFSP Sorocaba Campus
Sorocaba, Brazil
tiagoruivocoelho@gmail.com

Sergio Shimura
Electronics Department
Federal Institute of Education. Science and Technology of Sao Paulo - IFSP Sorocaba Campus
Sorocaba, Brazil
sergio.shimura@ifsp.edu.br

Abstract

This work shows the development of a platform for STEM experiments in high altitude using a stratospheric balloon, how it was developed, the challenges encountered in the whole process and the results of the first experiment carried out in this platform: cosmic radiation measurements from ground up to twenty kilometers in altitude. This platform features Globalsat GPS tracking, three cameras for recording video and still images and sensors for data collection. The onboard computer consists of Arduino and Labrador which are open source development boards with a BMP280 sensor for measuring temperature, pressure and altitude data that are stored in a mass memory card (microSD). The radiation is measured by a Geiger tube that captures alpha, beta and gamma radiation. The knowledge gathered in this experience including planning, launch, rescue and data analysis which are important to determine the onboard experiments constraints are shown and discussed. Finally, improvements concerning the payload space design and operational processes and important additional features such as telemetry and search-and-rescue aid electronics are proposed for the next launch that is scheduled for June 7, 2020.

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Biography / Biographies (for single author – biography and multiple authors- biographies) – 12 font bold

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Tiago Ruivo Coelho, 17, He is a former student of Federal Institute of Education, Science and Technology of Sao Paulo - IFSP Sorocaba Campus - Sorocaba, Brazil where he received the technical degree in Electro-electronics in 2019. He is now at Fatec Sorocaba, seeking a technologist degree in Mechanical Manufacturing. During elementary school at the Arquiminio Marques da Silva State School, he won a gold medal in the 2012 Mathematics Journey, a Sao Paulo State contest with over 60,000 participants. Among the academic achievements Tiago received in 2019 are: the top student award of IFSP; part of the IFSP winning team of the Remote Sensing in Defense Applications Symposium (SERFA) Hackathon; regional champion of the USP Knowledge Competition (CUCo 2019) and Fatec's 1st place in its entrance exam.

Sergio Shimura is the Research and Innovation Coordinator and Electro-electronics and Mechatronics professor at Federal Institute of Education, Science and Technology of Sao Paulo - IFSP Sorocaba Campus - Sorocaba, Brazil. Dr. Shimura holds a Bachelor Degree in Electronic Engineering, Master Degree in Power Systems, Doctor Degree in Electronic Systems and Post-Doctorate in Renewable Energies from University of Sao Paulo. He is author of Book Chapter of Photovoltaic Systems and Applications and earned a Certified Reliability Professional (CRP) in 2012. He has over 30 years of experience working in technology companies. His research interests include Aerospace engineering, Artificial Intelligence, Reliability engineering, Automation and Renewable Energies.

Reinaldo Squillante Junior is the Research and Professor of Electro-electronics and Mechatronics at Federal Institute of Education, Science and Technology of São Paulo - IFSP Sorocaba Campus. He received B.S. in Electrical Engineering from University of São Judas - Brazil; Master in Science in the area of Automation and Control Engineering from University of São Paulo - Brazil, and Doctor in Science in the area of Automation and Control Engineering from University of São Paulo - Brazil. He is author of books Applied Computing and Factory and Industrial Installations Project. Dr. Squillante have been developing research in the area of Automation and Mechatronics Engineering with a focus on control systems directed by events with experience in modeling, analysis and validation of control algorithms for advanced manufacturing systems; diagnosis of critical failures on the Process Industries based on Bayesian networks; modeling of accidents on the Process Industries from incomplete databases, and design of safety instrumented systems (SIS). Furthermore, he has over 20 years of experience working in technology companies, and finally, he has interested in Industry 4.0 and new approaches of education 4.0.

Veronica Trevizoli is professor at public and private schools in Sorocaba, Brazil. Miss Trevizoli holds a Licensed Degree in Mathematics and Pedagogy, Specialist in Methodology of teaching Mathematics and Physics, title of senior IT Management Specialist at FIAP, Sao Paulo. She has over 30 years of experience working in technology companies, with processes and technology. Her research interests include Education, STEM.

Cesar Hipolito is professor at public and private schools in Sorocaba, Brazil. MSc. Hipolito holds a bachelor's degree in Electric Engineering, Licensed Degree in Physics and master's degree in Astrophysics. He is author **Radio telescope construction for analysis of 12 GHz solar microwaves** in 2017. He has over 20 years of experience working in technology companies. His research interests include Aerospace engineering, STEM Education and cosmic ray detection and analysis.

Igor César Moreira Bernardes 17, is a student at the Universidade Estadual Paulista - UNESP, attending the 1st semester of Electronic and Telecommunications Engineering at the São João da Boa Vista Campus. In 2019, he completed the Technical course in Electro-electronics, at the Federal Institute of Sao Paulo - IFSP in Sorocaba (Sao Paulo, Brazil). Among his academic achievements, he was the Sudoku Champion in 2013, and received the honorable mention in the Brazilian Mathematics Olympics of Public and Private Schools - OBMEP (2015, 2017, 2018 and 2019) and the bronze medal in 2016. As a member of the IFSP Sorocaba Campus team, he was champion of Symposium on Remote Sensing of Defense Applications – SERFA 2019 hackathon, organized by the Institute for Advanced Studies - IEAv.