FTCN Replay: Mind the Gap!

In the latest episode of “From the Crows’ Nest,” host Ken Miller interviews Jonathan Dorminy, a 17-year-old high school student and award-winning researcher in electromagnetic spectrum studies. Dorminy’s groundbreaking project on terahertz gap communication using black-body radiation earned him the NSA’s award for electromagnetic spectrum research at the 2024 International Science and Engineering Fair. His work is a beacon for aspiring STEM students and a testament to the untapped potential in this challenging field.

Jonathan Dorminy’s Journey
Dorminy’s fascination with the terahertz gap began with an article in QEX, a technical magazine. He discovered that generating signals in the terahertz range has been a longstanding challenge due to the limitations of semiconductor technology. The solution he explored involved using black-body radiation, typically associated with infrared radiation. By heating an object to around 570 degrees Kelvin, it emits radiation peaking at 30 terahertz, providing a cheap yet inefficient method of generating signals in this range.

> *“My result was I achieved 60 times faster than anybody else has achieved. Unfortunately, 60 times a sixth of a bit per second is only 10 bits per second, which is still inordinately slow.”*

Innovative Approach and Findings
Dorminy’s key innovation was to increase the data transmission rate of terahertz signals. Previous efforts focused on setting distance records with extremely slow data rates. Dorminy’s approach involved mechanical modulation by spinning a disc with cutouts in front of the radiator to improve the data rate, achieving 10 bits per second—60 times faster than previous records. Despite this improvement, the project

highlighted the limitations of current sensors, which are not designed for high-frequency sampling required for practical applications.

Educational Impact and Future Aspirations
Dorminy’s work at the science fair not only showcased his technical skills but also connected him with professionals in the field, such as judges from the NSA and the Association of Old Crows (AOC). These interactions provided valuable opportunities and insights for his future studies and career.

Looking ahead, Dorminy aims to continue his research, particularly focusing on improving data rates using analog methods. He envisions a future in radiofrequency (RF) engineering, though the specific area within this broad field remains undecided. Dorminy’s enthusiasm for analog technology and RF spectrum applications positions him well for a promising career.

Advancing STEM and RF Engineering
Dorminy’s experience underscores the importance of supporting young researchers in STEM fields. While engaging high school students in RF engineering can be challenging, targeting college juniors and seniors could be more effective. These students are poised to specialize and can benefit from exposure to RF spectrum opportunities.

Historical Insights: National History Day Project
In addition to his scientific achievements, Dorminy excelled in history, securing third place at the National History Day competition with his project, “Fly Through the Fog: The Turning Point of Aviation.” The project focused on Jimmy Doolittle’s 1929 blind flight, which proved that aviation could be safe even in adverse conditions. Dorminy’s performance highlighted the development of key instruments like the bank indicator and Sperry directional gyroscope, which revolutionized aviation safety.

Conclusion

Jonathan Dorminy’s achievements in both science and history reflect a remarkable blend of technical acumen and a passion for learning. As he prepares for his senior year and college applications, his contributions to terahertz gap communication and historical research are sure to inspire many. His journey is a testament to the impact of dedicated mentorship, family support, and a relentless pursuit of knowledge.

Want more? Start listening to the full episode now.