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Diverse Applications Drive High Frequency Design Engineering

Gary Breed
Editorial Director

As the title above and the headline on our cover suggest, *High Frequency Electronics* readers are working a lot of different design assignments. We know this because that's what you told us! Once they have filled out the subscription form, our online subscribers are asked



to complete a short survey. The first question is, "What is the NEXT application you expect to work on?" The answers are, to put it mildly, all over the map.

You and your colleagues are working on everything from components to full systems, from production line testing to advanced theoretical research, from toys to deep-space probes. We have received a couple thousand responses to this survey—if we are to believe the results (and why not?), there is no single "killer app" that is occupying the time and effort of a large number of high frequency engineers.

There are, however, a few areas with a significant emphasis. The various forms of wireless networking show up more often than any other type of application. This fits our other observations that IEEE 802.11a/b/g, Bluetooth, HiperLAN and similar systems are currently strong business segments (which we have supported with articles in this and past issues). Also showing up often are the related data communications technologies of point-to-point and point-to-multipoint: wireless local loop (WLL) and wireless Internet access, with some LMDS and MMDS activity, as well.

The various types of 3G systems show up regularly, but in the context of your local wireless service providers' marketing messages, the number is surprisingly small. Still, this group is doing a lot of interesting work in specific areas such as video transmission, telemetry-over-cellular, or Internet-enabled handsets. Some of the other tasks mentioned in the survey clearly relate to these systems, such as feed-forward power amplifiers, smart antennas and multi-standard software-defined radios.

An examination of the long list of specific answers uncovered other pockets of activity—a sizeable number of military-related projects, semiconductor device development, high data rate optical systems, satellite systems, and lots of component and module work that might be used in any of a hundred different applications.

I think the diversity represented in our survey is a good thing! There are so many avenues of development that some are certain to blossom into strong market areas. Also, some of the job assignments are purely research, pursuing new ideas which will provide the seeds for future product development.

Grote Reber, 1911-2002 Pioneer in Radio Astronomy

I rarely run an obituary in my editorial columns, but Grote Reber deserves a special note. Reber died on December 20, 2002, just two days before his 91st birthday. His passing is an appropriate time for reflection on the innovations he brought to radio technology.

Reber created radio astronomy. After reading about Jansky's discovery of galactic radio "noise," Reber was inspired to build the first radio telescope and undertake the first systematic mapping of the sky at radio frequencies. Approaching the task as an engineer, he built one of the earliest large parabolic dish antennas and placed a state-of-the-art (for 1939) receiver at the focus. By 1941, his initial sky map was complete, and it has been used ever since to introduce engineers and scientists, as well as

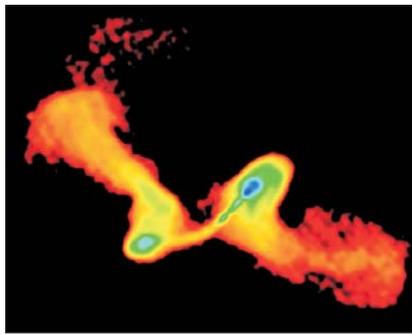


image provided by NRAO/AUI

laymen, to radio astronomy.

In the years between then and now, radio astronomy has resulted in a few Nobel prizes and added to our depth of understanding of the universe. The image above of NGC 326 is one of the recent discoveries. It was obtained last summer, and shows the collision of two galaxies.

If that's not exciting enough, there is a jet of matter and energy near one of the galaxy centers

(near the blue dot) that has been attributed to one black hole being consumed by another black hole.

This is big science, and it's based on *our* technology.

The greatest inspiration in Reber's work is that he was not a PhD academic. He was more of a technician and hobbyist than a trained astronomer (and a ham radio operator, as were most early radio pioneers). That first radio astronomy antenna was built in his back yard in suburban Chicago, yet his work was recognized as being so important that he received awards, prizes and guest lecturer invitations normally reserved for the top academic researchers.

There are many frontiers yet to be explored. Hopefully, there are at least a few more engineers with the combination of curiosity and creative energy that Grote Reber brought to radio technology.