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Profile of Angie Bukley

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Dr. Angie Bukley has over 25 years of professional experience in defense and space systems and holds a Ph.D. in Electrical Engineering, with a specialty in Control Theory, from the University of Alabama in Huntsville. Dr. Bukley is the Interim Associate Vice President (Chief Administrator) and Assistant Vice President for Research at the University of Tennessee Space Institute in Tullahoma, Tennessee, USA. From November 2003 - June 2007, she was a Professor in the School of Electrical Engineering and Computer Science and the Associate Dean for Research and Graduate Studies in the Russ College of Engineering and Technology at Ohio University, Athens, Ohio, USA. From October 1998 through October 2003, she was employed by The Aerospace Corporation in Albuquerque, NM, USA and was assigned to the Airborne Laser System Program Office at Kirtland Air Force Base. Dr. Bukley was also the Director of Laser Applications for The Aerospace Corporation.

Prior to joining Aerospace, Dr. Bukley worked with a number of defense contractors on a wide variety of programs. She also spent seven years at the NASA Marshall Space Flight Center in Huntsville, Alabama where she directed the Large Space Structures Laboratory and worked on remote sensing applications. She is a faculty member of the International Space University in Strasbourg, France and has held department and team project chair positions during the ISU Space Studies Program since 1995. She also teaches Space Engineering courses in the ISU Master of Space Studies Program. Dr. Bukley has over 70 technical publications and the book Artificial Gravity that she co-wrote and co-edited was awarded the 2008 Life Sciences Book of the Year Award by the International Academy of Astronautics. She is active in the American Institute for Aeronautics and Astronautics (Associate Fellow), American Astronautical Society, International Federation for Automatic Control, National Space Society, and American Society for Engineering Education. Dr. Bukley also received the 2003 University of Alabama in Huntsville Distinguished Engineering Alumni Award.

1) How did you get started in the satellite business?

For me, the question really begins with "how did you get into the space business?" I guess my ending up working in the space sector was predestined. From the time I can remember, I've always been interested in the planets, stars, and space travel. I was fascinated by the Apollo program and even built a one-meter tall model of the Saturn V with detailed lunar lander and Apollo capsule when I was a kid. Throughout my educational experience, I excelled in math and science, so becoming an engineer and working in the space industry was really what I was meant to do. I initially started out in biomedical engineering, but added electrical engineering to make sure that I had a "backup" in case the BME didn't work out. After completing my Masters in EE, with an emphasis in control and biomedical systems, biomedical engineering was still pretty new and most companies wanted a Ph.D. level for the research jobs, or technicians. Continuing my studies at that time was out of the question because I was out of money! So I took a job at a small consulting firm in Huntsville, AL, and just like that, I started down the path of turning myself into a bona fide rocket scientist! One of my first tasks was analyzing the stability of the

Space Shuttle Main Engine turbo-pumps. I moved on to actual launch vehicle design and simulation, and in the early days of the space station design, modeling and analysis of various docking and berthing mechanisms. After working on missile defense systems for a few years at another company, I finally was able to NASA working at the Marshall Space Flight Center in Huntsville for seven years. That's when I really got involved in satellite applications. Initially assigned to the Control Systems Division, I soon moved on to Program Development and then to the Global Hydrology and Climate Center (MSFC was and still is the lead for that enterprise) where I worked exclusively on the application of NASA's space and ground based assets to disaster management and a number of other civil applications like urban forestry and land use best practices. One of the nicest things about working for NASA is that they paid for my Ph.D.!!!

After leaving NASA, I made a move to Albuquerque, NM where I worked mostly on Air Force programs for the Aerospace Corporation. I worked on a number of classified satellite programs and was part of the development of some pretty amazing technologies. I also worked on the Airborne Laser system as a member of the System Program Office. Now, I'm a full-fledged academician and it's an absolute honor to be sharing all that I've learned with the next generation of engineers, entrepreneurs, and future space leaders/explorers.

2) How have you been involved in changes brought about in or by this business (innovations, technologies, services)?

The most significant innovation and application of a satellite technology that I've seen and been a part of from a military applications standpoint, is the use of GPS and Satellite Navigation Systems in general. The pervasiveness of GPS-based navigation systems not only in military but also in our everyday society is nothing short of astonishing. It's almost impossible to rent a car without being asked if you want a GPS with it. It's almost like ordering a burger without fries! A big change in which I feel I played a significant role is the use of space-based as well as airborne remote sensing systems for civil applications. I have been associated with projects applying remote sensing to drought monitoring, desertification studies, wildfire and forest fire monitoring and management, as well as agricultural applications. The technology has matured significantly in my lifetime and it's been absolutely gratifying to be part of the development of systems that impact humanity in a very positive way.

3) What do you think was the greatest event/situation/opportunity you experienced?

The biggest opportunity to ever be dropped on my head, so to speak, was the chance to make a career change to academe. I have been involved with teaching for the last 16 years, ever since I got involved with the International Space University. Every summer, the ISU Space Studies Program convenes for nine weeks of intensive space studies at a different location around the world. Since 1995, I've been part of the faculty team and have taught courses in satellite and space mission design. In 2003, I was offered the opportunity to be the Stocker Visiting Professor in the Russ College of Engineering & Technology at Ohio University. This position is aimed at industry or government professionals who want to teach in a university environment for up to three years. I took it! Talk about a life-changing decision. I never realize how rewarding it could be to teach full-time and share the information I've learned over the years. The best part was when I was teaching some fundamental principle in control theory, for example, I could always

turn around and tell the class about a time that I actually used it and why it's really important. Most of the students listened more intently to my stories than to the theory part of the lectures. It was and still is an absolute joy to be in front of a class.

4) What was the greatest obstacle?

I haven't had any significant obstacles. I've pretty much been able to do what I want to do and go where I'd like to go. There have been a few instances of having to deal with recalcitrant males who still had an issue with women being engineers, but basically I've just ignored them, worked around them, or got them fired. Or fired them myself.

5) What do you see happening in the next five years in this industry?

Predicting the future of any high-tech industry is difficult. With ever-shrinking and more capable components, tiny satellites with amazing capabilities is not out of the question. Prediction: the next big space debris problem will be defunct nano-sats!

6) What advice do you have for women interested in entering the industry?

Do it. A woman can do whatever she wants to do. The only impediment that I've seen for most women who have problems is their own attitude. You have to know who you are, what you want and the moxie to go do it. The best motivation I've ever had is when someone says "that can't be done." Yeah? Watch! Finally, young women considering this industry as a career should study hard, be the best they can be, and keep their self-confidence meter pegged. Learn to write and speak well. If you're outstanding at what you do and can communicate it, there's nothing you can't do.