This monthly article highlights one of our branch members. We hope that you enjoy knowing a little more about your fellow members and the interesting life they have had. If you have someone you would like to nominate or if you would like to help author an article, please email the editor, Ron Nakamoto, at ron.nakamoto(at)yahoo.com.

J. William (Bill) Young

I spent over 40 years working on satellites, watching them grow from a small grapefruit-size ball to large two-story boxes that unfurl in orbit. I experienced the evolution from slide rules to computers for engineering calculations. Satellite activities took me across the US and around the world to India, Japan, South America, Europe, Russia, and Kazakhstan. Some bits of my story will be the usual, but I included some adventures that might be of interest to you, at least they were to me.

I was my parents first child, born in Washington DC. The country was in the middle of the depression but fortunately, both my parents had jobs. Later, our family grew with the addition of two brothers and a sister. During WWII, my dad was in the Navy, so we moved a lot. After the war, my dad tried several jobs before settling down in Arlington, VA. I spent each of my high school years at a different high school. I was always the new guy and missed out on long-term friends and social cliques. I was active in Boy and Explorer Scouts. I used scouting as an excuse to spend weekends hiking and camping in the nearby Blue Ridge and Appalachian Mountains. I built and flew model airplanes, powered by hand, rubber band, and gas engine. I recall losing several to thermals carrying them out of sight. I mowed lawns and shoveled snow to pay for my hobby.

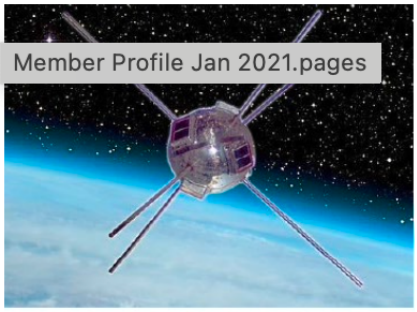
In my senior year I was given an aptitude test. I scored highest for a Park Ranger and second for an Engineer. I suppose park ranger was high because I enjoyed hiking, camping and the outdoors. The back of the results sheet listed potential salaries for the various vocations. Park ranger salaries were very low, so I went for engineering. I attended Virginia Tech studying mechanical engineering and applied mechanics. Applied mechanics uses mathematical techniques, mostly partial differential equations, to solve engineering problems. I enjoyed it and was good at it. This was before computers when engineers used slide rules.

The summer between my junior and senior college years, I worked at General Electric running large steam turbines and generators before they were sent to power plants. Just like automobile tires need balancing, the rotors in turbines and generators need balancing. I worked 12-hour shifts, 13 days in a row, before taking the mandatory day

off. I made enough money to pay for my senior year and to buy my first car, a maroon, Mercury convertible with large white wall tires -- just what a college senior needs.

My convertible helped on a blind date when I met Edel McGavock, a freshman at a nearby women's college. We fell in love but had to wait until she graduated to marry. During that time, I got a job at Naval Research Lab measuring vibrations (noise) in submarines with the goal of making them run smoother and quieter. I designed and had the machine shop build an impedance head to measure vibrations. The sub was docked so I never experienced an underwater cruise. In addition to my submarine work, I was able to watch the development of NRL's small, grapefruit-size, Vanguard satellite. I helped one of the satellite engineers with a vibration calculation. This was my first exposure to satellites.

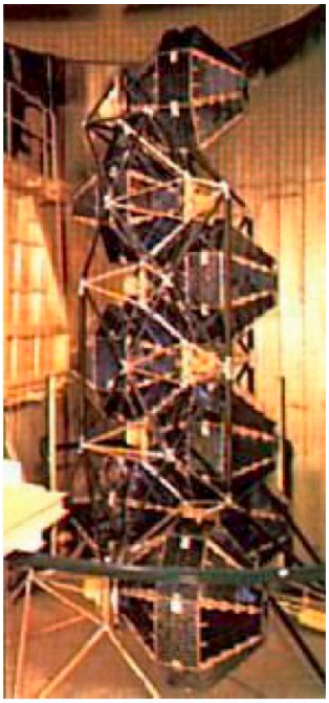
After Edel graduated with a degree in physics, we married and drove across the country to California so I could study Engineering Mechanics. Stanford offered me a fellowship and Professor Timoshenko, the father of Engineering Mechanics, was teaching there. Arriving in Palo Alto, the first thing we did was check out Stanford. We drove down Palm Drive to these muddy, brown buildings. What is this! Colleges are supposed to be stone or brick buildings.



NRL 1950's Vanguard Satellite

While I attended Stanford, Edel got a job at SRI in their Radio Physics Department studying how radio waves bounce off the ionosphere to travel around the world. She authored several research papers. After graduating with a PhD, we decided to stay in California as we liked the weather and people. I got a job at Philco working on communication satellites. Soon, Ford purchased Philco and we became Ford Aerospace. Later, Loral purchased Ford Aerospace and we became Space Systems Loral. The work did not change. My early years were spent supervising the design, analysis, and testing of structures and mechanisms. Our satellites were designed with low-weight mechanical parts so that more money-making electrical parts could be used. We were early users of computers for analysis and graphite materials for light-weight hardware. We had international customers. To win internationally, it helped to purchase components from foreign vendors. I made many trips around the world assisting our foreign vendors. Our satellites grew increasing larger as the capability of the boosters to launch them increased. On-orbit deployable appendages (antennas, solar arrays, booms) were added. Graphite-epoxy material became commonplace for its structural strength and light weight. We used computers extensively for mechanical design and finite element analysis. (Editor's note: Finite Element Analysis uses mathematics to comprehensively understand and quantify any physical design (structural, thermal, wave propagation).) I developed software for low-weight structural sizing, for booster coupled loads analysis, and for deployment mechanisms.

We wrote computer software for mechanical analysis before commercial software was available. I was invited to Dearborn to brief the Ford engineers on how we were using computers for mechanical design and analysis. Also, Stanford engineering invited me to give a seminar describing what we were doing. At the seminar, a well- known professor, who did not understand computer-based mechanical analysis, asserted that what we were doing made no sense. (Later, when he understood our methods, he published papers and taught students to use them.) Engineering analysis was moving from slide rules to computers. We used matrices that required the solution of simultaneous equations with hundreds of unknowns - - impractical for a slide rule but easy for a computer.



Air Force 1960's Eight-Satellite Spacecraft

As a young engineer in the 1960s I worked on an Air Force contract to launch eight, three-foot-diameter satellites on a single booster. This required a structure to hold the eight satellites during launch, then release them one at a time into orbit. This eight-satellite spacecraft was larger than previous spacecraft atop boosters. It was large enough that its structural dynamics would interact with the booster's structural dynamics causing loads on our spacecraft that depended on the interactions. I worked with the booster engineers to prepare a dynamic model of our spacecraft that was coupled to their booster dynamic model. The coupled model was used to calculate launch loads on our spacecraft. Next, we confirmed that our spacecraft could survive these loads. The coupled loads analysis became a standard part of the preparations for all future large spacecraft launches. I believe we were the first.

My later work years I served as a Technical Consultant assigned to projects where needed. This included proposal preparation, design review boards, problem solving, and failure review boards. I was on review teams that addressed stuck antennas, solar arrays, and instrument booms that did not deploy or did not deploy properly. Many of these problems were resolved. I participated in satellite launch and orbit raising at control centers in Palo Alto, India, and at Intelsat and NOAA (National Oceanic and Atmospheric Administration) both near Washington DC.In 1993, soon after the Iron Curtain came down, I was a member of a four-man team sent by Loral American Beryllium (LAB) to Ust- Kamenogorsk, in a remote north-east corner of Kazakhstan, to evaluate Russian beryllium. LAB wanted to buy less expensive beryllium from Kazakhstan. I was on the team because our satellites used some beryllium. It is as strong and stiff as steel but as light as aluminum. I knew nothing about making and machining beryllium. For me this trip was a boondoggle. The team was augmented with an American facilitator and a Russian translator. The translator was a good-looking, young Russian girl who had recently graduated from a Moscow university. She spoke English very well. She and the facilitator shared the same hotel room at night -- I think to save money.

In 1969, I was invited to be a "visiting professor from industry" at Brigham Young University for a school year. This invitation was precipitated by a fellow graduate student from Stanford who was on their faculty. I was needed to fill in while the engineering department had faculty on sabbatical. Employing a non-Mormon, engineering faculty member was unusual. So, I had to be interviewed by one of the Apostles from the Counsel of Twelve who ran the Mormon church. The Apostle was not interested in my qualifications to do the job but was concerned about my non-Mormon family fitting into a community that was 95% Mormon. Later, I had another teaching assignment at San Jose State College. These were good breaks from working on satellites, but I learned I would rather not teach. Teaching was regurgitating stuff I already knew. Industry had new and interesting problems to solve.

When I started at Philco, I wanted to be able to walk to work so did not look for housing outside of walking distance. We bought our home in Palo Alto and have been there for almost 60 years. We raised two children. Our son lives in Boulder Colorado designing computer chips for Xilinx and has two children, a boy and a girl. Both recently graduated from Colorado University. Our daughter teaches science at a middle school in Palo Alto and has two children, a boy and girl. Both are in high school. When our children were young, my wife Edel was active in PTA, was elected to the Palo Alto School Board, and ran a small sewing business. Later after our children left home, she passed the patent agent exam and wrote patents for local tech companies. I think her most important patent was the first Field Programmable Gate Array (FPGA) patent for Ross Freeman, inventor of the FPGA. We have been happily married for some 63 years.

Over the years we have been active, hikers, bikers, backpackers, skiers, and international travelers with Road Scholar. We made a number of trips with them including the Galapagos Islands, Machu Picchu. Canadian Rockies, and Alaska. When my son was in Little League baseball, I volunteered as an umpire. I continued umpiring for many years after my son left Little League because they needed help and I was reasonably good at it. After retiring, I spend more time in our garden. I have fruit trees, tomatoes, and vegetables. Years ago, the squirrels took a little fruit, but I got most of it. About ten years ago, the squirrel population exploded, and they were stripping my fruit trees and tomatoes of fruit while it was still green. I built large wire cages around my plants to keep the squirrels out. Now, I get the fruit and the squirrels get nothing.

In 2003, Peter Barba invited me to join SIR Branch 35. I knew that many of my former colleagues were members, so I readily accepted. It has been enjoyable keeping up with up the guys and making new friends. I was active in hiking lead by Ian Thompson, biking lead by Peter Barba, and computers lead by Jim Dinkey. In 2011 Vern Schmidt asked me to manage our check-in and attendance function. I was glad to volunteer to help our branch. I have performed the attendance function for some 10 years now and am ready for a younger member to help for a while and then take over. See me if you are interested. I have enjoyed the SIR activities and meeting new friends. SIR has been fun.