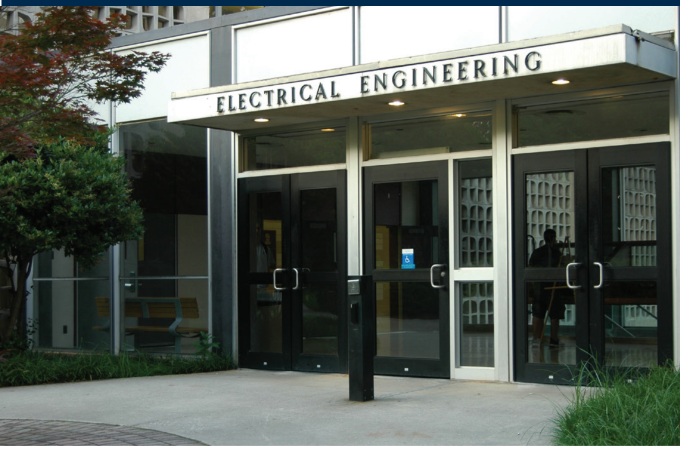



A Compendium of Georgia Tech ECE History

1896 - 2004

Roger Webb & David Hertling

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To the many thousands who've "gotten out"
and especially the many who have aided
and guided them through.

Acknowledgement

We wish to acknowledge that, without the dedicated efforts of faculty and staff over the past hundred years, there would be no School history worthy of documentation. Also, we wish to acknowledge that, in order to place School development in context with Institute development, we 'borrowed' shamelessly from the works of Wallace, 'Dress Her in White and Gold' and Giebelhaus, McMath et al, 'Engineering the New South'.

Then we wish to thank those who contributed directly. School staff Ashlee Gardner and Caitlin Burro aided in developing the biographical sketches in the appendix. Development Officers Suzy Briggs and Anna Walker conducted and documented the interviews in the appendix. Georgia Research Alliance retiree Kathleen Robichaud who, by dint of outstanding editing skill and remarkable patience, greatly ameliorated the travail of readers plowing through pages of pedantic engineering-style wordsmithing. Finally, we wish to thank School staff member Dan Watson and School Chair Arijit Raychowdhury; Dan for the remarkable job of preparing the draft for publication and Arijit for enabling Dan to do the packaging and for agreeing to have the resultant published.

Table of Contents

Preface

The School of Electrical and Computer Engineering at Georgia Tech has evolved from a program with one full time faculty member, two courses and a handful of students to its status today as a world leader in engineering education and research. This compendium is intended to chronicle that evolution, not only in terms of a timeline of School activities and events but also in relation to the unique culture of Georgia Tech, to the ever-expanding spectrum of activities encompassed by the profession of electrical engineering, and, most importantly, to the contributions of key individuals who have fostered and enabled the evolution.

The compendium is organized by era, each era corresponding to the tenure of the successive chairs of the School. While it is certainly the case that the actions of each School leader were guided by individual goals and aspirations, it is also true that each Chair worked with a group of dedicated faculty members. Many of the initiatives undertaken emanated directly from the faculty and, with certainty, all were enabled by them.

It is also true that during the epoch covered by this compendium, Georgia Tech in general and the College of Engineering in particular have enjoyed similar success, to the extent that the College and the Schools within the College are recognized as being among the top six in the nation. The individual schools within the College enjoy a degree of autonomy unique to Georgia Tech, and unprecedented in academic institutions in general. The collective success of the individual school development trajectories is attributable to its common operational context: the unique Georgia Tech culture. The compendium seeks to illustrate the operational context by chronicling major Institute initiatives undertaken during the tenure of successive Institute presidents.

Appended to the compendium are short biographical sketches of several long-time faculty members: Ben Dasher, Demetrius Paris, Kendall Su, Dan Fielder, John Hooper, and Tom Brewer. Also appended are interviews with Professor John Peatman and distinguished alumnus Jim Carreker.

The Beginning

The electrical engineering program at what was then called the Georgia School of Technology (GST) was authorized in December 1896. GST had been established 10 years earlier in 1886 by action of the Georgia Legislature as a result of a determined effort of a group of Georgia business and political leaders who believed that a technical college could be a catalyst for broadening the agrarian economy of the state. The economic development impetus for founding the Georgia School of Technology is important to note as it had, and still has, a great deal to do with the culture of Georgia Tech. It may also be noteworthy that the initial president of the Georgia School of Technology, Isaac Hopkins, whose educational background was medicine, had a strong personal interest in the use of machine tools. In his prior position as president of Emory University, he had established at Emory a program in tool-craft and design.

Having assessed the programs of the technical colleges in Massachusetts — Massachusetts Institute of Technology (MIT), established in 1861, and Worcester Polytechnic Institute (WPI), established in 1865, — the founding group concluded that the shop-based curriculum and emphasis on commercialization of student projects at WPI was more aligned with the group's aspirations than the more science-based program at MIT. As a result, the Georgia School of Technology formally opened in October 1888 with a single degree program in mechanical engineering. It was modeled after the WPI shop-based program, and a key tenet of the current Georgia Tech culture was established at the outset.

By the mid-1890's, it was clear that Faraday's electric dynamo, invented in 1840, was going to have a profound effect. The AC versus DC current war had been resolved. Exterior lighting with electric arc bulbs was becoming commonplace. Edison's incandescent light bulb was rendering interior electric lighting practical. The newly completed Niagara Falls hydroelectric power plant was beginning to illuminate New York. The joint GE/Westinghouse license to manufacture and market Tesla's induction motor was initiated and induction motors were increasingly being utilized as machinery drives. Marconi's wireless telegraphy and radio inventions were beginning to attract attention. To support and further this dynamic environment, it was apparent that a degree program in electrical engineering at the Georgia School of Technology would be necessary. Actual implementation would await a transition in leadership.

The Hopkins presidency was relatively short-lived. After successfully leading the initiation of GST, Hopkins found that he had little appetite for the political and financial struggles necessary to sustain and grow the enterprise and resigned 1895. His successor, Lyman Hall, was named the second president of the Georgia School of Technology in June 1896.

Hall was a Georgia native, born in Americus in 1859. He received an appointment to West Point and graduated in 1877, but a physical condition interrupted his military career. He taught mathematics at several institutions before being elected to the chair in mathematics at the GST in 1888, where he served until assuming the presidency. Hall's tenure as president was marked by a much more disciplined and aggressive approach than that of his predecessor, emphasizing expansion of the academic programs, the physical facilities and the student enrollment. Just six months into his tenure, he established two new degree programs: electrical engineering and civil engineering. He also secured funding for an electrical engineering building in 1901. This building, now known as the Savant Building, served as the home of electrical engineering until 1962.

Dedicated in 1901, the Savant Building served as the home of electrical engineering until 1962.

During his presidency, which ended with his death in 1905, Hall established a total of five new degree programs, fostered the construction of nine new buildings and tripled enrollment. He was adept at the political aspects of the position, was a very successful fundraiser and clearly established a model for future presidents to emulate.

The commercial shop model of WPI proved to be economically unsound and ended in 1896 with a decision to move to a purely educational institution with increased emphasis on thorough training in science and mathematics. This decision provided added impetus for adding a major in electrical engineering, viewed as a prototype of the desired change to "scientific" engineering. The new electrical engineering curriculum was authorized in 1896 and appeared in the 1897 catalog. This initial electrical engineering curriculum differed from the mechanical engineering curriculum only by two senior year courses. The curriculum still had a heavy shop component with the equivalent of one day per week in shop in each of the four years. The mathematics requirement was five hours per week each semester of the first three years and three hours in the first semester of the last year, beginning with geometry and ending with calculus. Physics was required all four years, with two hours per week the first year, three the next two years, and five the senior year. Included in the physics requirements were courses on electricity and magnetism, electric power transmission, and telegraphy and telephony. Chemistry courses were required each year including organic and inorganic chemistry, geology and mineralogy, and industrial applications of chemistry. The only requirements other than those in science and engineering were courses in English.

Specific mechanical engineering courses covered mechanical drawing, kinematics, mechanics, machine design, materials, and steam engines. For electrical engineering students the materials and steam engine courses were replaced by courses in rotating electrical machines and electric power transmission.

In 1896, GST Board of Trustees established the degree of Electrical Engineering. In 1900, the Georgia legislature appropriated $10,000 toward the construction of the Electrical Engineering building and an additional $25,000 was raised from the private sector. The building was completed in 1901.

The first electrical engineering faculty member was Robert Quick, an 1894 Cornell University graduate. After graduation, he taught at Cornell for a year and then came to Tech as a professor of physics. He was tasked with designing the new electrical engineering curriculum and attendant electrical engineering courses, and is listed in the 1897 catalog as Chair of Physics and Electrical Engineering.

The first two Georgia Tech degrees were awarded in 1890. The first electrical engineering degree was awarded in 1897 to an enterprising student who took advantage of the overlap between the mechanical and electrical engineering programs, changed majors and graduated in the first year the electrical engineering degree was available. By 1906 Georgia Tech had graduated 261 engineers, more than 50 of whom were electrical engineers.

Professor Quick died unexpectedly in 1899 and was replaced by Ezra Scattergood, who also chaired the department of physics and electrical engineering. Albert Ford replaced Scattergood in 1901. A year later, physics and electrical engineering were separated, and Ford assumed the title of Chair of Electrical Engineering and became the first full-time faculty member.

The Ford/Wood Era

Albert Ford

Ford was a graduate of the University of Wisconsin, earning his electrical engineering degree in 1895 and the professional engineering graduate degree in 1896. After working briefly in industry, he spent two years at the University of Colorado and came to Georgia Tech as a professor of electrical engineering in 1901. He left Georgia Tech in 1905 to head the electrical engineering department at the University of Iowa. Professor R. W. Hargrave joined the electrical engineering faculty in 1906. In 1907, H. P. Wood became Electrical Engineering Department Head and served in that capacity for the next 10 years.

Kenneth G. Matheson was named to succeed Lyman Hall in as Georgia Tech's president in 1905. He was a protégé of Hall's, serving as a professor of English since 1898. Like Hall, his undergraduate education was military-based. He was a graduate of the Citadel, subsequently receiving the master's degree in English from Stanford University.

By 1906 Tech was beginning to look more like a technological university than a trade school. There were five degree granting programs: Mechanical Engineering, Electrical Engineering, Civil Engineering, Textile Engineering and Chemical Engineering. There were several new buildings including the electrical engineering building, a new dormitory and a president's home. There were social fraternities, a literary society, an engineering society and a monthly student magazine. After nearly being abandoned for financial reasons, the football program had been revived. The Tech Athletic Association was created in 1901, money was raised, and, in 1903, John Heisman was hired as football coach. (It should be noted that Heisman's contract also required that he coach the baseball team.)

Constant financial struggles plagued Matheson's tenure as president. Unable to secure necessary state funds, he pursued an aggressive and largely successful fund-raising campaign, allowing construction of several new facilities including a shop building, an infirmary, the YMCA and a power plant. President Matheson also acquired funds to purchase additional campus real estate, including the property where Grant Field and Peter's Park are now located. A local businessman, John Grant, donated funds to build the first concrete bleachers for the football field. President Matheson was also active in curriculum development. He established a degree program in chemistry in 1906, the first science degree at Tech. Unfortunately, the department of chemistry was closed in 1919 due to low enrollment and budgetary issues.

He established a department of commerce in 1913. He had launched a night school program in 1908 and populated it primarily with courses in commerce. In establishing the night school program, he managed to get agreement to admit women students. The first woman to receive a Tech degree was Anna Wise who received the commerce degree in 1919. Probably the most important and enduring contribution Matheson made to Tech's curriculum development was the establishment of the co-op program in 1912. Twelve students enrolled as co-ops in its first year and 26 the following year. In 1922, finally tiring of, in his words, "being a modern Lazarus" begging for money to keep Tech's doors open, Matheson resigned to accept the presidency of Drexel University.

H. P. Wood came to Tech from the University of Illinois in 1907 to become Electrical Engineering Department Head. A native of Pennsylvania, he attended the State College of Pennsylvania, receiving the B.S. degree in electrical engineering in 1899 and the advanced degree in 1903. After a short time in industry, he joined the electrical engineering faculty at the University of Illinois.

When Wood arrived at Tech, he and one adjunct faculty member constituted the entire electrical engineering teaching faculty. The curriculum had remained unchanged during the Ford/Hargrave era, but student enrollment had grown considerably. Despite limited faculty resources, Wood set about expanding the curriculum, and, by 1917, there were four courses covering electrical machines and power transmission instead of the original two. Electric lighting, telegraphy and telephony, alternating current circuits and electric railway courses had been added as well as a thesis requirement. There was also an elective course in electric signaling, which introduced concepts of radio. (Professor Wood was instrumental in initiating Georgia Tech's radio station in 1913 and in housing it in the electrical engineering building.) Two faculty were added, and the graduating class of 1917 included 51 electrical engineers. Professor Wood resigned in the fall of 1917 to join the U.S. Army where he served as captain of the army engineering corps. After the war ended, Wood accepted a position on the University of Wisconsin faculty. After Professor Wood's departure, Professor C. P. Eldred was named department chair, but was in place for only one year, leaving Tech to become electrical engineering department head at Rensselaer Polytechnic Institute.

Other changes at Georgia Tech at this time laid the foundation for future growth and expansion of electrical engineering. Following President Matheson's departure, Marion L. Brittain was named President and would shepherd Georgia Tech through the tumultuous post WWI years, the Great Depression and the early years of WWII. While having no prior experience in higher education, Brittain had served his apprenticeship with Georgia education and associated politics as superintendent of Fulton County Schools for 10 years followed by 12 years as Georgia's state superintendent of schools.

President Brittain proved to be an adept fund raiser, an inspirational leader in creating academic programs and in hiring highly qualified faculty, and a courageous and dedicated champion for Georgia Tech. Shortly after becoming president, Brittain secured a major grant from the Carnegie Foundation which enabled creation of the Physics building. Several other buildings followed in short order. In 1930, he secured a $300,000 award from the Guggenheim Foundation that led to the creation of the aeronautical engineering program and its associated building. A promise by the State of Georgia to provide matching funds over the next several years was instrumental in securing the award. The state, however, failed to follow through with the promised matching funds. In addition to the aeronautical engineering department, President Brittain established a ceramics department and a business department (now known as the School of Materials Science and Engineering and the College of Management).

During the depression years, President Brittain became very adept at securing building and renovation funds from the federal government. So-called New Deal programs resulted in construction of a new mechanical engineering building (the Coon building), a civil engineering building, several athletic facilities and dormitories. One of the dormitories was located south of North Avenue adjacent to what was to become Techwood Homes, the first publicly subsidized housing development in the United States. President Brittain was interested in removing the shantytown that existed there, and the dormitory and Techwood Homes apartment buildings were packaged together.

In 1931, the then governor of Georgia, Richard B. Russell, established the Georgia Board of Regents (BOR) to coordinate the activities of Georgia's universities. President Brittain had advocated for this, but ultimately had to engage in political battles to enable the BOR to take actions that supported Georgia Tech (and the other units of the university system). Declining university enrollments during the Depression prompted the BOR to consolidate programs, moving the small University of Georgia civil engineering program to Tech and moving the extensive Tech commerce department, largely a night school operation, into the University of Georgia adult education program. President Brittain objected, and, with the backing of the Atlanta business community, successfully argued that engineers needed business training, leading to the establishment of the Tech department of business in 1934. An even more compelling political opportunity presented itself when a subsequent governor, Herman Talmage, attempted to get the BOR to enact policies which likely would have resulted in loss of accreditation of Georgia's universities. President Brittain was encouraged to delay his announced retirement to consolidate the Georgia education community's efforts to defeat Governor Talmage in the upcoming 1942 election. Brittain did so, Talmage lost (crediting the educators for his defeat), the threat to the BOR was removed and important precedents were established.

The Fitzgerald Era


T. W. Fitzgerald

T. W. Fitzgerald became Tech's Electrical Engineering Department Head in 1920 and served in that position until his death in 1940. During his tenure, the department grew modestly and continued to educate engineers for the electric power and distribution industry. A native of West Virginia, Fitzgerald earned the BSEE from the University of West Virginia in 1910. He served on the faculty of the University of Arizona for 10 years prior to joining Georgia Tech. Seven faculty members comprised the staff working with Fitzgerald, none of whom were on the staff prior to 1920. Two of the new staff, Professors Ellis and Seidel, remained on the faculty throughout Fitzgerald's 20-year tenure, and beyond. In fact, faculty stability became a hallmark of Fitzgerald's operation. Of the seven faculty members who were on the staff in 1940 when Professor Fitzgerald passed away, five, Professors Ellis, Seidel, Savant, Duling and Stalnaker, had been faculty members for at least 12 years. Savant and Duling had joined in 1922.

The increased faculty size and stability enabled curriculum enhancement. In 1923, two courses on radio engineering were offered, the second being an elective to students who wished to take it rather than the previously required civil engineering course on hydraulics. Also introduced in 1923 was a course on thermionic valves, later known as vacuum tubes. The 1924-25 catalog listed a limited number of graduate courses for those wishing to pursue a master's degree. Until 1940, most of the curriculum efforts focused on upgrading the existing courses and laboratories and expanding the graduate program course offerings. School enrollment declined somewhat during the Depression. In 1920 the graduating class numbered 51. In 1933, 47 bachelor's degrees and three master's degrees were awarded.

Two of the last additions to Fitzgerald's staff were Benjamin Dasher and Martial Honnell, both of whom came to make substantial contributions to the electrical engineering department. Dasher, who graduated in 1935, remained as a graduate teaching assistant until his appointment to the faculty in 1940. Honnell, who graduated in 1934, entered Georgia Tech after spending several years in the merchant marines where he had obtained a radio operators license and put himself through school as the nighttime operator of the Tech radio station.

Professor Fitzgerald became ill in the latter part of 1940 and died in February 1941. Professor Domenico P. Savant of the existing faculty was chosen to succeed him.

The Savant Era, the Start of the Modern Era


Domenico Savant

Domenico Savant was born in Nole, Italy in 1885 and came to the U.S. at age four. He attended Rose Polytechnic Institute where he earned a BSEE. He subsequently earned an MSEE from Harvard. Savant began his academic career at the University of Missouri, and served on the faculty at Harvard before joining Georgia Tech in 1922 as an assistant professor. He was promoted to full professor in 1925 and was appointed as the first Tech Dean of Engineering in 1934.

Savant had the vision of Georgia Tech becoming a leading technological university and began working with the engineering schools to raise the excellence of their programs and to develop more modern curricula and graduate programs. Professor Savant continued teaching electrical engineering courses throughout his deanship. He became Electrical Engineering Department Head when Professor Fitzgerald died and later director until his retirement in 1952. He also continued as dean until 1945 when Professor Cherry Emerson was named dean, with Savant serving as vice-dean. Three years later Emerson was moved to another position and Professor Jesse Mason was named dean.


Blake Van Leer

Upon becoming department head, Professor Savant immediately set about continuing the work he had initiated as dean. Fortunately for Savant and the School, Blake Van Leer became president of Georgia Tech not long after Savant became department head. President Van Leer shared Savant's vision for Georgia Tech and fully embraced and supported the reforms Savant initiated.

Savant and his staff, now numbering 11, created a revised undergraduate curriculum in short order. For the first time, there was a sophomore year course on electrical engineering fundamentals. In the junior year, there was a new course on electrical measurements, and the previous course on thermionic valves was replaced by a course called electronics. In the senior year, students could elect to pursue one of two options, the power option or the communications option. There were courses common to both options with four courses specific to each. In the power option the only 'new' course introduced was a course on transmission lines. The communications option consisted of two courses on communications, a course on high frequency measurements and a course on high frequency transmission. The aforementioned Martial Honnell was listed as being 'in charge' of the communications option. Having joined the faculty in 1939, Honnell's extensive background in electronics and communications provided expertise that enabled the curriculum transition.

In 1945, Georgia Tech switched from semesters to a quarter system, requiring repackaging of the new curriculum, but it remained basically unchanged throughout Savant's tenure. After a decline in the Depression years, enrollment in the undergraduate program increased significantly. In 1925 there were 74 BSEE degrees awarded. In 1935 there were 53. In 1945 there were 75 and in 1950 there were 127.

Prior to 1940, only a very limited number of graduate courses were offered and only six master's degrees had been awarded. The first was in 1932 to Irvin Gerks, who later served on the faculty for several years. The size of the faculty was clearly a limiting factor. Professor Savant vigorously set about to remedy this situation. By 1942, when the faculty numbered 11, six graduate level courses were offered. By 1950 the faculty working with Savant numbered 21, there were 16 master's level courses offered including three course sequences in communication, power, electromagnetics and control. Additionally, Georgia Tech had been authorized in 1946 to award Ph.D. degrees, and the faculty had developed eight advanced level graduate courses available to doctoral candidates. By 1951, three doctoral students had passed the qualifying examination and the first Ph.D. degree was granted in 1953. The development of a viable graduate program was well underway when Professor Savant retired in 1952. President Van Leer dedicated a bronze plaque, honoring Professor Savant in 1955. The plaque originally hung in the electrical engineering building, newly renamed the Savant Building. It was moved to the Van Leer building in 1963. In 1998, an energetic thief, clearly not understanding the value of bronze, pried the Savant plaque from the wall. Professor Savant passed away in 1968.

Blake R. Van Leer had become President of Georgia Tech in 1944. He was the first Tech president educated as an engineer, and certainly had more experience in engineering education than any of his predecessors. Although born in Texas, he attended Purdue University and received the BSEE degree from Purdue in 1917. He then went to the University of California, Berkeley where he became an instructor and head of their hydraulics laboratory. An ROTC student at Purdue, he entered the U.S Army as a second lieutenant in 1917, emerging two years later a decorated captain. After the war, he returned to Berkeley, receiving a master's degree in mechanical engineering from there in 1920 and then earning a master's in engineering from Purdue University in 1922. In 1932, Van Leer became Dean of Engineering at the University of Florida, remaining there until 1937 when he took the same job at North Carolina State University. With the onset of WWII, Van Leer was again inducted onto the army. He was promoted to full colonel and became chief of the army facilities branch, a position he retained until joining Georgia Tech.

Colonel Van Leer, as he preferred to be called, viewed himself as a change agent. Coming to Georgia Tech at the end of WWII, when everything was changing was propitious for both the Colonel and for Georgia Tech. Changing the name of the Georgia School of Technology had been under discussion almost since inception. The Colonel changed the name to the Georgia Institute of Technology in 1948 and, at the same time, dropped 'Science' from the engineering degree titles, changed the name of the degree granting departments from department to 'School' and the head of the school to director. Professor Savant became Director Savant of the School of Electrical Engineering, which conferred Bachelor of Electrical Engineering (B.E.E.) degrees. Colonel Van Leer had pushed hard for expansion of the graduate program and attendant faculty resources. Without doubt, Director Savant's graduate program expansion was a major beneficiary.

During Colonel Van Leer's tenure as president, the Engineering Experiment Station (now known as the Georgia Tech Research Institute (GTRI) budget went from $50,000 to $2,000,000, and an independent not-for-profit company, now known as the Georgia Tech Research Corporation (GTRC), was established as a funded research-contracting agency. An element in the early success of Engineering Experiment Station (EES) was a gift from the Georgia Power Company of a so-called AC Network Analyzer. The analyzer, together with an expert in its utilization, Herb Peters, came to EES from Westinghouse in 1945. For years thereafter almost all the southeastern U.S. electric power companies contracted with EES to perform power flow and system protection studies.

Eventually the analyzer was rendered obsolete by digital computers; the power system analysis business went back to companies like Westinghouse; and Georgia Power re-acquired the equipment. Later Georgia Power gave a scaled-down version of the analyzer to the School of Electrical Engineering to use as laboratory tool. Essentially just a large analog computer, the analyzer was much more effective than any computer printout in illustrating that electric current, like water and bureaucratic effluent, always flows downhill.

Colonel Van Leer did battle with the Board of Regents and the governor of Georgia not only about the usual budgetary matters but also over two important issues affecting the future of Georgia Tech. He won both. The first issue had to do with admission of women students. Colonel Van Leer worked assiduously almost from the start to get approval for women's admission. In 1952 approval was granted. One of the first two women graduates was Shirley Clements Mewborn who received her B.E.E. degree in 1956. Mewborn went on to become a principal in the Southern Engineering Company and was an active alumna. She served a term as president of the Alumni Association and was on the school Advisory Board for many years. She was a recipient of the 1994 Joseph M. Pettit Distinguished Alumnus Award. The Georgia Tech women's softball venue is named for her.

The second issue was equally impactful. The Georgia Tech football team accepted an invitation to play the University of Pittsburgh in the 1956 Sugar Bowl game. The then governor of Georgia, Marvin Griffin, proposed cancellation of participation because Pittsburgh had a black player. Colonel Van Leer objected vigorously, threatening to resign. Uncharacteristically, the Georgia Tech students entered the political fray and staged a march on the Governor's mansion. The Governor relented, and the game went on. Tech won.

Colonel Van Leer passed away in January 1956. While his gruff demeanor and militaristic management style put some off, few, if any, would disagree that the changes that Colonel Van Leer implemented significantly moved the needle forward in recognition of Georgia Tech as a major player in engineering education.

When Savant retired in 1952 from the electrical engineering faculty, Professor W. A. Edson, was chosen as his successor. Dr. Edson had been a faculty member since 1948 and was a recognized expert in his technical area. However, he resigned in 1953 to take a position at Stanford.

The Dasher Era


Benjamin J. Dasher

Benjamin J. Dasher was named School Director in 1954, becoming the first Georgia Tech graduate to hold that position. Dasher was born in Macon, Georgia in 1912. He matriculated to Georgia Tech in 1931 and graduated with honors in 1935, receiving a BSEE. After graduation he remained at Tech as a graduate teaching assistant, working part time on his master's degree. He accepted a faculty position as an instructor in 1940 and was promoted to assistant professor in 1945.

In 1947, Dasher took leave from Georgia Tech, moved his family to Boston and entered the Ph.D. program at MIT. At MIT he was affiliated with the Research Laboratory for Electronics. He did his doctoral thesis in network theory, gaining considerable recognition for development of the 'Dasher Method' for synthesis of two-port networks, which was widely publicized and utilized. In 1952, he returned to Georgia Tech as associate professor. Two years later he was promoted to professor and named School Director, a position he retained until becoming Associate Dean of Engineering in 1969.

During Dasher's 15-year tenure as School Director three major events occurred which, although external to the School, affected its developmental trajectory.

In 1952 Georgia Tech began admitting women students, and one of the first two women graduates earned her degree in electrical engineering.

In 1957 Russia launched Sputnik, triggering a significant national emphasis in science and engineering.

In 1961, Georgia Tech began admitting Black students.

There were also many activities in which Dasher played a key role that enabled the steep upward slope of the School's trajectory. He installed a modern flexible undergraduate curriculum. He almost single-handedly jump-started the Ph.D. program. He moved the School into a new, modern facility. He nearly doubled the size of the faculty, hiring only individuals with earned Ph.D. degrees.

In 1945, Vannevar Bush, who served as chairman of the U. S. Office of Scientific Research and Development during WWII, delivered his report, Science, the Endless Frontier, in which he argued strongly for engineering education to become more science-based. Since Bush did his doctoral work at MIT, served for years on the electrical engineering faculty there and became the first dean of engineering at MIT, it is not surprising that MIT pre-empted the report and had already begun serious revision of its engineering curricula.

Dasher was at MIT while all this was transpiring and paid attention. Soon after he became School Director, he began assiduously installing the "Dasher curriculum." The most notable aspect of the curriculum was flexibility. The previous curricula were very prescribed only allowing students to elect in the senior year to take either the power option or the communication option. The two options were removed from the Dasher model and replaced by 36 quarter hour electives in the junior and senior years with only one hard constraint — 9 of the 36 hours had to be senior level electrical engineering courses. Thus, a student could elect to take up to 27 hours in related or complimentary areas or to take 36 of EE or he could mix and match. Additionally, the electrical engineering courses could focus on a particular sub-field or not. The required portion of the Dasher curriculum consisted of two courses in the sophomore year — elements of circuit theory and elements of field theory — followed by three course sequences in circuits, electronics, electromagnetics and electric energy conversion, plus single courses in electric measurements and transients in the junior and senior years. This also reflected significant change, with increased emphasis on electromagnetics and reduced emphasis on heavy current machinery. The Dasher curriculum remained intact until 1972 when the Board of Regents mandated a 30 percent reduction of credit hours required for degrees in all units of the university system.

A clear vision of Benjamin Dasher was to grow the electrical engineering doctoral program. The first Ph.D. graduate was William B. Jones who completed his doctorate in June 1953 and whose thesis advisor was Dasher. By the end of the decade, the School had granted 13 Ph.D. degrees. Dasher was thesis advisor for 8 of the 13. This is in part a natural consequence of the fact that the faculty that Dasher inherited when he became School Director had only three members with Ph.D, degrees: Frank Nottingham, David Finn and Kenneth Hurd. Nottingham and Hurd each advised two of the first 12. It is likely that Dasher's own research interests, intellect and passion were the major factors that enabled him to 'kick start' the School's doctoral program.

Dasher also worked diligently to elevate the quality of the faculty. At the start of his tenure, his staff numbered 19, only three of whom had Ph.D. degrees. At the end of his tenure, there were 34 faculty members and all new faculty members he recruited held Ph.D. degrees. He was criticized for hiring several graduates from his own School. It should be noted, however, that during the years when he was actively recruiting faculty, Georgia Tech was not exactly the go-to place for aspiring and aggressive faculty candidates, while graduates of the School clearly sensed the upward momentum. It is also worth noting that Tech graduates that Dasher recruited established successful careers at Georgia Tech and elsewhere. Bill Jones left Tech to become electrical engineering department head at Texas A&M. Merle Donaldson initiated and headed the electrical engineering department at the University of South Florida. Kendall Su remained at Tech, retired as Regent's Professor and achieved international recognition for his scholarly contributions. Joe Googe became department head at the University of Tennessee. Henry Meadows left Tech to join the faculty at Columbia University where he enjoyed a long and successful career. Dan Fielder remained at Tech, became well-known as the Doc member of the Soc and Doc duo, Soc being his faithful dog Socrates who accompanied Fielder to all his lectures. He also achieved renown for his regular publications of his research in numerical sequences in the Fibonacci Quarterly. John Hooper left Tech to become Vice Chancellor of the University System of Georgia, and then returned to the faculty, becoming the founding Director of the Microelectronics Research Center. Demetrius Paris remained at Tech and succeeded Dasher as School Director. Roger Webb also remained and succeeded Paris.

In 1962, the Van Leer Electrical Engineering building and the Bunger-Henry Chemical Engineering building became the first two 'off the hill' academic buildings on the Tech campus. Dasher and one of his senior faculty members, Dave Finn, carefully planned the new 162,000 square-foot building, assuring that it was well configured and properly equipped. It was initially far too large for the meager electrical engineering faculty and staff and miscellaneous folks from other units were allocated the excess space. Dasher solved that problem by expanding electrical engineering faculty, staff and student enrollment,

Dasher spent most of his years as School Director during the presidency of Dr. Edwin Harrison with whom he had a good working relationship. In 1969, Dasher stepped down as Director of Electrical Engineering to become Associate Dean of the College of Engineering. Three years later, two weeks shy of his 60th birthday, he passed away from heart failure, leaving an enduring legacy.

Edwin Harrison was chosen as the sixth president of Georgia Tech in 1957. A native of Arkansas, Harrison graduated from the U.S. Naval Academy in 1939, then served in the Navy until the end of WWII, rising to the rank of lieutenant commander. Returning to civilian life, he resumed his education, earning a Ph.D. in mechanical engineering from Purdue in 1952. He began his academic career at Virginia Tech, subsequently leaving Virginia Tech to become dean of engineering at the University of Toledo, a position he held until being recruited by Georgia Tech.

It is generally agreed that the Harrison presidency was successful in terms of moving Tech forward. The size of the campus was nearly doubled. Many new buildings were completed, including the Van Leer Electrical Engineering building. Admission standards were raised significantly, as was the size and quality of the faculty, and research funding doubled. There were a few bumps. In 1961, Harrison announced that Tech would be the first university in the South to voluntarily allow admission of Black students. Despite serious opposition from the Governor's office and from the Board of Regents, President Harrison persevered, publicly announcing the planned integration together with the academic credentials of the students chosen for admission. On the day of the student's arrival the only noticeable concession was that President Harrison banned the news media from campus, having the intended collateral effect of precluding invasion by politicians. This, together with Tech students just going about their business as usual, rendered the process largely a non-event.

A second bump had to do with President Harrison's plan to reorganize the administrative structure of Georgia Tech. A key element of the plan was to create a new position of Vice President. Harrison asked the long-serving dean of engineering, Jesse Mason, to take the vice president position. When Mason refused, President Harrison summarily removed him from the dean's position, returning him to the chemical engineering faculty. Arthur Hanson was recruited to become dean of engineering, arriving in 1966. The whole affair created significant turmoil, the net effect being the failure of the implementation of the planned reorganization.

The most severe bump resulted from the arrival in 1965 of George Simpson as Chancellor of the University System of Georgia. The Harrison/Simpson relationship began experiencing difficulties early on, eventually becoming sufficiently adversarial to precipitate what many viewed as his early resignation as president. Harrison took a leave of absence four months before his resignation date and left Tech to become an executive vice president of the J.P. Stevens Company. Vernon Crawford, a member of the School of Physics faculty and then serving as dean of the General College, served as Acting President pending completion of a search for Harrison's replacement.

Arthur Hansen was chosen as Tech's seventh president in 1969. Hansen had been at Georgia Tech since 1966 when he was appointed dean of engineering. Originally from Wisconsin, Dr. Hansen earned bachelor's and master's degrees from Purdue in mechanical engineering and completed his doctorate in applied mathematics at Case Western University. He was serving as chair of mechanical engineering at the University of Michigan when he accepted the Georgia Tech appointment as dean of engineering. His tenure as president was very brief. He departed in 1971 to become president of his alma mater, Purdue. His 1970 appointment of Dr. Thomas Stelson of Carnegie Mellon University as dean of engineering had lasting impact on Georgia Tech and on the School of Electrical Engineering.

The Paris Era


Demetrius Paris

Demetrius Paris was named to succeed Ben Dasher as Director of the School of Electrical Engineering in 1970. He had been a member of the faculty since 1959 and had served as assistant director under Dasher since 1967.

Paris was born in Stavroupoli, Greece in 1928. At age 19, he immigrated to the U.S., arriving at Ellis Island and then making his way by train to Durant, Mississippi, to live with relatives. He enrolled at nearby Holmes College to perfect his English language skills and then, after a year, transferred to Mississippi State University where he graduated with honors, earning a BSEE in 1952. Also, in 1952 he married Elsie, a widow with two children and moved his new family to Atlanta where he had accepted employment with Westinghouse. Soon after coming to Atlanta, Paris enrolled in the graduate program at Tech on a part-time basis. He received his MSEE in 1958. Along the way Paris attracted the attention of Dasher who offered him a position on the faculty. Paris readily accepted and in 1959 began his life-long career at Georgia Tech. He completed his Ph.D. program in 1961. His early academic career was highly successful, most noteworthy for publication of the classic textbook, "Basic Electromagnetic Theory," co-authored by faculty colleague Ken Hurd, which was widely adopted by electrical engineering departments nationwide.

Upon becoming School Director, Paris had three stated and related major goals: grow the research program; grow the faculty to enable research and to better support the classroom teaching requirements of a rapidly increasing enrollment; and grow the graduate program. He was very successful on all three counts. In 1970 there was only one funded research project in the School with annual expenditures of $140,000 and there were 22 faculty members. The number of Ph.D. graduates was about 10 per year. During his tenure as School Director, Paris increased research funding and strengthened the graduate program by hiring faculty who started research programs and increasing graduate student enrollment. In 1988, when Paris became Tech’s research vice-president, School research expenditures exceeded $5 million and there were 59 faculty members. By 1990 the number of Ph.D. degrees awarded was 28. No doubt, Paris’ success was abetted by his excellent timing in becoming director. Thomas Stelson became dean of engineering in 1970. More importantly, Joseph Pettit became president in 1972. Both were supportive of Paris’ efforts. And, in turn, his efforts contributed to the success that they achieved.

One of the first initiatives Paris developed came about through his affiliation with the Air Force’s Rome Air Development Center (RADC). Working with RADC, he procured small to medium research contracts for various faculty members. This activity eventually led to the development of an RADC research coordinating center known as Southeastern Center for Electrical Engineering Education (SCEEE). Operated through the School, SCEEE granted research contracts to faculty members at participating southeastern universities. While SCEEE did not play a large role in the School’s research program development, it operated until 1991 and annually provided some $200,000 in research funding for School faculty members.

Of far greater impact was the development of the program in digital signal processing (DSP). Realizing that the then relatively new field would become a major research and educational field, Paris recruited two freshly minted MIT Ph.D. graduates, Tom Barnwell and Russ Mersereau. Then, using the McCarty Professorship, he recruited Ron Schafer, also an MIT Ph.D., from Bell Labs. The three formed the nucleus of what soon became the foremost academically-based DSP program in the country. Paris recruited several additional members to the group, including a senior member, Jim McClellan. The DSP group obtained substantial continuation funding from the Joint Services Electronics Program (JSEP) as well as from Hewlett Packard and Texas Instruments and other organizations. They also prospered in the pedagogical area, developing courseware and producing textbooks. At Georgia Tech they developed a beginning sophomore level electrical engineering course in DSP supported by their pioneering textbook DSP First, a model soon adopted by other electrical engineering schools.

Paris did not invest recruitment resources solely in DSP. He added several faculty members to enhance the electromagnetics program. He also recruited new faculty to initiate a program in electro-optics and, significantly, he invested heavily in recruiting faculty to support microelectronics development.

The creation of the Microelectronics Research Center (MiRC) was a major element in the development of the School's research program. While Paris did not initiate it nor was it part of the School's organization, Paris strongly supported it, and electrical engineering faculty member John Hooper led its development. The MiRC was ultimately a huge source of research funding for the School and for Georgia Tech.

Credit for initiating the MiRC rests solely with Tech president Joseph Pettit. A Minnesota native, Petit graduated from UC Berkeley with a BSEE degree in 1938 and earned his Ph.D. from Stanford in 1942. He worked on a radar countermeasures project at Harvard during WWII, and then joined the electrical engineering faculty at Stanford in 1947. He was serving as dean of engineering at Stanford when Tech recruited him.

Pettit arrived with the avowed goal of transforming Tech from a good regional university to a first-class graduate research institution. Having been party to the tremendous growth of the Stanford research program, he understood a bit about how to accomplish his goal. His chosen mode of operation was to build from within, utilizing individuals familiar with the unique culture of Georgia Tech and the extant resources. He created the position of Vice President for Research and moved Tom Stelson from dean of engineering into the position. He selected Bill Sangster, Director of the School of Civil Engineering, to be dean of engineering. In like manner, Pettit selected John Hooper of the School of Electrical Engineering to lead the development of the microelectronics research program, a major plank in Petit's overall building program.

Hooper joined the electrical engineering faculty as an instructor in 1958 while still working on his Ph.D., which he completed in 1961. His academic career progressed rapidly, and he was ultimately promoted to Regents Professor in 1971. Along the way, he created a successful research program in a field then known as physical electronics. In 1972, he left the faculty to become vice chancellor of the University System of Georgia. In 1979 he returned to Georgia Tech and in 1981 Petit appointed him Founding Director of the Microelectronics Research Center.

John Hooper

At Hooper's insistence, the MiRC would not be a part of a school or college but would report directly to the Office of the President. Though not a unit of the School of Electrical Engineering, Paris was fully supportive of MiRC, providing money from his budget for Hooper and three younger faculty whom Hooper had asked to assist in the development of the center — Bob Feeney, Dave Hertling, and Jay Schlag. Paris also offered space on the ground floor of the Van Leer building previously housing the School's rotating machinery laboratory as the initial MiRC location. Hooper and his intrepid colleagues set about removing rotating machines and associated power panels, purchasing and installing appropriate research enabling equipment, and recruiting faculty from across Georgia Tech to participate in MiRC. Even though the Van Leer space could not accommodate sophisticated equipment requiring 'clean room' environments, sufficient equipment was installed so that by 1983 some 30 faculty were actively engaged with MiRC, and over $2 million in external funding for microelectronics research had been generated.

Also in 1983 an opportunity presented itself, the exploitation of which resulted in a more appropriate home facility for MiRC. Alarmed by the growing penetration of Japanese companies into the U.S. electronics/computer marketplace, a group of companies formed a consortium to create and fund a research enterprise, which came to be known as the Microelectronics and Computer Company (MCC). Cities across the country were invited to submit bids to be the MCC location. Georgia Tech collaborated with the City of Atlanta to create an Atlanta bid.

Ultimately Austin, TX was chosen, but the Atlanta bid was a close second. The report defining the selection process gave significant attribution to Georgia Tech for enabling the Atlanta's strong showing. Armed with this and his personal credibility, Pettit went to the Georgia government leaders, presented a field of dreams argument and returned with a $15 million commitment to create a microelectronics research facility. This, together with an additional $15 million raised from private sources, put Hooper and colleagues back in the design and build business. The result was a 98,000 square foot building with 6,900 square feet of clean room space, more than 10,000 square feet of laboratory space, and 54 offices and carrels for 120 graduate students. Groundbreaking occurred in 1986 and occupancy in 1988. Unfortunately, Pettit passed away not long after the groundbreaking ceremony in 1986. Hooper was asked to serve as acting Vice President for Academic Affairs following Pettit's death, and then retired from Georgia Tech in 1988 at age 57. Quite fittingly the microelectronics facility, located adjacent and connected to Van Leer, is named the Joseph Mayo Pettit Microelectronics Building. Also fittingly, there is a plaque commemorating Hooper's huge role in creating MiRC.


Joseph M. Pettit Microelectronics Research Center

Hooper's vision was to create a resource center where researchers from different disciplines could work and collaborate. While realization of that vision is ongoing, the magnitude of Hooper's contribution can be appreciated by noting that the house that John built is now named the Institute for Electronics and Nanotechnology (IEN) and encompasses the Pettit building and the newer 191,00 square-foot Marcus Nanotechnology Center. The Marcus Center that has 10,500 square feet of inorganic cleanroom, 3,954 square feet of organic clean room, 3,174 square feet for cell manufacturing, 4,052 square feet of materials characterization facilities, and 13,469 square feet of laboratory and office space. In FY22, the IEN core facilities served 833 unique users. In addition, as a result of continuing Georgia Tech-French partnership, there is now a microelectronics research facility at Georgia Tech- Lorraine (GTL). This facility, called Institut Lafayette, is a 25,000 square foot building adjacent to the original GTL building in Metz, France. It includes offices, laboratories and a 5,000 square foot clean room with state-of-the-art characterization, fabrication and pilot manufacturing equipment that supports ort GTL faculty and doctoral students.

The total microelectronics research funding in FY22 was some $384 million, which is distributed among different Georgia Tech units. The Pettit Building and the Marcus building provide equipment and facilities for the multidisciplinary microelectronics research that Hooper envisioned far beyond what individual researchers could procure.

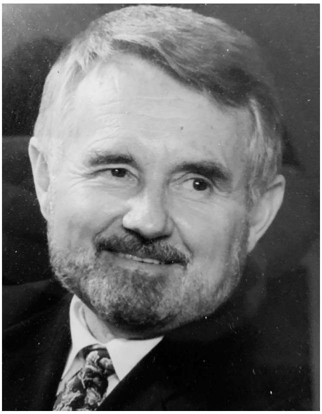
Paris, even before construction of the Pettit building began, assiduously set about fulfilling the they will come end of the field of dreams bargain. With Hooper's help, he recruited Ajeet Rohatgi, a photovoltaics expert, from Westinghouse Research Labs. He utilized the first endowed chair in the School, the Ken Byers Chair, to recruit another senior level microelectronics expert, Carl Verber, from Battelle Labs and Verber's Battelle colleague, Richard Kenan. From the University of Oregon, Paris recruited Richard Higgins who eventually became Director of MiRC. Several junior faculty with backgrounds in microelectronics were also hired. Other Georgia Tech schools, primarily Chemical Engineering and Physics, also added related faculty so that when the Pettit building opened it was almost immediately occupied by MiRC associated faculty, staff and graduate students. Attendant research funding, much of which came to electrical engineering quickly followed.

Two other noteworthy accomplishments of the Paris era were the initiation of Georgia Tech Lorraine, Georgia Tech's branch campus in Metz, France, and hiring the first African American and women faculty members. In the early 1980s, Georgia Tech accepted an invitation from the City of Metz, France to establish a graduate research operation for a technology park being developed near Metz. The 'theme' of the park was telecommunications, and the Metz leaders asked that the Georgia Tech operation initially be in electrical engineering. Paris undertook the task, engaging one of his senior faculty members, Hans 'Teddy" Puttgen, to assist. Puttgen was fluent in French and his French wife Christine was familiar with French culture, assets which proved invaluable in working with Paris and French officials to define and initiate Georgia Tech Lorraine (GTL). The end result of the negotiations was a significant research and teaching facility bearing the Georgia Tech name and a process for bringing Georgia faculty on a rotating basis to GTL at French expense. Puttgen was named the initial Director and GTL was officially launched in 1990. As with any start-up, the enterprise faced significant challenges but eventually the operation expanded to include not only an enlarged electrical engineering scope but participation by several other Georgia Tech units, primarily Mechanical Engineering, Chemical Engineering and the College of Computing. and incorporation of an undergraduate program. By any measure, Georgia Tech Lorraine (renamed Georgia Tech-Europe in 2022) can be viewed as an outstanding success and a significant factor in Georgia Tech's growing international recognition.

Dr. Paris hired the first African American faculty member, Mark Smith, who after a successful tenure with ECE left to become ECE Department Chair at Purdue University. He also hired the first two ECE women faculty members, Bonnie (Heck) Ferri who is now the Vice Provost for Graduate and Post Doctoral Education and Nan Jokerst, who subsequently left GT to join the faculty at Duke University.

Paris became Vice President for Research and Graduate Studies in 1988. He remained in that position until 1994 when he returned to the School as an advisor to young faculty in research program development. He was still working in that capacity when he suffered a ruptured brain aneurism and passed away in 1998.

The Webb Era


Roger Webb

When Paris became research vice president, Roger Webb was appointed School Director. Webb completed his Ph.D. at Georgia Tech in 1963 and was offered a faculty position. Never intending to pursue an academic career, he was surprised by the offer but decided to accept, describing himself thereafter as an accidental academic.

The early part of Webb's tenure overlapped the presidency of Patrick Crecine and the initiatives Crecine implemented significantly affected School development.

Crecine was chosen to be the ninth president of Georgia Tech in 1987. A native of Michigan, he earned his Ph.D. from the Carnegie Mellon University Tepper School of Business in 1966. He began his academic career at the University of

Michigan, serving there until he became dean of Carnegie Mellon's College of Humanities and Social Studies 1976. In 1983, he became Provost of Carnegie Mellon, the position he held until leaving for Georgia Tech. Crecine's tenure as Georgia Tech president was relatively short and significantly bumpy. Although Crecine resigned under some pressure in 1994, there is little doubt that he instituted changes that have had significant positive effect on the Institute's evolution.

When Crecine began his tenure, Georgia Tech had four colleges: the College of Engineering, the College of Architecture, the College of Management, and the College of Science and Liberal Studies (COSALS). COSALS administered the Schools of Chemistry, Physics, Biology, Psychology, Mathematics, and Computer Science and service departments in English and Social Studies, which provided liberal studies courses for students in the various degree programs. Crecine proposed retaining the College of Engineering and the College of Architecture and creating three new colleges — the College of Science (COS), the College of Computing (COC), and the Ivan Allen College of Management, Policy and International Affairs (IAC). COS was straightforward and not controversial. The College of Computing was modeled after the similarly name college at Carnegie Mellon, the only such college at any university and one that Crecine had been instrumental in initiating. Being a new concept with only one degree program and without definition of intended future evolution, the COC was viewed with some trepidation.

The proposed IAC caused major controversy and challenges. Embedding the existing College of Management within a new college (IAC) was structurally flawed. The management faculty and alumni viewed it as diminishing their college's visibility and effectiveness. Creating new degree programs in public policy and international affairs and opening the possibility of additional such programs was viewed by many as ill-conceived. It was not clear how the required service courses would be provided. Crecine put the whole restructuring proposal to a vote of the faculty. It passed by the narrowest of margins, was approved by the Board of Regents, and implemented.

The perceived issues associated with the restructuring were either resolved or accommodated. The College of Computing created additional degree programs in areas focused on information and data processing, developed strong graduate educational and research programs and became recognized as one of the nation's top computer science programs. The Ivan Allen College structural issue was eventually resolved by extracting the College of Management, restoring it to its previous status, and changing the IAC name to the Ivan Allen College of Liberal Studies. The IAC created new degree programs in modern languages, literature, media and communications, and history and sociology; developed associated graduate programs; and continued to provide service courses for students in other colleges. Creation of the Ivan Allen College greatly enhanced elective course offerings for electrical engineering students. Creation of the College of Computing, in addition to providing related elective courses for electrical engineering students, led directly to the development the computer engineering degree program in the School of Electrical Engineering. It is widely accepted that the broadening of the scope of Georgia Tech enabled the transformation of the Institute from a from a specialized institution to a widely-recognized top-flight national university.

Before becoming head of the School of Electrical Engineering, Roger Webb worked as the School's Associate Director for 10 years and was intimately familiar with School's status and needs. Webb's primary goals as Director were to increase the size of the faculty to better serve the instructional needs of a growing student enrollment, to continue to grow the research program, and to enhance support services provided for the faculty. Fortunately, in addition to the sweeping changes Crecine fostered during the early years of Webb's leadership, several unique opportunities presented themselves during Webb's tenure as School Director, the exploitation of which enabled him to achieve his goals.

The first opportunity that Webb took advantage of was Dean Sangster's securing funding for new faculty positions in the College of Engineering, enabling Webb to add 12 new faculty members during the first year of his tenure.

The second opportunity was the creation of the Georgia Research Alliance (GRA) in 1990. An independent nonprofit corporation, GRA was a partnership of Georgia's research universities, the state's corporate leadership and state government aimed at fostering economic development. The basic GRA strategy was to recruit world-renowned scholars who would attract significant research funding and develop intellectual property that could foster new startup enterprises. GRA provided half the funding to provide an endowed faculty position (a GRA Eminent Scholar) at one of the participating universities with the university providing the other half from private funds. GRA also created programs to seed the formation of start-up companies.

Webb recruited the first GRA Eminent Scholar, John Copeland, who became the founding Director of the Georgia Center for Telecommunications Technology (GCATT) and was instrumental in creating the GCATT building (now headquarters of the Georgia Tech Research Institute). Copeland established a strong research program and created intellectual capital based on his research which led to the development of a successful company, Lanscope, (subsequently acquired by Cisco).

Leveraging GRA funds and Georgia Tech Foundation funds, Webb was able to split the Joseph Pettit Endowed Chair into two endowed chairs. He then recruited James Meindl and Rao Tummala to fill the Pettit Chair in Microelectronics and the Pettit Chair in Electronic Packaging, respectively. Professor Meindl became Director of the MiRC and Founding Director of its successor organization, the Institute for Electronics and Nanotechnology (IEN). Professor Tummala, soon after joining the School, was successful in bringing to Georgia Tech its first National Science Foundation Engineering Research Center (ERC) — the Packaging Research Center (PRC), a consortium of worldwide electronics companies. In total Dr. Webb recruited nine GRA Eminent Scholars, creating nine endowed chairs.

The Yamacraw project provided another unique opportunity when the Georgia governor's office had contracted with a Silicon Valley company to assist the state in economic development. The company, which specialized in developing simulation tools for designing electronic systems, proposed, for a fee, to work with designated faculty to develop a proposal for enhancement of electrical engineering and computer science programs in the various state universities. Were Georgia to accept the proposal, the company would then utilize their intellectual capital marketing operation to assist in development of companies based on the university faculty research products.

Webb, who initially opposed the project fearing that it would lead to company-imposed curriculum revisions, was asked to coordinate interaction with representatives of the company to produce the proposal. Webb and a small group of faculty engaged in intense interaction with company representatives and a proposal absent curriculum revision possibilities was produced. The essences of the proposal was that the State would fund 80 new faculty positions in electrical engineering and computer science in participating state universities and provide continuation funding to enable new faculty research initiation. Shortly after Roy Barnes became governor in 1992, the state accepted the proposal and project Yamacraw was launched.

Georgia Tech was the primary beneficiary, receiving 40 new faculty positions, equally divided between the College of Computing and the School of Electrical Engineering; the remaining positions were allocated to other state universities who had substantial computer science programs. Governor Barnes lost his reelection bid and the subsequent administration discontinued the research funding, but the faculty positions remained. The upshot of Yamacraw was the addition of 20 faculty members for the School.

Webb's enhanced support services infrastructure goals were accomplished mainly through reorganization (and some additional funding). In 1993 the name of the School was changed to School of Electrical Engineering and the title of Director changed to Chair. Dr. Webb soon thereafter asked Professor Alvin Connelly to join him as Associate Chair for Faculty Development, concentrating initially on improving the process attendant to faculty promotion and tenure.

Connelly developed and managed a promotion and tenure process which ensured appropriate vetting of credentials for promotion and for tenure of individual faculty members and immaculate preparation of the supporting documentation. The provisions established the credibility of the School's process with the College of Engineering and, more importantly, assured young faculty members of School support. A new personnel position to provide interface for faculty and staff with the Institute's Office of Human Resources was created.

In addition, faculty self-selected to be members of one or more of several Technical Interest Groups (TIG). Each TIG was assigned specific secretarial and accounting personnel. A budget program was developed to facilitate tracking of the aggregate School budget and enable TIG accounting personnel to track individual research budgets. A central computer support group for the School was developed to provide purchasing and maintenance support for individual and group computer operations.

Wayne Clough became Georgia Tech's 10th president in 1994. A native of Georgia, Clough earned BCE and MSCE degrees from Georgia Tech and his Ph.D. from UC Berkeley. He served on the faculty at Stanford for several years and then moved to Virginia Tech where he became dean of engineering. He left Virginia Tech to become provost at the University of Washington, where he was serving when Georgia Tech recruited him. Clough's tenure as president, from 1994 to 2008, was remarkably successful: research expenditures more than doubled; student enrollment increased 50 percent with commensurate expansion of the faculty; many new academic and research facilities were built; the campus footprint was extended; and a major capital campaign was launched and successfully completed.

Georgia Tech acquired property east of the expressway which bordered the campus and transformed what was a blighted area into what has become a vibrant innovation neighborhood. A number of large companies built major facilities adjacent to the original Georgia Tech development. The development also resulted in construction of several joint academic/corporate use buildings.

These enabled the School to move a large number of faculty from the remote GCATT facility back to the central campus and to relieve overcrowded conditions in the Van Leer building.

Marcus Nanotechnology Research Center

By 1994, when Dr. Webb served as both School Chair and interim Director of MiRC, it was clear that the MiRC facility in the Pettit building was operating at capacity and that Georgia Tech needed an additional research facility to remain competitive in microelectronics/nanotechnology research. Thanks mainly to Jim Meindl, who became MiRC Director in 1995, President Clough presented a well-documented case to the State and received a commitment for half the funding necessary to create a new research facility. Bernie Marcus, co-founder of Home Depot, agreed to provide the matching funds. Meindl headed a committee to define specifications for the facility and the resultant Marcus Nanotechnology Research Center was open for business in 2009. The MiRC morphed into the Institute for Electronics and Nanotechnology (IEN) with Dr. Meindl as founding director and the Marcus Center as home base. With this addition, Georgia Tech now has superior facilities to enable electronics research and the School is a major beneficiary.

Shortly after Clough became president, the Institute launched a major capital campaign. Unlike previous campaigns, conducted solely by the development office with donations managed by the Georgia Tech Foundation, the Clough campaign utilized a distributed model. The central development office managed the campaign, but development officers were assigned to work with the individual units within the Institute. The central office solicited donations for the Institute in general and unit development officers solicited donations on behalf of their assigned units.

While donations on behalf of the Institute remained with the Georgia Tech Foundation, the associated units could directly utilize the donations they raised. Each unit had to declare a campaign goal. Suzy Briggs, the development officer assigned to the School, faced a significant challenge — achieving the School's aggressive target of $50 million.

Webb, realizing that it would require corporate donations as well as alumni donations to achieve the goal, hired an additional development officer, Harry Vann, using School resources. He also asked Teddy Puttgen to serve as Associate Chair for Development to help coordinate the development activities.

Briggs and Vann were not assigned distinctive alumni/corporate roles, but functioned as a team, and functioned extremely well. The capital campaign resulted in over $77 million in gifts and donations for the School, exceeding the goal by more than 50 percent. Significantly, about half of that total came from the corporate sector.

Certainly, the most enduring benefit from the campaign is that it enabled creation of the several GRA Eminent Scholar endowed faculty chairs. Specific gifts matching the GRA contribution came from the Motorola Corporation and alumni John Weitnauer, John Pippin, Rhesa Farmer, Jim Carreker and Steve Chaddick. Chaddick also provided funds to endow the School Director position.

Prior to Webb's retirement in 2004, the School created a new degree program in computer engineering and changed the School name to School of Electrical and Computer Engineering (ECE). The Institute decided 'Director' was an insufficiently academic title, changing it to Chair. Webb therefore entered as Director of the School of Electrical Engineering and departed as the Steven

W. Chaddick Chair of Electrical and Computer Engineering, job description unchanged.

During his 16-year tenure as head of the School, Webb succeeded in reaching his goals of increasing the size of the faculty, growing research funding, and improving support for faculty. In 1988, the School's faculty numbered 59 and the research expenditures were about $5 million. In 2004, when Webb retired, there were 115 faculty members, including two additional African American members, two additional women faculty, and three Hispanic members. Research expenditures exceeded $50 million, the number of Ph.D., degrees was 105, and the support services for faculty and staff were greatly improved.

Summary

This compendium chronicles the growth in excellence and recognition of the EE/ECE program from inception near the end of the 19^{th} century to early in the 21^{st} century. The compendium is organized by era, each era coincident with the tenure of the successive School leaders. Each era witnessed significant growth in the size of the School and enhancement of the value of the School-granted degrees. It is important to note that the School's evolution occurred not as a series of discrete steps but as a continuum with each succeeding era building upon the preceding.

Professor Ford was the first full-time department head and also the single faculty member. Professor Wood added three faculty, increased the course offerings from two to seven, including a course on radio, and was instrumental in initiating the George Tech radio station. At the end of his tenure there were 51 electrical engineering graduates. Much of the Fitzgerald era occurred during the Great Depression years when enrollments declined and budgets were tight. Nevertheless, the curriculum was expanded, faculty members more than doubled and the graduate program was initiated.

Significantly Fitzgerald's successor, Savant and Savant's successor, Dasher were faculty members and worked closely with Fitzgerald during his tenure. Savant became Tech's first dean of engineering before he became School Director, and then served in dual roles as Dean and School director. Professor Savant clearly believed that Georgia Tech could become a leader in engineering education and worked assiduously to lay the groundwork for that. His major emphasis as School Director was expanding and modernizing the undergraduate curriculum.

Professor Dasher, with his Georgia Tech background leavened by his MIT experience, extended the improvements accrued during the Savant era, installing a modern, flexible undergraduate curriculum and jump starting the doctoral program.

Professor Paris, who had worked closely with Dasher as Assistant Director of the School, successfully took on the task of expanding the faculty to enable development of a robust, funded research program. Similarly, Professor Webb further expanded the faculty to enable continuation of the graduate research program and ensure the integrity of the undergraduate program and developed the support services function so that the faculty could focus on education and research.

The business of the School of Electrical and Computer Engineering is the development of intellectual capital: self-confident graduates who can "hit the ground running" and products of research leading to enhancement of extant enterprises or development of new ones. Over the first century of its existence, the School has grown in size and stature to become preeminent in the business that it is in, and the foundation for continued growth has been laid.

Appendix

Further historical readings originally published in the ECE Connection.

Historical Spotlight:

Daniel C. Fielder Iconic Academic

Professor Daniel Fielder and his dog, Socrates

Near the main entrance to the Van Leer Building are two plaques. The large marble one reads: "In Loving Memory of HELLUVA SOCRATES 1965-1981." A smaller bronze one reads "In Memory of Dr. Daniel Fielder." Each encapsulates a bit of the life and career of Daniel C. Fielder, an icon of the School of Electrical and Computer Engineering.

Dan loved teaching and brought vigor and enthusiasm to it that few can emulate. He also loved conducting research, but did so on his terms, never seeking funds for his research and never requesting relief time from teaching to pursue it. He published extensively, not for recognition nor for enhancing his citation index, but as a way to share his insights with like-minded folk. His personality quirks set some of Dan's actions apart from commonly-accepted faculty behavior, but his colleagues and students univer-sally respected, admired, and liked him.

Born in North Kingstown, Rhode Island in 1917, Dan's education began in the town's public schools. Undergraduate work followed at the University of Rhode Island where he completed a B.S. in electrical engineering in 1940. After graduation, he went to work at Westinghouse Electric. A year later, the company placed him on loan to the Bureau of Ships in Washington D.C. He remained there until 1946, working on magnetic compass systems for naval vessels. While in Washington, Dan met, diligently courted and, over her mother's objections, married Mildred Elizabeth "Connie" Margolius.

Dan's first experience with Georgia Tech was as a graduate student, receiving his M.S.E.E. in 1947. He then spent a year as an instructor of electrical engineering at Syracuse University but returned to Georgia Tech in 1948 as an assistant professor. In 1951 he received the professional degree in electrical engineering from the University of Rhode Island, and six years later completed his Ph.D. at Georgia Tech. He was promoted to associate professor in 1957 and to professor in 1963.

Dan's career at Georgia Tech spanned more than 50 years. Following his mandatory retirement at age 70, Dan continued his career as Professor Emeritus, teaching a course nearly every term and pursuing his research activities.

As an undergraduate, Aubrey Bush, who became Dan's faculty colleague, had Dan as his instructor in electromagnetics. He described young Dan as an excellent teacher with an enthusiastic lecturing style and the ability to engage and inspire his students. Another colleague, Erik Verriest, commenting on Dan's love of teaching, recalled that while riding together to a conference in Charleston, South Carolina, Dan occasionally used the windshield condensation as a blackboard to explain a concept. Erik also remembers Dan's passion for education, saying Dan gave distinctive meaning to the idea of lifelong learning.

Early in his career, Dan developed some unique work habits. He came to work as soon as 3:00 a.m., did his class preparation and research, taught his courses, and left. Student and colleague interactions were "between-class" encounters. He rarely participated in school social activities. Although his colleagues thought him somewhat reclusive, he was always friendly and professional and was universally well-liked and respected.

On one of his early morning arrivals at Van Leer in 1965, Dan found a litter of nine pups abandoned near the adjacent architecture building. He promptly gathered all nine and took them to his office, spreading newspaper on the floor and establishing a feeding regime. He built a wooden feeding tray which he kept in the faculty lounge to access the refrigerator. The inevitable edict from Ben Dasher, then School Director, that the pups must go was undoubtedly hastened by the actions of a few insufficiently occupied graduate students who had begun surreptitiously lacing the puppy pablum with a bit of mild laxative. Dan understood the edict but negotiated the terms, agreeing to find appropriate homes for eight while keeping one. Thus Socrates became ensconced in Dan's office and School lore.

Socrates was a medium-sized dog (around 75 pounds) of clearly mixed lineage. Hair color and texture and general demeanor suggested substantial input from a collie and a golden retriever. He was eminently trainable, responding well to the "education" to which Dan subjected him. He followed Dan everywhere, ignoring students and others trying to get his attention, and attended all of Dan's classroom lectures. Dan was an animated lecturer excited about his subject, sometimes excessively so, but Socrates remained calm. There are reports of Socrates walking the aisles in full monitor mode during examinations, but no reports of his detecting misbehavior. As half the "Soc and Doc" team, he earned student affection and for 15 years served as School mascot. When Socrates passed away in 1981, Dan succeeded in getting the marble plaque in his honor installed in front of Van Leer.

While Dan was a School "character," he was much more than that. He was a man with many skills, talents, and wide-ranging interests. Outside the academic realm, he was a talented woodcarver, fashioning animal likenesses by hand. He drove a late 1940s Buick for years, doing most of the maintenance himself, including fabricating replacement parts in his shop. He was an amateur astronomer, acquiring a sophisticated telescope to observe the heavens. He loved electronic gadgets and was an early and enthusiastic adopter of digital photography.

In the academic arena, Dan was both a talented and highly effective teacher and scholar whose work was characterized by its diversity. He was a life fellow of IEEE, an emeritus member of the Mathematical Association of America and a sustaining member of the Fibonacci Association. Over time he taught most of the courses in the School curriculum but focused mainly on circuits, electromagnetics, and combinatorics. Whatever the course, Dan brought energy and enthusiasm to the classroom that was unparalleled and contagious. He was a man with coincident vocation and avocation.

Dan published some 70 journal articles and more than 20 conference papers. Not surprisingly, a fair percentage of his journal publications were in IEEE Transactions of Education and dealt with his unique insight into conveying specific topics, for example, "A Classroom Reactance Determination Method."

Another reoccurring theme in Dan's publications reflected his long-standing interest in number theory and combinatorics. His first paper on this topic was published in 1960, his last in 1999 in the Fibonacci Quarterly. An early adopter of computers as research and development tools, Dan combined his number theory and computer interests to assemble several computers, configure them to do parallel processing, and use them as simulation tools to investigate properties of recursive numerical sequences. A series of papers, co-authored with colleague Cecil Alford, a computer expert, resulted.

Aside from the diversity of topics, two other aspects of Dan's publications are remarkable: none of his research received external sponsored funding, and his publication style was simply communicative. He was a true academic. He worked on things that interested him, investigated and concluded, and then just shared with others. There was no turf marking, no resume or citation index building—just doing exciting stuff and sharing.

Dan's post-retirement work habits changed considerably from his semi-reclusive, pre-retirement schedules. He began keeping regular hours, participated actively in School social functions, and became downright gregarious. This change in behavior stemmed from changes at home. Early on, Dan's wife Connie, the more reclusive of the couple, wanted Dan at home during the day, and Dan adjusted his schedule accordingly.

Shortly after Dan retired in 1988, Connie began having health issues and was happier having Dan at home in the early morning and evenings. To meet her needs, Dan again adjusted his schedule—and the gregarious Dan emerged.

Dan taught his last course in the summer of 2002. In early fall he suffered a series of strokes and died October 4, 2002. He had two last requests. The first was that his estate be used to care for Connie, with any remaining funds after she died donated to the School of Electrical and Computer Engineering at Georgia Tech. The second was that his remains be cremated and scattered at Georgia Tech.

Dan had managed his money well and left a considerable estate. Linda Newton, a staff associate of Dan, stepped up to ensure that Connie's post-Dan life was full and enjoyable. When Connie passed away in 2009, sufficient funds remaining in the estate established the Daniel C. Fielder Endowed Professorship.

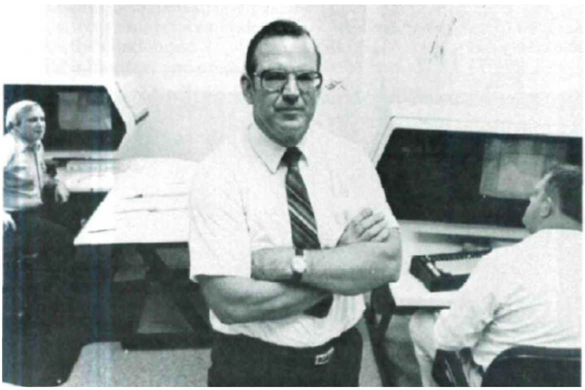
The ash-scattering request proved a bit more problematic. Such scattering was not feasible for several reasons, and an alternate plan was conceived involving the use of Dan's ashes to "fertilize" a new tree in front of Van Leer. This new plan encountered several barriers, but after considerable negotiation, gained approval. Dan's ashes were scattered in the tree root hole before planting. Today, that tree, a robust Ginkgo, stands next to the bronze plaque dedicated to

Dan’s memory.

A lingering and unanswerable question remains: are Socrates’ ashes interred beneath the nearby Socrates memorial? Friends of Dan familiar with his loyalty and general proclivities would compute favorable odds. Those less analytical, and likely even the odds-makers, would hope it to be so.

John Hooper

Innovator and Catalyst



Professor John Hooper

Innovator and catalyst is the right descriptor for John Hooper. Low-key and self-effacing could be added. John built a smoldering fire by inaugurating the Microelectronics Research Center, and then brought gasoline to the fire by overseeing the design and construction of the Pettit Microelectronics Research Building enabling Georgia Tech to successfully recruit outstanding microelectronics faculty. The resulting $110 million research enterprise, currently operated under the auspices of the Institute for Electronics and Nanotechnology (IEN), speaks for itself. But it is important that John's contribution be recognized as he would never “toot his own horn”.

In the early 1980s, there was increasing concern in the technical community and associated business community about the growing penetration by Japanese companies into the U.S. electronics/computer marketplace. In order to help combat what some feared might eventually become Japanese dominance of that marketplace, a group of U.S. companies formed a consortium to create and fund a research enterprise, which came to be known as the Microelectronics and Computer Technology Corporation (MCC).

The next step in establishing MCC was to choose a location, and a bidding process ensued. Georgia Tech, the City of Atlanta, and the State of Georgia collaborated on creating a bid to locate MCC in Atlanta. Austin, Texas won the bidding process and MCC was located there. Quite surprisingly, given the fairly recent focus on microelectronics research at Georgia Tech, the Atlanta bid came in second and the report describing the selection process gave significant attribution to Georgia Tech for enabling the strong showing by Atlanta. Andrew Young, then Mayor of Atlanta, publicly declared that Austin "bought" the MCC. While that was probably just "sour grapes,” one has only to look at the subsequent growth of the electronics/computer industry in Austin to know that Austin enjoyed enormous returns on whatever was invested. MCC may not have been directly responsible for the growth, but establishment of MCC brought attention to the issue, spurring technical development in general. Locating MCC in Austin enhanced the visibility of the city and ultimately resulted in major companies such as Applied Materials, Samsung, and many others, establishing facilities in Austin. MCC was ultimately dissolved and no longer exists, but the results remain.

Fortunately, in the MCC bidding game, like in horseshoes, “close” had value. The strong showing of the Atlanta bid and the role of Georgia Tech in enabling that result attracted the attention of political, business, and academic leadership, and ultimately resulted in the state ponying up $15 million to build the Pettit Microelectronics Building. This enabled Georgia Tech to eventually become a major player in microelectronics research. It can easily be argued that the subsequent Marcus Nanotechnology Building, as well as other associated laboratories around campus, are a direct result of coming “close” on MCC. The more important part of the story, however, is that by establishing first class research facilities, Georgia Tech has been able to attract the top-notch faculty and graduate students necessary to effectively utilize the facilities.

While the role of “close” on MCC in enabling the emergence of Georgia Tech as a leader in microelectronics research may seem to be a bit happenstance, it was actually anything but. There were two people at Georgia Tech who were primarily responsible for this evolution, President Joseph Pettit and Professor John Hooper. Pettit’s role in transitioning Georgia Tech into a major graduate research institution is well documented. Having been at Stanford and participated in the Stanford research development, which was a major catalyst for “Silicon Valley,” he set about emulating the Stanford model. Pettit’s encouragement and support of initializing the microelectronics research center, MRC, and naming John Hooper as the founding director was critical. The MRC was primary in creating the MCC proposal. Pettit recognized the importance of “close” and had the stature to use it as leverage to secure funding to create a physical home for MRC—the Pettit Microelectronics Research Building.

Hooper’s role in Georgia Tech’s research evolution is less well documented. Having accepted Pettit’s invitation to become the Founding Director of the MRC, he became the man on the ground working to create the functioning entity. Hooper shared Pettit’s vision, but vision is one thing and implementing realization of the vision quite another, and a job for which John Hooper was uniquely suited.

John Hooper received the degrees of B.S.E.E. and B.S. in Business Administration from Kansas State College in 1954. Later that year, he came to Georgia Tech as a graduate student and received the M.S.E.E. degree in 1955. He did a master’s thesis related to modeling of electric power transmission lines, a traditional electrical engineering field and not at all relevant to his later work. He then spent two years in the U.S. Army, returning to Georgia Tech to pursue a Ph.D. in 1957. The same year, he married Mary Anne, whom he had known since they were children. In 1958, he joined the electrical engineering faculty as an instructor.

He completed his Ph.D. in 1961. His thesis advisor was Earl McDaniel, then an electrical engineering professor, later transferring to the School of Physics. The thesis was in the emerging field known as physical electronics, a field which laid much of the foundation for microelectronics. After completion of his Ph.D., John was promoted to assistant professor and then rose rapidly though the professorial ranks to become Regents' Professor in 1971. In 1972, he began a stint with the University System of Georgia Chancellor's Office, eventually becoming vice chancellor of the university system. In 1979, he returned to Georgia Tech as Regents' Professor. Following President Pettit's death, John served as acting vice president for academic affairs from 1986 to 1987.

In 1988, John retired from Georgia Tech. Post retirement, he first established and operated a small cattle ranch in Jasper, Georgia, which he later sold. He and Mary Anne then moved to Texas to be closer to their children and their families. They established a ranch near Ft. Worth, where they still live and run a stocker cattle operation.

Early Years

John was born June 9, 1931 in Clarendon, Arkansas but grew up in nearby Hazen, a small town about 45 miles east of Little Rock. When John was born, Hazen had a population of around 800. The latest census says about 1,600. He was the son of John Word Hooper and Caroline Rosina Hooper. John's father was well liked and respected, holding elected public office in Clarendon. Unfortunately, he passed away the year John was born. So John never knew his father and was raised by his mother, who by all accounts was a truly remarkable woman. She ran for and was elected to the office her husband had held, owned and operated a small business, and provided a positive and nurturing home in a rural environment. Both the mother and environment contributed to the shaping of John's character. He was a good student, aspired to and was encouraged to pursue higher education. He also liked and adapted to the rural environment, owning a horse and becoming comfortable working with livestock. The result was a man who had a remarkably successful academic career, but who remained faithful to his roots, sustaining his avocation and subsequent vocation as a cattle rancher.

John had an older sister, Mary Caroline and a younger sister, Merlyn. Mary Caroline settled in Las Vegas, Nevada with her husband and four children and died there in 1995. Ultimately, John's mother and Merlyn left Arkansas and headed west, living for a time in Colorado and Nevada before finally settling in 1962 in Fredonia, Arizona, a small town (population 1,300) near the border with Utah. She was employed there as a home economics teacher from 1962 until retiring in 1972. She also was a volunteer in the (totally volunteer) Fredonia public library. Following her retirement from the school system, she trained to achieve certification as a librarian and was employed as the town librarian from 1972 to 1984. VeRene Tait, town historian of Fredonia, remembers John's mother fondly saying, "she was a woman with an adventurous mind and spirit and impeccable integrity who was well-liked and respected by all in the community." John's mother passed away in Fredonia in 1994 and is buried there. Merlyn still resides in Fredonia.

Academic Career

John Hooper is a medium-sized fellow, well put together, with broad hands and shoulders. Those who knew him best at Georgia Tech describe John as competent, self-confident but self-effacing, personable, and thoughtful, not given to idle chatter, and a keeper of his own counsel. Such a description perhaps brings more to mind a cattle rancher than a college professor or perhaps the dichotomy is—one who does versus one who professes. He was well-liked and respected, not only for his character but also for his wide-ranging intellect. He still has a particular interest in matters related to energy efficiency, converting his pick-up truck to run on natural gas and designing, building, and living in a 'bermed' house long before Al Gore invented climate change. John put together a splendid academic career consisting of three distinct phases, his early academic career, his sojourn in the chancellor's office, and his program development phase after returning to Georgia Tech.

The success of John's early academic career is perhaps best appreciated by noting that his transition from beginning assistant professor to Regents' Professor took only 10 years; certainly a minimum time trajectory, perhaps a Georgia Tech record. He was an active and well-received classroom instructor. He ran a successful research program aimed at characterizing electronic properties of materials. This program was continuously funded by Oak Ridge National Labs and NASA, and continued even after John left to join the Chancellor's Office. For many years, this program was the only funded research activity in the School of Electrical Engineering (as the School was then known).

Five outstanding graduate students, supported by this program, earned Ph.D.s under John's guidance. The first of these was Carl Lineberger who finished his Ph.D. in 1965 and went on to become Distinguished Professor of Chemistry at the University of Colorado, where he is still active. Lineberger was elected to the National Academy of Science. Frank Bacon graduated in 1968 and enjoyed a successful career at Sandia National Laboratory. Robert Feeney and Marshall Pace finished their Ph.D.s in 1970. Upon graduation, Feeney joined the Georgia Tech School of Electrical Engineering faculty, becoming an active collaborator in the ongoing research program and managing the program after John joined the Chancellor's Office. Feeney retired from Georgia Tech in 2004 and presently resides in Powder Springs, Georgia. Marshall Pace had a distinguished faculty career at the University of Tennessee, retiring in 2007 and passing away in 2017. James Majure, Ph.D. 1971, had a successful career in the private sector and became an entrepreneur. He retired from the company he founded, Majure Data, Inc. and subsequently passed away in 2012. The other element of John's success as a faculty member was active participation in service activities.

Most noteworthy of these activities is that he chaired the presidential search committee that found Joseph Pettit.

In 1971, then chancellor of the University System of Georgia, George Simpson, asked John to join him as associate vice chancellor. John accepted and remained at the Chancellor's Office until 1979. While accomplishments in such a position are not documentable in the same sense as faculty accomplishments, there is no doubt that John contributed as he was promoted to vice chancellor, the position he held when he left. Chancellor Simpson stepped down as chancellor in 1979, and John returned to Georgia Tech as Regent's Professor of Electrical Engineering.

Upon his return to Georgia Tech, John accepted Pettit's request to initiate and become the Founding Director of the Microelectronics Research Center (initially known by the acronym MRC, later changed to MiRC to distinguish it from the subsequently formed Manufacturing Research Center). Two issues had to be resolved before the center could be formed: where to locate it physically and where to locate it organizationally. The School of Electrical Engineering agreed to house the MRC on the first floor of the Van Leer Building in space formerly utilized as a large rotating machines laboratory, which was no longer integral to the electrical engineering curriculum. Rotating machines, power panels, and other equipment were removed; walls were erected to create a few offices; and the remaining 4,000 square feet became the initial MRC laboratory. While the size was more than adequate, it was hardly an ideal microelectronics environment, with no facilities to manage chemical waste products and a ventilation system unable to even approach "clean." But better a "dry" lab than no lab, so MRC set up shop in Van Leer in 1981.

The issue of organizational location was resolved by John's insistence that the MRC be the first "ecumenical" research center at Georgia Tech. Knowing a successful MRC would be inherently multi-disciplinary; wishing to encourage that; and wanting to avoid the internecine skirmishes over space and equipment utilization, and overhead revenue distribution that would inevitably result were

MRC to be the provenance of a school or college, John insisted that MRC report directly to the President's Office, specifically to the research vice president.

Thus, the MRC was initiated with two employees, John and a secretarial assistant (other staff would be added subsequently as facility operation and maintenance became necessary). No faculty would be on MRC payroll. Faculty participants would pay for use of MRC facilities out of research revenues. John viewed his role to be that of a facilitator rather than a manager. In actuality, John's role in MRC initiation and development is much better described by the word "catalyst" than either "facilitator" or "manager." He had not only to create a functional laboratory facility, but also to engage relevant faculty to utilize the facility. John did all of that and his ecumenical model not only succeeded but persisted. The present incarnation of the MRC, the Institute for Electronics and Nanotechnology (IEN), operates on the ecumenical model, as do most of the interdisciplinary research institutes that comprise Georgia Tech's present formal research structure. Indeed, the fact that Georgia Tech is well known as a place where interdisciplinary research flourishes is largely attributable to the persistence of John's "ecumenical model."

The Microelectronics Research Center creation was formally announced in a memorandum by Pettit in November 1981. The memo introduced John Hooper as the founding director and defined the "ecumenical" organizational model reporting directly to the vice president for research. Acquisition of research equipment and tools, enabled by donations and some Georgia Tech funding, began in earnest. It should be noted that the laboratory needed was not at all like the laboratory John had utilized in his earlier research program. The focus of the MRC lab needed to be circuit design and fabrication and not just characterization of material properties. The physical limitations of the laboratory space, which precluded utilization of some of the more elaborate fabrication tools, made development of the lab even more challenging. Working with potential lab user faculty, John proceeded to assemble a functional laboratory. Various computer systems to assist in design and layout processes were obtained, and equipment for characterization of electronic properties of materials was added. A Molecular Beam Epitaxy (MBE) tool was obtained, enabling small-scale device fabrication of various types of devices, absent elaborate chemical processing and ventilation facilities. Faculty participation grew, validating the "ecumenical" model.

By the time the MCC opportunity arose in 1983, there were some 30 faculty actively participating in MRC, and the aggregate external funding for microelectronics research had grown to around $2 million annually. The MRC had become the campus center for microelectronics research, attracting faculty participants from several schools in the College of Engineering, the College of Sciences and Liberal Studies (now known as the College of Sciences), and the Georgia Tech Research Institute. Cross-fertilization was occurring and truly multidisciplinary research was flourishing. Thus, the Atlanta MCC bid, in which John Hooper played a major role, could unabashedly document a robust microelectronics research program operating under the aegis of MRC, documentation which undoubtedly contributed to the strong showing of the Atlanta bid. President Pettit then launched his "close" campaign, which resulted in a landmark commitment by the state to support the developing microelectronics program at Georgia Tech.

John Hooper together with a strong supporting cast consisting primarily of John's electrical engineering faculty colleagues, Bob Feeney, David Hertling, and Jay Schlag, began planning in earnest to build a state-of-the-art research facility. In 1985, a defining article by the Metropolitan Atlanta Business Report titled, "Tech Plans of $30 Million Expansion of Microelectronics Research Program," chronicled the extended and potential importance of the state commitment. The State committed $15 million with an additional $15 million raised from private sources. Tom Stelson, then vice president for research, stated that, "The size of the state's grant makes it possible to not only erect the building, but to fill it using the largest equipment allocation we've ever had," adding that "the new facility will propel Georgia Tech to the very top ranks of university microelectronics research."

John Hooper added, “The microelectronics center has brought this institution to the threshold of national prominence in microelectronics.” In practice, the result of this grant was that the building was planned, groundbreaking occurred in early 1986, and the new facility was erected and opened for business in late 1988. For its time, it was indeed a remarkable facility, consisting of 48,000 square feet of usable space, encompassing 6,100 square feet of clean room space, 10,500 square feet of laboratory space, 55 offices for faculty and staff, and 120 carrels for graduate student occupancy. Unfortunately, President Pettit did not survive to see this realization, having passed away in September 1986. John Hooper was asked to serve as acting vice president for academic affairs following Pettit’s death, serving in that capacity from 1986 to 1987, with attendant reduction of his MRC activities.

Shortly after assuming office, the incoming Georgia Tech President, John Patrick Crecine, issued a memorandum to the Georgia Tech community entitled “John Hooper,” dated November 3, 1987. Crecine thanked John for his service as acting vice president, made laudatory references to John’s service in creating the Microelectronics Research Center, and announced that John had agreed to undertake creating a research activity focused on high-temperature superconductivity. A perhaps premature announcement by researchers at the University of Utah stated they had developed a material which exhibited superconductivity (conduction of electric current without losses) at room temperatures. This announcement elicited great excitement and research universities, including Georgia Tech, were anxious to join the fray. In typical Hooper fashion, John declared that the superconductivity activity was properly the purview of MRC, assembled a group of MRC participants with interest and relevant expertise, with their help created a proposal to the Board of Regents to fund activity, and submitted the proposal (which ultimately was not funded undoubtedly because of doubts that had arisen regarding the validity of the Utah claim). John then announced his imminent retirement bequeathing the project to whomever succeeded him as MRC Director. John retired in 1988 at age 57.

The microelectronics research building was formally dedicated January 17, 1990 and was officially and appropriately named the Joseph M. Pettit Microelectronics Research Building. Both in conception and early inception, the facility was very much a "field of dreams" endeavor, an expectation that was ultimately more than fulfilled. But, in 1990, there were far too few relevant faculty members at Georgia Tech to fully utilize (and occupy) the facility. Consequently, significant numbers of faculty and students without relevance to MRC were allocated space in the building, and predictably there was some administrative carping about building an "albatross."

The first, and one of the most significant, "field of dreams" faculty additions resulting from the Pettit Building was Ajeet Rohatgi, who actually joined Georgia Tech when the Pettit Building was still a gleam in John Hooper's eye. Ajeet had a successful program in photovoltaics research and development at the Westinghouse Research Labs in Pittsburgh, but was considering moving to academia. He accepted an offer of a faculty position by Demetrius Paris, then the Director of the School of Electrical Engineering, and came to Georgia Tech in 1984. He was assigned laboratory space in the MRC area of Van Leer, modified the space to accommodate silicon processing, and proceeded to develop one of the premier photovoltaic research programs in the world. Ultimately, Ajeet occupied space in Pettit as well as Van Leer. His research program, continuously funded for decades by the Department of Energy, set records for silicon solar cell efficiency which still stand, and ultimately produced intellectual property that was commercialized. Ajeet's research program continues apace.

When asked why he came to Georgia Tech, the answer was simple and straightforward — John Hooper. Ajeet says that he was being courted by both Georgia Tech and North Carolina State University and was leaning strongly toward N.C. State. N.C. State had an established photovoltaics research program with attendant laboratory infrastructure. Georgia Tech had no ongoing PV program and only the promise of forthcoming laboratory facilities. John Hooper entered the fray, arguing that rather than joining an ongoing operation with established facilities, Ajeet would perhaps be better off joining an entrepreneurial organization and utilize the promised laboratory resources to "roll his own." That proved to be the winning argument. Ajeet joined Georgia Tech, remains glad that he did, and gives full attribution to John Hooper, not only for recruiting him but also providing generous support and guidance once he arrived.

The endowed faculty chair funds initially supplied by the state in connection with the research building were sufficiently augmented by funds from the Georgia Research Alliance and by the Georgia Tech Foundation to create two endowed chairs both aptly named Joseph Pettit Endowed Chair in Microelectronics in the School of Electrical and Computer Engineering (as the School was renamed in 1993). Two outstanding and well-known individuals were recruited, Rao Tummala and Jim Meindl, both of whom are members of the National Academy of Engineering. Tummala and Meindl arrived almost simultaneously, bringing immediate visibility, and set about developing outstanding research programs.

Tummala, who had been a research fellow at IBM, quickly established Georgia Tech's first National Science Foundation (NSF) Engineering Research Center, in the area of electronic packaging. The Packaging Research Center was hugely successful, has been sustained even after the NSF support timed out, and today runs a successful industry consortium with 30-40 member companies. Jim Meindl, who was provost at Rensselaer Polytechnic Institute before coming to Georgia Tech and had previously directed the microelectronics program at Stanford, became the Director of the Microelectronics Research Center and later the founding director of its successor, the Nanotechnology Research Center, later being named the Institute for Electronics and Nanotechnology (IEN). He established a successful SRC-funded Center for Interconnect Focus Technology, ensured that Georgia Tech would be a node of the NSF-funded National Nanotechnology Network (NNIN), and was instrumental in developing the Marcus Nanotechnology Building, which is the home base for IEN. Jim Meindl retired from Georgia Tech in 2013 and passed away in June 2020. Rao Tummala retired in 2019, but still works part-time in the School of ECE.

The "field of dreams" scenario continued with young faculty such as Mark Allen (EE '89), Gary May (ECE '91), and Mark Prauznitz (ChE '95) joining. Senior faculty such as Dennis Hess (ChE '95), Walter de Heer (Physics '98), and Russell Dupuis (ECE '03) joined as well. By the early 2000s, the Pettit Building was fully occupied by faculty and graduate students actively engaged in microelectronics research. Faculty participants in the Microelectronics Research Center had grown to 96, with an aggregate funded research income of approximately $50 million. In fact, the Pettit facility was saturated and it became necessary to retrofit space in adjacent buildings such as Van Leer and Bunger Henry to accommodate the growth.

Consequently, Wayne Clough, then president of Georgia Tech, presented to the Board of Regents much the same "field of dreams" argument that Joseph Pettit had employed 20 years earlier, and received a commitment of $35 million to build a new facility. The $35 million was matched by a donation from Bernie Marcus, a founder of Home Depot, and design of the new facility, ultimately named the Marcus Nanotechnology Building, began in earnest. The Marcus Building would add 12,580 square feet of faculty and student office spaces, 14,250 square feet of research laboratories, and nearly 30,000 square feet of cleanroom space. Additionally, unlike the Pettit Building, the Marcus Building would enable working with both inorganic and organic materials in order to facilitate biotechnology related-research.

Groundbreaking for the Marcus Nanotechnology Building occurred in August 2006 and the facility opened for business in April 2009. And they continue to come. The Marcus Building became the headquarters of the Microelectronics Research Center reformulated as the Institute for Electronics and Nanotechnology, (IEN). The IEN has purview over the facilities in Marcus and Pettit, as well as the related facilities in Van Leer, Bunger-Henry, and the Manufacturing Research Center Building. An additional microelectronics research facility was added at the Georgia Tech Lorraine campus in Metz, France, which adds 5,000 square feet of cleanroom space to the mix. An appreciation of what the humble beginnings of the Microelectronics Research

Center in 1981 has become is obtained by noting that the number of faculty participants in IEN is now more than 200 and Georgia Tech research awards with a total funded amount approaching $300M have benefited from the micro/nanofabrication and characterization core facilities in 2019. IEN is now established as a site and coordinating office for the $81 million NSF-funded National Nanotechnology Coordinated Infrastructure (NNCI), a network of 16 nanotechnology fabrication and characterization centers across the U.S.

In a remarkably candid interview published in the June 1988 issue of Tech Topics, John reminisced a bit. He noted that he has known his wife Mary Anne since he was "almost four," adding that together they missed by one day being a perfect model for planned parenthood by producing their first child, Christie, on August 15, 1958, and their second, Jeffrey, two years later on August 14, 1960. He remarked on the entrepreneurial culture of Georgia Tech, saying, "If you are willing to jump in, there is always an opportunity to contribute." When asked to comment on the fact that over his career he had served in every academic rank, John, in a statement extreme in self-effacement even for John, said that it proves that if you live long enough, you can do most things. But most faculty who hang around don't become Regents' Professor, even fewer accomplishing the minimum time transition from beginning assistant professor to that rank. Being plucked from academia to serve in a leadership position in the Chancellor's Office is not a result of longevity. And, most certainly, creating an enterprise destined to become a cornerstone for Georgia Tech's rise to becoming one of the foremost research institutions denotes much more than endurance.

If asked to comment on his role in developing the enterprise now known as the IEN, John would almost certainly deflect most of the credit to President Pettit. Pettit certainly deserved full attribution for his role in transforming Georgia Tech into a graduate research institution and for having the vision that led to the creation of the MRC. But he operated from his base as president of Georgia Tech. John Hooper, operating from his base as a faculty member, implemented the realization of the vision by developing the MRC and its initial laboratory, defining the structure ensuring its multidisciplinary status, engaging relevant faculty participants, and leading the design and development of the Pettit Building. By implementing the realization of the dream, John created his own unique secure and enduring legacy. When asked what he would do after leaving Georgia Tech, John simply said he would pursue opportunities in the private sector, leading some to speculate as to why John elected to take what many viewed as early retirement. As usual, John kept his own counsel, and it is likely that he just decided his work at Georgia Tech was done and it was time to go raise cattle.

Tom Brewer

Master of Laboratory Management and Deadpan Humor

Tom Brewer (right) with W. Marshall Leach, Jr.

Tom Brewer served as the School of Electrical and Computer Engineering instructional laboratory manager from 1981 until his retirement in December 2018. He worked with five successive school chairs and had a variety of different titles. Still, his enduring function was to manage the labs, dispensing wry and insightful “Brewerisms” all along the way.

Over the 37 years of his tenure, he interacted with and influenced more Georgia Tech undergraduate students than any other member of the instructional staff—not only ECE students, but students from the other engineering schools in electrical engineering service courses. Some who took his classes came to experience his unique instructional skills, and legendary sense of humor divulged through verbal asides delivered with little inflection and absent any hint of a smile or even a twinkling of an eye. However, they were always funny, pointed, and, in a broad sense, educational.

Announcement of his retirement precipitated appreciative responses from many of these students: “Holy s---, what a sad day. What an absolute legend”; “I pity future students for missing the opportunity to learn from this man”; “Dr. Brewer is a ‘helluva instructor,’ and I’m glad I got to learn from someone who is himself, and an institution within the Institute.”

But even his most ardent admirers probably do not appreciate the full extent of Tom’s impact. As a laboratory manager, he was responsible for oversight of all lab instructors (primarily graduate teaching assistants), maintenance and upgrading of lab equipment and facilities, and currency and validity of instructional materials and manuals in light of curriculum changes. The net effect of his adept management is the establishment of a genuinely viable and vital component of the Georgia Tech educational experience. The impact of his style is a continual source of mirth. The good news is that Tom has not fully retired, but continues on a part-time basis to lend his skill, wisdom, and humor to the School.

Tom was born and raised in the small town of Crossville, Tennessee, which advertised itself as ‘The Top Town for Miles Around.” Tom verifies this self-accolade by noting that it is also the only town for miles around. His father and mother operated a small department store in Crossville and successfully raised three children, Tom, and his brother and sister. After graduation from Crossville High School, Tom enrolled in Tennessee Tech in Cookeville, Tennessee, graduating in 1965 with the B.S.E.E. degree. He was employed at NASA

Houston for a year and then returned to Tennessee Tech, where he completed his M.S.E.E. degree in 1968. Tom enrolled in the electrical engineering doctoral program at Georgia Tech in 1973 and completed his Ph.D. in 1979, doing his Ph.D. thesis under Professor Aubrey Bush. He supported his graduate program studies at Georgia Tech by serving as a graduate teaching assistant (GTA).

Before Tom's appointment as laboratory manager, the individual labs were the purview of the faculty member assigned to teach the associated lecture course, assignments which varied from term to term. There were no stand-alone laboratory classes. Maintenance of lab equipment and facilities fell to Russ Beason, the lead School technician who had many other responsibilities and was not directly involved with laboratory instruction. The laboratory program operation was thus spotty at best.

In the context of his service as a GTA, Tom and Russ became acquainted and mutually appreciative. As Tom's graduation neared, Russ learned that Tom was not anxious to seek employment in industry or the government labs, was not enamored of a faculty career with attendant tenure falderal, and that he thoroughly enjoyed his experiences as a laboratory instructor. To his everlasting credit, Russ initiated discussions which ultimately led Demetrius Paris, then School Director, to offer Tom a position as a laboratory manager. In accepting the offer, Tom also took the responsibility to define the job, with there being no precedence and little guidance.

As with students, Tom found ready acceptance among the faculty and technical staff. Those faculty who previously had laboratory responsibilities were especially appreciative not only for being freed from lab management duties, but also because the laboratories became truly functional, assuming their proper role in the instructional program. Over time, and as a result of their mutual participation in laboratory operations, Tom and two others established long-term lasting friendships, the other two being Marshall Leach and John Pomakian. A more disparate, tripartite friendship would be hard to imagine.

Marshall Leach was a professor, renowned for his expertise in audio engineering, who had developed an audio engineering program at Georgia Tech and a truly superb audio laboratory. Countless alumni probably still enjoy Leach designed/student implemented audio systems in their homes. He was an amiable person with a ready smile and genteel southern mannerisms. Marshall died prematurely in 2010.

John Pomakian was of Armenian descent, grew up in Lebanon, immigrated to the United States, got a technical degree from DeKalb Technical College, and was hired at Georgia Tech as an electronics technician by Ben Dasher. John was industrious and very good at keeping lab equipment maintained. He had an intense, somewhat volatile personality, eventually developing severe paranoia and had to take early retirement when the paranoia affected his ability to deal with others. Both Tom and Marshall continued to look after John, post-retirement, bailing him out of paranoia-induced difficulties. John passed away in 2006.

Tom was the only source of comic relief amongst the three, but as distinctly different in demeanor and appearance as either of his colleagues. His presence and countenance, with the high waist britches and dour expression, are more than faintly reminiscent of the pitchfork guy in the famous painting American Gothic by Grant Wood. One cannot be around Tom for long without coming away with admiration for his immense vocabulary, clever and humorous utilization of that, and a vague sense that the appearance and countenance are a well-executed camouflage of a gleeful and sensitive soul who is chuckling to himself all the while.

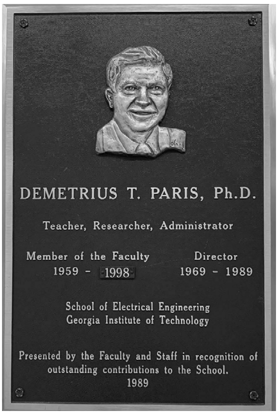
Inevitably, Tom's wry humor escaped the bounds of the School. He wrote short pieces that appeared regularly in the campus daily. When it was announced that the Van Leer parking lot would be replaced by grass to contribute to the 'greening' of the campus, Tom opined that the same result could be obtained more directly and effectively by requiring all cars inhabiting the lot be painted green. His letters to the editor of the Atlanta Journal Constitution were published and enjoyed by subscribers. During the period when it was feared that the

Japanese would dominate U.S. electronics and automotive markets, Tom wrote a humorous letter-to-the-editor, pointing out that rather than denigrate Japan for invading our markets, we should applaud them for being about the only country on the planet without their hand in our pocket. He created hilarious YouTube videos, not bothering to disguise the Georgia Tech connections, which in today's politically correct climate would incur the wrath if not the vengeance of the protocol police. But through all these excursions, he remained on task managing the School laboratory program.

Significant contributions are often made by people who do things their own way and are not in it to accumulate accolades. The statement of the student who felt it a privilege to learn from someone who is himself provides a fitting and appropriate description of Tom Brewer. Tom created an enduring legacy and will help it grow both by continuing to contribute and by having trained his successor, Allen Robinson. He also bequeathed to his many acquaintances and admirers, an unending stream of "Brewerisms,' which will continue to evoke laughter and fond memories. Anyone with the opportunity to meet Tom and share a laugh should do so, recognizing that half the laughter will be a deadpan concealed imperceptible chuckle.

Demetrius Paris

Passionate Intellectual



Plaque of Demetrius Paris displayed in the Van Leer Building.

Demetrius Paris had a remarkable 39-year career at Georgia Tech, serving as a faculty member, as Director of the School of Electrical Engineering, and as vice president for research of the Institute. During his 20-year tenure as School Director, Demetrius established a highly successful graduate research program, thereby enabling the School to become recognized as one of the premier programs in the nation.

Demetrius succeeded Ben Dasher as School Director in 1969. Dasher had enjoyed a remarkably successful 15-year tenure as school director, installing a modern curriculum, jump-starting the doctoral program, moving the School into the new Van Leer building, and nearly doubling the size of the faculty. However, when Ben stepped down as director, the School had yet to establish a viable graduate research program. Demetrius Paris, who had served as Assistant Director of the School since 1967, was well aware of this daunting challenge when he applied to become director. When he was named director, he, in his typical style, entered the fray with a plan.

Demetrius' path to Georgia Tech and School directorship was circuitous. He was born in Stavroupoli, Greece, a town in the Macedonian region of northern Greece, on September 27, 1928, and was christened Demetrius Theodore Paraskevopoulos in the Greek Orthodox Church. He was the only child of Theodore and Aspasia Paraskevopoulos. His father was a pharmacist, a scholarly man who could read and converse in seven languages and was an avid student of Byzantine culture and heritage. Demetrius' early childhood was pleasant and uneventful, but in early 1941, the Germans invaded Greece and the brutal three-and-a-half-year occupation, followed quickly by severe political upheaval, clearly had a lasting influence on Demetrius and his future. His father, realizing that Greece would not soon stabilize, unselfishly sent Demetrius to the United States, specifically to the small town of Durant, Mississippi, where he had a distant relative. So the 19-year-old Demetrius, absent familiarity with either the culture or language, arrived by boat in New York, cleared the immigration hurdle, and, by train and bus, made his way to Durant, a small town in the center of Mississippi. Demetrius' sponsors in Durant were A.K. "Charlie" Dinas and his wife Mary, both Greek immigrants who migrated to Durant, opened a small café where Demetrius worked, and raised three sons, with whom Demetrius bunked. Additionally, Demetrius enrolled in Holmes Community College in nearby Goodman, Mississippi, where he honed his language skills.

After two years at Holmes College, Demetrius transferred to Mississippi State University in Starkville, Mississippi. His sponsors in Durant referred him to a fellow Greek immigrant, James Marmaduke, who, with his American wife Amalie, operated a café in Starkville where Demetrius worked. Elsie Dorsett, Amalie's sister, was living with James and Amalie at the time. Elsie had recently been widowed when her husband died from a heart attack, leaving Elsie with a three-year-old daughter, Cheryl, and a yet-to-be born son subsequently christened James Dorsett (Jimmy). So Demetrius and Elsie met through the Greek connection, and soon she was addressing him by the

Demetrius diminutive, Taki. They were married January 5, 1952.

After receiving his Bachelor of Science in Electrical Engineering with honors from Mississippi State University in 1951, Demetrius accepted a job with Westinghouse Electric in Atlanta and moved his new family there. He subsequently left Westinghouse, joining the avionics section of Lockheed Aircraft specializing in developing radomes for aircraft antennae. He also enrolled in the graduate program at Georgia Tech. Demetrius was only about a year into his tenure at Lockheed when Ben Dasher offered him a position as assistant professor of electrical engineering at Georgia Tech. He accepted and began his lifelong career with Georgia Tech in the fall of 1959. Upon joining the faculty, he immediately began pursuing his Ph.D., which he completed in 1962. His thesis entitled A Variational Principle and its Application to Problems in Electromagnetic Theory was done under Professor Ken Hurd.

Demetrius' early career was remarkably successful. In 1963, he was promoted to associate professor, followed by full professor in 1966. He was a medium-sized man with an open countenance, a ready smile, and an engaging manner, well-liked by faculty colleagues and students alike. Ed Joy, a now-retired electrical engineering faculty member, and one of Demetrius' first Ph.D. students recalls him fondly:

"As an undergraduate at Georgia Tech, Demetrius was my favorite professor, and I took all the courses he taught. After a stint in the United States Navy, I returned to Georgia Tech as a graduate student, again taking every graduate course Demetrius offered. His enthusiasm was contagious, and soon I too became an 'electromagnetics geek.' Demetrius got me engaged with Scientific Atlanta which sponsored my Ph.D. dissertation research on near-field antenna measurements, a field in which I remain engaged to this day."

In 1969, Demetrius, together with his colleague and former thesis advisor, Ken Hurd, published a classic undergraduate textbook Basic Electromagnetic Theory, which was widely acclaimed and was adopted by several U.S. electrical engineering departments. Over 14,000 copies were sold.

After Ben Dasher stepped down as School Director in 1969, Demetrius applied for the position. He was appointed and installed at the beginning of the 1969-1970 academic year. He had served the previous two years as Dasher's assistant director and was well aware of the primary challenge before him. Demetrius inherited the program with 19 over-burdened, tenure-track faculty. The undergraduate student population was large and growing, requiring multiple sections of required courses and the graduate program also required significant teaching commitment. The resultant faculty teaching load was oppressive. It is small wonder that in 1970 that there was only one funded research project in the School and the funded research budget was $47,000.

Demetrius realized the compelling need to increase the size of the faculty to relieve the overwhelming instructional burden and to increase the funded research program to support the graduate program. His plan was simple and straightforward, albeit challenging to implement: recruit and hire outstanding Ph.D. graduates of established programs with research experience in areas of perceived high research potential and opportunistically recruit well-established faculty (water walkers) in the same areas. The example of developing the digital signal processing (DSP) research area will suffice to illustrate the plan implementation and results.

In 1972, Demetrius recruited Tom Barnwell who had done his Ph.D. at MIT. In 1974, Demetrius utilized the newly established John and Marilu McCarty Professorship to recruit Ron Schafer from Bell Labs. Ron, a 1961 graduate of the University of Nebraska, completed his Ph.D. at MIT in 1968, becoming one of the first to do Ph.D. research in DSP. Upon graduation, he joined the technical staff at Bell Labs where he quickly established himself as a leading researcher in DSP. By now, DSP was becoming recognized as a distinct field of electrical engineering with its very own IEEE society. Russ Mersereau, another newly minted DSP graduate from MIT, was recruited in 1975.

These three, later joined by others, quickly developed what is arguably the nation's premier DSP program, acquiring significant research support from private industry, the National Science Foundation (NSF), and the Army Research Office. They developed course work, associated textbooks, and teaching aids, and they produced copious amounts of intellectual property and well-trained graduates. A major outcome of the DSP program development was Georgia Tech obtaining membership in the prestigious Joint Services Electronics Program (JSEP).

Demetrius' tireless efforts to convince JSEP leadership that Georgia Tech could play effectively in this long-standing Department of Defense (DoD) university research consortium were rewarded in 1979 with JSEP funding for DSP projects. Under Ron Schafer's leadership, the Georgia Tech JSEP program soon expanded to include projects in optical communications and electromagnetic measurements. From 1979 until 1997 (when all JSEP activities ended), Georgia Tech's JSEP program supported an average of eight faculty and 10 doctoral students per year, with funding of over $500K per year. The Georgia Tech DSP program continues to thrive under the leadership of Jim McClellan, who succeeded Schafer as the McCarty Professor.

President Joseph Pettit arrived at Georgia Tech in 1972 with the avowed mission of transforming the Institute into a significant graduate research operation. Educated as an electrical engineer and having served on the Stanford electrical engineering faculty before becoming dean of engineering at Stanford, President Pettit realized the critical role that the School of Electrical Engineering must play in the transformation. In particular, President Pettit was well aware that the absence of a strong research program in microelectronics would jeopardize his Georgia Tech transformation goal, and he set about effecting a remedy. He formally announced the inauguration of the Microelectronics Research Center (MiRC), naming John Hooper, a longtime electrical engineering faculty member, as the founding director and defining the center to be multidisciplinary, reporting directly to the President's Office.

Creation of adequate laboratory space was clearly the first priority. Demetrius offered up the mothballed rotating machines laboratory on the first floor of Van

Leer. President Pettit allocated renovation and equipment funds, lab space and offices were created, and the MiRC lab space problem was partially solved—only partially because it was impractical to renovate the Van Leer space to provide either clean room level ventilation or evacuation of toxic chemical waste.

John Hooper, with Demetrius' blessing, asked existing faculty members Bob Feeney and Jay Schlag, along with newly recruited Dave Hertling, to lend their considerable expertise to the project. This core team, aided by some faculty from other units, aggressively set about acquiring and installing equipment and soliciting faculty from across campus to utilize it. The success of their efforts is attested by Atlanta coming in a surprising second to Austin, Texas in a nationwide competition to host the Microelectronics and Computer Technology Corporation (MCC), a research organization funded by a consortium of U.S. electronics companies. The Hooper team contributed significantly to the Atlanta bid, and the report issued by the selection committee paid attribution to the MiRC. And "second place" counted since President Pettit's subsequent proposal to the Board of Regents resulted in the funding of a major new research facility, the Joseph Pettit Microelectronics Research Building.

With the complete solution of the MiRC laboratory issue in sight, Demetrius set about recruiting faculty to effectively utilize it. With the help of John Hooper, he recruited Ajeet Rohatgi from Westinghouse Electric in 1984. Ajeet, a well-recognized photovoltaics expert, quickly established a research laboratory, secured long-term support from the Department of Energy, and embarked on the development of a premier photovoltaics research center, which is still active. Over time, Ajeet's lab developed technology which produced silicon-based photocells that set long-standing records for conversion efficiency and eventually led to commercialization.

Using the Byers Endowed Chair, funded by alumnus Ken Byers, Demetrius recruited Carl Verber from Battelle Laboratories and Dick Kenan, a long-time Verber colleague. He subsequently added two additional distinguished faculty members, Dick Higgins who ultimately became Director of MiRC, and Phil Allen, a well-established expert in CMOS technology.

The result of the Pettit/Paris initiative that created the MiRC and the Hooper team is that Georgia Tech now operates three clean room equipped facilities: the Pettit facility, the Marcus Nanotechnology facility (opened in 2010), and the Institut Lafayette at Georgia Tech Lorraine (opened in 2014). These facilities, operating under the auspices of the Institute for Electronics and Nanotechnology (IEN), now have aggregate research funding approximating $110 million per year.

An early initiative in Demetrius' research program development didn't follow the "plan." It came about through his affiliation with the Rome Air Development Center (RADC) and in particular with an avionics research program operated by Dr. Woodson (Woody) Everett. Woody had formed a coordinating organization called the Northeastern Center for Electrical Engineering Education (NCEEE) with the business office at RADC and program coordination effected through the Department of Electrical Engineering at nearby Syracuse University. Through this affiliation, Demetrius was able to secure several research contracts for his faculty, some in collaboration with Syracuse University faculty. The connection was productive from the RADC viewpoint, leading to a proposal that Everett's operation be moved from Syracuse to Georgia Tech, including the transfer of several senior faculty from Syracuse.

The reservations to this proposal expressed by some existing faculty members were sufficiently persuasive to cause Demetrius to rethink and negotiate. The result was that NCEEE and the Syracuse faculty remained at Syracuse. A new center, the Southeastern Center for Electrical Engineering Education (SCEEE), with a branch office in Orlando, Florida serving as the business center, was created. The Georgia Tech School of Electrical Engineering assumed the research coordination role. SCEEE operated effectively until the late 1990s, providing research support not only for Georgia Tech, but also for many other southeastern electrical engineering schools. While RADC and SCEEE played an essential role in initiating research support for several school faculty, it did not become a central force in school research program development.

During Demetrius' tenure as School Director, he successfully recruited over 50 new faculty members, adding some 40 tenure-track faculty positions to the School. There were commensurately increased enrollments in the graduate programs, and external funding for research increased from $140K to nearly $5 million annually. The School became ranked in the top 10 such programs in the nation. In short, Demetrius successfully executed his plan.

So how did this Greek immigrant, arriving in this country as a teenager with little knowledge of either American English or American culture, become a true leader in American engineering education? First and foremost, Demetrius brought Greek passion and unrelenting adherence to his principles to everything he did. His time at Holmes College was devoted to learning the language. He emerged speaking American English, devoid of a Greek accent or southern dialect, with the only evidence of it being his second language being its impeccable utilization. Shortly after moving to Atlanta, Demetrius bought a modest house in the Garden Hills area. His financial circumstance quickly evolved to where he could easily afford a much grander domicile, but having established a home, Demetrius lived there until he died, fastidiously maintaining the house and yard. He and Elsie proudly invited friends, students, potential faculty, and potential donors and supporters to their home and all relished the ambiance (and the food). Demetrius raised Cheryl and Jim as his own, and each still refers to him as "Daddy," but he never formally adopted them. His answer as to why was simple but remarkably reflective. He didn't want his children to in any way dishonor their heritage.

Even though thoroughly Greek, he became, in his son Jim's words, "a flag-waving American." He adopted American culture, becoming a fan of major league baseball and college athletics, and a devotee of country music. His enjoyment of country music led him to learn to play the guitar, and he would play and sing to and with his family. When asked "how come?" his answer was simply that American country music reminded him of the Greek folk music he enjoyed growing up.

The other aspects intrinsic to his success were Demetrius' remarkable affinity for people, his ability to select partners and associates with skills that complemented his own and, most importantly, his ability to convince them to join his team.

While he would never admit to anything analytical about his courtship with Elsie, the result confirms the point. Demetrius' passion and devotion to theory sometimes dominated his common sense, and his openness with people tended to be noncritical. Elsie, on the other hand, was all about common sense, not easily perturbed, and had an uncanny phoniness detector. Their son, Jim, recounts with glee Demetrius' initial attempt at air conditioning the house. He bought a small window unit, installed and plugged it into the wall socket. Elsie cautioned him that he should probably get an electrician to check the service panel before turning it on. Assuring her that he'd made the calculation, he threw the switch and the old fashioned "instant blow bottle fuse" instantly blew. Chagrined, Demetrius acknowledged that he had neglected to account for the compressor starting current and hired an electrician to upgrade the service panel.

Demetrius' selection of Ken Hurd to co-author his book was entirely analytical. Ken was a physicist by training and, while certainly knowledgeable, was not nearly as passionate a devotee of electromagnetics as Demetrius. But, as Demetrius learned from his thesis endeavor, he was a meticulous and effective editor. So, while the intellectual content and organization of "Paris and Hurd" was largely Demetrius, the clarity of presentation certainly benefited from Ken's participation. Likewise, in selecting an associate director for the School, Demetrius looked for someone to counter his self-acknowledged tendency to overthink decisions and attempt to resolve second order effects before pulling the trigger. In selecting Roger Webb as Associate Director, he chose someone whose style was more "just do it," than measure and manage unintended consequences. The resultant compromise was usually effective.

Demetrius was a principal in establishing Georgia Tech's major initiative in international education, Georgia Tech Lorraine (GTL), which was initially only an electrical engineering program. He selected Hans (Teddy) Püttgen to become the initial Director of GTL. Teddy's facility with the French language, and more importantly, French culture enabled him to navigate the dangerous shoals of French political waters, bringing to GTL undeniable success rather than yet another failed or inconsequential foreign entanglement.

In 1988, Demetrius was offered the position of vice president for research. He accepted and moved to "the Hill." He took pride in the fact that he was the sole member of the "upper administration" who had a Georgia Tech degree. He applied himself assiduously to the vice president for research (VPR) role and accomplished it in his usual efficient and competent manner. But, being primarily a management position and mostly absent of development opportunity, it was not a good fit for either Demetrius' natural proclivity or skill set, and he derived little satisfaction from it. So, upon the arrival of President Wayne Clough, he stepped down from the VPR position and returned to the School of Electrical and Computer Engineering in 1995. As a side note, the "Computer" part of the School's name was added in 1993.

Roger Webb, who had succeeded Demetrius as school chair, asked him to function as an advisor to his office and to the faculty on research development, a task which Demetrius enthusiastically embraced. He advised faculty on targets for research proposals, assisted in proposal preparation, and provided most effectively the school interface to the Office of Contract Administration (which had reported to him as VPR).

Early in his Georgia Tech career, Demetrius had suffered from a leaky brain aneurysm which took him out of action for a few months, but from which he completely recovered. Later, he had heart surgery and became a devoted adherent of careful diet and exercise and was seemingly a healthy 69-year-old. On Friday, August 21, 1998, Demetrius went to work at Georgia Tech just as he had done for nearly 40 years. The following morning, Demetrius was beginning his usual Saturday yard care routine when he suffered a severe headache. Probably recognizing the symptoms from the previous occurrence, he asked Elsie to take him to Piedmont Hospital, but lost consciousness at home. He was transferred to Piedmont where they diagnosed a ruptured brain aneurysm. He never regained consciousness and passed away on August 29, 1998. As he would have wished, Demetrius died "with his boots on" having lived a useful and successful life and bequeathing Georgia Tech a remarkable and enduring legacy.

Benjamin J. Dasher, Jr.

Engineer, Educator, Scholar, Difference Maker

Benjamin Dasher Jr.

Benjamin Dasher, Jr. was a man of smallish stature who spoke with a genteel southern accent and had an enduring twinkle in his eyes. Quiet, self-confident and modest, he became head of the Georgia Tech School of Electrical Engineering in 1954. During his 15-year tenure as the School's leader, he laid the foundation that enabled it to become one of the nation's preeminent electrical engineering education programs.

Born in 1912 in Macon, Georgia, Ben attended public schools there. While in high school, he and his younger brother Campbell formed Dasher Electric, an electric apparatus repair business and Ben gained a reputation for being able to fix anything.

Ben matriculated at Georgia Tech in 1931 and received his B.E.E. degree in 1935. That was not a banner year for employment of fledgling electrical engineers, so Ben remained at Georgia Tech as a graduate teaching assistant. He joined the faculty as an instructor in 1940. When he completed his master's degree work in 1945, he was promoted to assistant professor.

In 1941, Ben married Anne Brooks, an Athens, Georgia, native and graduate of the University of Georgia. Anne's UGA roots ran deep; her father, Georgia's first Rhodes Scholar, served as Dean of the Business School and Dean of Faculty. According to family lore, Anne's UGA heritage always surfaced during the annual Georgia Tech-UGA football game.

The first of Ben's six children was born in 1943, and in 1947 Ben moved his family to Boston to enter the doctoral program at the Massachusetts Institute of Technology. At MIT, he was affiliated with the Research Laboratory for Electronics. According his oldest son, Ben III, his father was passionate about voice recognition and intended to do his thesis research in that area. RLE Director Jerome Wiesner, who later became president of MIT, believed voice recognition was not feasible and sent Ben in another direction. Working with Professor Ernst Guillemin, a renowned network theorist, Ben focused his doctoral research on passive network synthesis. A major result was Ben's development of the "Dasher Method" for synthesis of two-port networks. The method achieved considerable recognition and wide utilization.

One example: Immediately following the Soviet Union's launch of Sputnik in 1957, the U.S. government began development of several offensive and defensive missiles. A problem engineers frequently encountered in initial testing of these missiles was that the control system sensors would pick up various mechanical resonances (e.g., body bending and fuel sloshing) causing the missiles to oscillate at the resonant frequencies, often with disastrous results. Control system designers labeled these phenomena as "tail wags the dog" effects. They adopted the Dasher Method to design so called 'notch filers,' which greatly attenuated the offending frequencies. Thus, the Dasher Method became a major tool in restoring the dog to its rightful role.

In 1952, after earning his Doctor of Science degree at MIT, Ben returned to Georgia Tech as Associate Professor of Electrical Engineering. Two years later, he was promoted to Professor and named Director of the School. At the time, the School was in the vastly inadequate Savant building. The 17 tenure-track faculty shared a limited number of faculty offices, with as many as five faculty in one small space.

That year, the School produced 111 bachelor degree graduates, 8 master's degree graduates, and no doctoral degree graduates. The graduate course offerings were limited and the undergraduate curriculum was much the same as when Ben graduated in 1935.

One of Ben's first initiatives as director was to revise the undergraduate curriculum. He led implementation of a modern and flexible curriculum, which remained in effect until 1969 when the University System of Georgia mandated a 20 percent reduction in credit hour requirements for the bachelor's degree. A parallel initiative was to increase the number of faculty and position them to operate a modern curriculum and growing graduate program.

Major events external to the School helped drive the success of these initiatives.

- The Board of Regents approved granting of the Ph.D. degree in science and engineering in 1950, spurring the development of doctoral programs.
- The first women earned Georgia Tech degrees in 1956. One of them, Shirley Clements Mewborn, who earned a B.E.E., had a very successful engineering career and served on the School's advisory board for a number of years. The Georgia Tech women's softball field is named for her.
- In 1955, then Georgia Governor Marvin Griffin banned Georgia Tech participation in the 1956 Sugar Bowl because the opposing team had an African American starting player. National press widely covered Georgia Tech students' vehement protest of the ban, leading to its lifting. (Georgia

Tech scored the only points in the game, beating the Pittsburgh Panthers 7 – 0.)

- The 1957 the Soviet Union's launch of Sputnik precipitated a sea change in technological development, in the public view of engineering and science and, ultimately, in the nature of and enrollment in the associated academic programs.
- In 1961, Georgia Tech became the first so-called "Deep South" university to integrate without a court order. Then President Ed Harrison banned the press from campus on the day the first three African American students enrolled and integration was essentially a non-event.
- In 1962, the Van Leer Electrical Engineering Building and the Bunger-Henry Chemical Engineering Building became the first two new "off the Hill" academic buildings on the campus.

Ben and one of his senior faculty members, Dave Finn, carefully planned the new 80,000-square-foot Van Leer Building so that it was well-configured and well-equipped. The building did, however, have a few challenges coming on line. It was far too large for existing School operations, and the university assigned space to the computer science school and to computer center staff. Ben resisted, conserving space for future faculty expansion by assigning generous faculty offices even to graduate teaching assistants. Another problem was unsynchronized hall clocks, making ringing of classroom bells a random event. After attempting unsuccessfully to have a contractor correct the problem, Ben lived up to his reputation and fixed it himself.

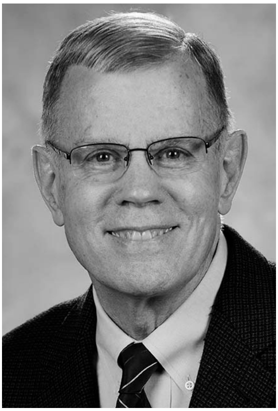
In 1969, when Ben stepped down as Director of Electrical Engineering to become Associate Dean of Engineering, the School had grown both in size and stature.

Ben would probably not accept full credit for his many contributions, but in fact his quiet, professional leadership was directly responsible for positioning the School for its robust future evolution. He kick-started the doctoral program.

He designed and implemented a completely revised undergraduate curriculum. He initiated and managed moving the School to new and modern facilities. He nearly doubled the size of the tenure-track faculty.

Ben Dasher, Jr. died in 1972 just two weeks shy of his 60th birthday. His life was short, but he lived it well and left an enduring legacy. He truly made a difference.

A Conversation With John Peatman



John Peatman

The following are excerpts from a conversation between Anna Walker (Director of Development for the School of Electrical and Computer Engineering) and Professor Emeritus John Peatman. John joined the School faculty in 1964 and served with distinction until he retired in 2014. He developed the digital design program in the School and taught his immensely popular senior elective that evolved from Digital Systems Design to Embedded Systems Design over the course of his career. He was named Outstanding Professor both within ECE and campus wide. He wrote seven textbooks, widely utilized both at other universities and in professional practice. By virtue of his truly outstanding pedagogical scholarship, John contributed greatly to the reputation of our School as a center of excellence in electrical engineering education.

Anna: Thank you for taking the time to talk with me. Your career at

Georgia Tech touched the lives of many, most of whom will be recipients of the forthcoming School newsletter in which excerpts from our conversation will appear. I'm certain that all the recipients will enjoy hearing from you.

John: Thanks Anna, I am pleased to visit with you. After agreeing, I spent some time thinking about what I would say. I discarded the notion of defining a career timeline in favor of just talking about what I view as some highlights of my career.

Anna: Perfect! Perhaps we can begin by talking about the beginning of that career, how you came to Georgia Tech?

John: I was nearing completion of my Ph.D. at Case Western University and was looking to continue the academic career that had begun with two years of teaching at Missouri School of Mines in Rolla, Missouri. A fellow doctoral student at Case, Lou Holliman, had been on the mechanical engineering faculty at Georgia Tech before coming to Case to complete a Ph.D., and he extolled the virtues of Georgia Tech. Both my wife Marilyn and I were attracted to this urban location. I, of course, knew of Georgia Tech, that it had a good academic reputation and an established graduate program. So I applied to Georgia Tech and was invited to interview.

I met Dr. Ben Dasher, School Director, in his spacious office in the brand-new Van Leer Electrical Engineering Building. He was an engaging gentleman, and we proceeded to have an interesting conversation. At some point the conversation was interrupted by a telephone call. Ben answered and held forth with a strong southern accent. When he hung up, I asked him what the different accent was about. He laughed and explained that having grown up in South Georgia, that was his natural accent. When he went to MIT to pursue his doctorate, he found that his southern accent was a professional liability. By mimicking others, he developed the accent he had been using with me. I was impressed by his candor. He seemed like a boss under whom I could flourish. I liked his vision for the School, which included the need to develop programs in digital systems engineering, and I liked the environment. So, when I was offered a position as assistant professor, I accepted and joined the faculty in fall quarter 1964. It was a fortuitous choice.

Anna: I understand that your career progressed from the days of gates and flip-flops to the early days of microprocessors, and on to microcontrollers (i.e., one-chip computers). Describe the succession.

John: My first lab used RTL logic gates and flip-flops. My second lab used what became the dominant family of logic parts, TTL logic which included not only gates and flip-flops but also what was then called MSI (medium-scale-integration) logic, e.g., counters, data selectors and decoders. Motorola's first microprocessor, the 6800, led to a major change in our activity, followed by their 6809 microprocessor. Hewlett-Packard's gift of a sophisticated development system led to our first use of a microcontroller, Motorola's 6801. Motorola's 68HC11 microcontroller led to new vistas for us as we moved on from the use of an expensive development system to a student-designed logic analyzer board used to track and control the execution of program instructions. Subsequent to this, as Microchip Technology gained a foothold in the very low-cost microcontroller business, we switched to their early PIC microcontrollers together with their hand-held PIC debugging pods. As Microchip Technology developed flash program memory, we migrated to the PIC18F452 microcontroller. Not only could we download a program into the chip and run it, but we could include student-developed, sophisticated debugging capability within the chip. It would accept commands to run to a breakpoint and then single step the program while displaying internal registers.

Anna: Your senior elective was always popular. Any comment?

John: Early on I realized the power of my creating a new lab design project every week, to challenge my students with real-world activity. Not only did they like meeting the challenge, but they also appreciated the absence of "word" from the same project being repeated from a previous quarter. At the same time, this also drove me to augment the lab with new devices around which to build projects.

As we began to work with microprocessors, the success of my lab depended heavily upon having lab teaching assistants who had previously taken my course. Over all the years of my teaching, I am grateful that our department supported the extra budget for my undergraduate TAs. It made all the difference. It was a treat for me to approach my best students and ask if they would like to serve as a TA for my lab. And what an outstanding group they have been over many years!

Anna: Building a new lab is always a challenge for a new professor. How did you get started?

John: I was fortunate in 1966 to secure an NSF grant that permitted us to build what we called a digital synthesizer. It had a panel of binary switches and thumbwheel switches for input and binary lights and Nixie tube decimal lights and a stepper motor for output. Digital logic components were connected together and to the input/output devices via a plug board receiver. Thirty-five custom built plugboards allowed each student to use the plugboard assigned to him/her (not many "hers" in those early days!) and implement his/her own design for a specified project with plugwires inserted into the plugboard with its lettered and color-coded pattern. It was quite sophisticated for those early years of digital design.

Anna: What was distinctive about Georgia Tech to you as a new professor in your early years?

John: When I first came to Georgia Tech, my assignments included developing and teaching undergraduate and graduate courses in Digital Systems Design. As my career evolved, it became clear that I had less interest in graduate research but was passionate about undergraduate teaching and laboratory development for my digital design senior elective. The resulting migration was acceptable as a career trajectory, in contrast to what I would have found at many other schools. Furthermore, my course was driven by what we were doing in the laboratory. Each day I'd show up in class with a fresh set of handout notes for the students. Pretty soon I wanted to turn the notes into a formal textbook, but between the heavy academic year teaching load, the necessity to secure summer jobs, and participation in raising my young family, it was difficult to find time to dedicate to a book. Demetrius Paris, who succeeded Ben Dasher as School Director, made a huge difference in my life by offering to support me on the summer budget in 1970 if I would remain in Atlanta, devoting my time exclusively to the completion of my first book before the fall quarter began.

I will be forever grateful to Demetrius for his unflagging support. Even in years of tight budgets, Demetrius made a huge difference. He was aware that I was consuming more than my fair share of his copying budget but he never raised the issue, knowing that the materials consumed drove my ever-evolving lab and course development activities and thereby, my textbook writing.

After completion of that summer manuscript, I consulted with my office neighbor Kendall Su, a very successful textbook author, on how to get the book published. He wisely advised that I submit the manuscript to all six or so major engineering textbook publishers. He pointed out that an editor could have an unspoken reason to discourage an author, perhaps seeing the book as a possible competitor to a forthcoming textbook of their own. McGraw-Hill came back to me with a contract. In fact, the manuscript was written by me in pencil and, after considerable editing by my wife Marilyn, was typed on an IBM Executive typewriter with its proportional type font. She produced amazingly clean pages that looked very different from what a book editor was used to receiving — heavily marked up pages and a normal typewriter's monospaced type font. McGraw-Hill bypassed the galley proof stage and skipped directly to page proofs resulting in a 1972 early release of the book.

Anna: What else was going on in your early career?

John: I had been invited to the 1968 Freshman Camp by an enterprising rising senior, EE student Jim Carreker. He included me with his cabin-mate freshmen to meet in a Van Leer classroom the night before leaving for Rock Eagle. We sat in a circle and Jim asked each of us to give our name, hometown, and something about ourselves. Then Jim repeated this information flawlessly and followed up with each freshman doing the same, bonding them towards lasting friendships.

Thank God, Jim allowed me to skip the memorization process!

Subsequently, Jim came to me and together with Neal Williams (who would go on to be valedictorian of his class) suggested that we initiate an EE Senior Seminar as a one-hour elective open to juniors and seniors for the 1969 spring semester. After securing authorization for the elective, Jim, Neal, Ray Miller, and Ray Eberle proceeded to invite 10 distinguished people to come and talk to our seniors about subjects of value upon completion of a degree from Georgia Tech. They invited the head of Stanford's EE school, the admissions director from Harvard Business School, the lead designer of CDC's supercomputer, the father of inertial guidance from MIT, an expert on personal financial planning, and five others. It was a revelation to me that these seniors could attract eminent leaders without the availability of travel expenses or even an honorarium. At that moment I realized that these students had unleashed a powerful opportunity that I would continue every spring quarter until Georgia Tech switched from quarters to semesters in 1999.

Anna: Give me an overview of the book writing part of your career.

John: The technology of digital systems was continually changing and advancing, necessitating upgrading of materials for my course and resulting, over time, in the publication of six additional textbooks. My second book Microcomputer-Based Design was published by McGraw-Hill in 1977. It was the groundbreaking book after microprocessors first came on the scene. Sales were evenly split between students and practicing engineers, so I ended up working with both the College Division of McGraw-Hill and their Professional and Reference Book Division on the promotion of the book. It was my bestselling book and funded our children's college careers. McGraw-Hill published my third book in 1980 and the fourth in 1988. My fifth and sixth books were published by Prentice-Hall in 1998 and 2003.

My seventh book Coin-Cell-Powered Embedded Design provided a bit of reminiscence. Because the cost of technical books was ranging around $125-150, I decided to self-publish the book in 2008, utilizing funds accrued from royalties on my previous books. I contacted the person at the company in Chennai, India, who had done the artwork for my previous book. She agreed to do the same plus prepare the page proofs and cover art. I engaged Lulu.com, a print-on-demand publisher to print the book from the resulting pdf pages. I set the price of the book at $16.50, the price McGraw-Hill charged for my first 1972 book. In addition to providing this printed copy, Lulu agreed to provide the pdf pages on their website. Georgia Tech students could use their library privileges to print a free copy. I was very pleased with the outcome.

Anna: I understand that because you organized your sixth book around a PC board that you had designed, you ended up with some fascinating former student interactions.

John: Yes. I had designed what I called a QwikFlash board for my sixth book entitled Embedded Design with the PIC18F452 Microcontroller. The intent was to take what was at the time the top of the line microcontroller of a leading microcontroller company, Microchip Technology, and build a board that could provide a professor with the makings of a microcomputer lab with only the addition of a personal computer. When I approached my editor at Prentice Hall, he was excited about publishing it, not realizing the implication of the QwikFlash board. As we proceeded with the publishing of the book, we talked about the appendix with a parts list for the board and the directions for populating it with these parts. I talked about my plan to include a bare board in a CD sleeve mounted inside the back cover of the book. He balked. He said there was no way he could do that. "Find some other way to deal with that problem, John!" He felt that it was counterproductive to have a potential buyer of the book feel that the price included some unknown amount to pay for the board. I came up with two solutions that satisfied him. By this time, former student Jim Carreker had established an endowment for a chaired professorship in our department. But it had gone unfilled for several years, so I called Jim and asked if he would be amenable to using some of the accrued interest to pay for the boards for the first printing of the book. He agreed and to allay the worries of my editor, a note was included inside the back cover along with the board saying, “The QwikFlash board in this first printing has been provided to you gratis by Jim Carreker, former student and continuing friend.”

The second solution dealt with two issues. How to support the book for a professor who didn’t want to be building boards and how to support the book after that first printing. I talked to two former students and ongoing friends, Bill Kaduck and Dave Cornish, who had created a local company, Microdesigns, some years earlier. I asked them if they would build the board and sell it at cost. To this day they do so from their website www.microdesignsinc.com. It has made all the difference to the life of the book!

Anna: What have been your other interactions with industry?

John: I spent a significant fraction of my early career working directly for Hewlett-Packard. I spent five summers as a digital designer in Colorado Springs, Loveland, Palo Alto, and a year in Scotland. I have always been very grateful to Hewlett-Packard for all of their support.

I served as a director from 1977 to 2014 of a local company, Intelligent Systems Corp., formed by one of our graduates, Charlie Muench. Leland Strange, a Georgia Tech graduate, carried on over the years as CEO. I used some of my director’s fee to buy components for experiments to enhance my lab and subsequently to defray the cost of designing and fabricating “evaluation boards” and “target system boards” with which new generations of microcontrollers could interact with an increasingly sophisticated selection of I/O devices like thumbwheel switches, digital incremental encoders, temperature sensors, stepper motors, magnetic card readers, alphanumeric displays, and even a DigiTalker speaking chip. Over the years and with the help of former student Rick Farmer, we produced new generations of boards to take advantage of advancing developments in microcontrollers and new sophistication in I/O devices.

Anna: Didn’t you gain industry support for some of your lab activities over the years?

John: In 1976 Bryant Wilder, a Motorola engineer and former student, had Motorola give us what they called an EXORciser which led to our getting into the microprocessor laboratory business and the incorporation of microprocessor design into my subsequent books. The EXORciser included a Motorola 6800 microprocessor with associated memory and input/output circuitry. We built a target system board with switches for input and LEDs, a stepper motor, and a seven-segment display for output. By employing a complicated process utilizing the campus computer to write assembly language code for a control design, and the help of Jim Stratigos, a graduate student at the time, we could download the code to the EXORciser and run it to effect sensing and control of the target board elements. The process was tedious and totally absent of debug capability but did afford students the opportunity to do rudimentary microprocessor design.

A major step forward occurred in 1982 when HP gave us their new six station HP64000 Universal Development System that enabled students to develop the program code on the HP64000 and run it on the target board. Over the next several years we built increasingly sophisticated target boards. Each station in the laboratory was equipped with a system for program development and execution with complete debug capability.

Anna: Talk about the projects that led to commercial products.

John: In 1989 Larry Madar and Joe Bazzell worked with me on the design of a two-board evaluation board set. This two-board set provided considerable capability to help a professor build a lab around a microcontroller. Motorola sold it to schools pretty much at cost.

I built my last book around a Qwik&Low board that we designed to form a complete instructional lab. The board includes two chips, a microcontroller, and an alphanumeric LCD controller together with a few other I/O devices. It uses a coin cell for power, and connections to a DC microammeter for monitoring average current—a big deal for such applications. Microchip Technology, via the support of former student and friend, Rawin Rojvanit, sold the board to schools to support a lab for low power applications using this microcontroller.

Anna: What led to your career decision to stay focused on low-cost microcontrollers even as much of the world moved on to ARM chips and their full-bodied competitors?

John: I aimed at the many applications of these low-cost chips in industry. It soon became apparent that an electrical engineering graduate could go to work for almost any manufacturing company and sooner or later find the chance to build "smarts" into their products with an added cost defined more by the cost of development than by that of the parts.

Anna: What are other developments in which you take exceptional pride?

John: We began our microprocessor/microcontroller work, learning to do simple things. For small applications, programming in assembly language (the native language of the chip) made sense, and so this was the language of choice for us. As applications grew in size, the resulting "spaghetti code" with disorganized program flow produced unreliable program execution because of the difficulty of debugging program code. In the early 1980s, Skip Addison took advantage of a feature of the HP64000 development system's assembler to add structured constructs to the assembly language. Thus, the IF-THEN-ELSE construct executes a test and controls the resulting flow of a program. In similar manner the DO-WHILE construct repeats a sequence of instructions over and over again until a test condition is met. Following this introduction, program coding in my lab was transformed. Subsequently as we moved beyond the HP64000 development system, Jessica Meremonte developed a structured assembly preprocessor for an assembler that would insert the assembly language translation of these same structured constructs into an assembly language program.

We eventually switched to the use of the C programming language because the "self-documenting" feature of the resulting programs was becoming a recurrent demand from industry. In fact, a lot of what makes a C program self-documenting eliminated the "spaghetti code" control flow that we had long since eliminated with our structured assembly programming.

Anna: You clearly had a wonderful relationship with your students. In my encounters with alumni, your name always comes up as one of their favorite professors.

John: Tech students are the best. Being a top-notch but relatively low-cost school attracting the best students has been wonderful. Furthermore, any honest professor will tell you that one of the attractions of the profession is the chance to work with students who are smarter than you. The chance to pursue new tool development and equipment development with superstar TAs created most of the highlights of my career. Without going on, let me just point out that I dedicated my last book: "To six former students who changed the direction of my professional life: Jim Carreker and Neal Williams, 1968-1969, Joe Bazzell and Larry Madar, 1989-1990, and Rawin Rojvanit and Chris Twigg, 2001-2002."

On the first day of class I would hand out a sheet asking for information on the students, including a request that they provide the name or nickname that they preferred to be called by. I would use that name in calling roll as a means of connecting with students. And I insisted that they call me John.

Anna: Thank you very much for a most interesting and enjoyable conversation. Is there anything you wish to add?

John: Yes, I almost forgot a very important point. I prepared all my class and lab handouts myself directly with my typewriter, in the early days, and on my personal computer, subsequently. In contrast, all my books, from first to last, were written in pencil on pads of paper. Then my wife Marilyn would take my page-long sentences and grammatical slips and make sense of it all. She even learned the jargon along the way. Without her, I never would have had a book writing side to my career.

Anna: Thank you so much for remembering to include that.

Kendall Su

The Standard for Educator Excellence

Kendall Su (left) with his son, Jonathan.

Shortly after President Joseph Pettit arrived at Georgia Tech in 1972, he encountered Kendall Su and remarked to Kendall that he had only recognized Kendall's name on the Georgia Tech electrical engineering faculty. President Pettit surely intended his remark as a compliment, and Kendall took it as such. However, given President Pettit's long-standing affiliation with electrical engineering academia while a faculty member in electrical engineering at Stanford and subsequently dean of engineering at Stanford, his remark was at the same time much more complimentary than probably intended and an apt evaluation of the status of electrical engineering at Georgia Tech.

Pre-Pettit, Georgia Tech was known as an excellent regional engineering school which produced excellent engineers, but whose name recognition had more to do with football than academics. By 1967, the School of Electrical Engineering (EE) had grown to include a little more than 20 tenure-track faculty. The undergraduate student body was large and growing, requiring multiple sections of most required courses, and a valiant attempt at establishing a viable graduate curriculum was underway. Thus, a typical faculty teaching load was four or five courses per quarter, plus some laboratory supervision, and few faculty members were able to find time for research.

Small wonder then that President Pettit's unspoken evaluation was apt, and that his recognition of Kendall was remarkable. Without the benefit of funding for his research or workload relief to pursue it, Kendall persevered. In point of fact, throughout his long and productive career, Kendall neither sought nor received financial support or teaching load relief for his research and publication activities, and yet he authored over 25 refereed research publications, supervised 20 Ph.D. theses, and published six books. He loved his field of endeavor and felt obligated to contribute to its development and elucidation.

Kendall was born in Nanping, China, on July 10, 1926. Nanping is in the Fujian province, bordered on the east by a rugged coastline fronting on the Taiwan Strait and the west by mountains with peaks rising to 6,500 feet. The island of Formosa (Taiwan) lies 100 miles from the coast. Kendall's given name is Ling-Chiao Su; the name Kendall was adopted after he immigrated. He was the seventh of nine children born to the Reverend Ru-Chen Su and his wife, Xiu-Xiang Su. The family lived in a Methodist compound associated with a Methodist school where Kendall's paternal grandfather was a teacher. The Reverend Su lived to be 100. He received his divinity degree from Boston University. Kendall greatly admired his father and recalled him as extraordinarily meticulous and a strict disciplinarian. Kendall's mother, Xiu-

Xiang Wang Su, initially joined the Su family as a domestic worker. Kendall recalls her as a very caring and good mother to her large family.

Kendall attended primary and secondary schools in Nanping and finished in 1943. In the fall of 1943, he entered college at the National University of Amoy, also known as Xiamen University, which was then located in temporary headquarters in Chang-ting due to the Japanese occupation and blockade of the coastal area. In 1946, the university moved back to the Amoy campus where Kendall completed his bachelor's degree in electrical and mechanical engineering. He then went to work as a junior engineer with the Taiwan Power Company in Taiwan, China. Kendall emigrated to the U.S. in 1948, which was fortunate timing. In 1949, communists took over mainland China, and the nationalists fled to Taiwan after that emigration became more difficult.

Kendall's immigration and subsequent enrollment as a graduate student at Georgia Tech was facilitated by a Rotary Club program. A husband of one of Kendall's sisters, David Lin, had received a Methodist church scholarship to attend Emory University in Atlanta. David Lin learned of the Rotary Educational Foundation Scholarship from Kendall Weisiger, whom he knew. Mr. Weisiger was the president of the Educational Foundation of Georgia and ultimately arranged for Kendall to receive a fellowship attending Georgia Tech. After receiving Mr. Weisiger's fellowship letter, Kendall, having decided an American first name would be advantageous, adopted the first name of his benefactor.

Kendall completed his master's degree at Georgia Tech in 1949. In the fall of 1949, he enrolled at the University of Washington to pursue the doctorate, since Georgia Tech was not yet certified to grant Ph.D. degrees. Kendall didn't like the weather in Seattle, so when Dr. Domenico Savant, then Director of the School of Electrical Engineering at Georgia Tech, offered him a graduate teaching assistantship and asked him to enter the newly formed Ph.D. program at Georgia Tech, Kendall gladly accepted and happily returned to Atlanta in the fall of 1950. He completed his Ph.D. in 1954. His thesis, entitled "The

Approximation Problem in the Synthesis of R-C Networks," was under Dr. Ben Dasher. Kendall was the third to receive the Ph.D. degree from the School. While serving as a graduate teaching assistant, Kendall found that he liked teaching, so when Ben Dasher, who had become Director of the School, offered him a position as assistant professor, Kendall readily accepted and joined the electrical engineering faculty in fall of 1954.

Jennifer Su, Kendall's wife, was born in Shanghai, China, but moved with her family 10 years later in 1948 to Taiwan. In Taiwan, she attended Taipei American School, an English-speaking school, and many of the students were children of U.S. military or U.S. embassy employees. After completing her secondary education, Jennifer applied to Brenau College, was accepted, received a scholarship, and, after clearing the necessary hurdles, came to Atlanta. She met Kendall through mutual friends in 1957, and they married in 1960.

Jennifer and Kendall have two children, Adrienne, born in 1967, and Jonathan, born in 1969. Adrienne was educated at Harvard and the University of Virginia. She is currently poet-in-residence and professor of creative writing at Dickinson College in Pennsylvania. She is the author of four books of poetry and the mother of two daughters. Jonathan followed in his father's footsteps and studied electrical engineering, receiving his BSEE at Rice University and his Ph.D. at Georgia Tech. Jonathan's doctoral advisor, Regents' Professor Russell Mersereau, offered Kendall the opportunity to install Jonathan's doctoral hood, which Kendall eagerly accepted and proudly conducted at Jonathan's graduation. Jonathan is now a research scientist at MIT Lincoln Laboratory. Jennifer had several impressive years as executive secretary at The Portman Companies when its famous founder, Atlanta architect John Portman, was extending his operations into China. She remains the strong and quiet bulwark of the Su family.

Kendall's contributions to Georgia Tech were considerable. He was, without a doubt, the first "homegrown scholar." He reached the highest academic position of Regents' Professor, the first electrical engineering faculty member to be so recognized.

For four decades, he set the standard in teaching and scholarly publications. Kendall retired in 1994 but continued teaching for almost 10 years after he "retired." Kendall was the mainstay of the required undergraduate circuits courses, so most electrical engineering graduates for five decades underwent the "Su treatment." When asked, the common Su descriptions utilized were "tough" and "fair." He was sometimes described as "Killer Su." Many alumni credit his toughness in the beginning electrical engineering courses for preparing them for the rigor that would follow.

The course EE 205, required for all electrical engineering undergraduates, was the beginning circuits course until the curriculum change brought on by the Board of Regents mandatory degree credit hour reduction in 1973 and the material was moved to new courses, EE3200 and EE3250. Generally, there were three or four parallel sections of 205, with three or four different instructors, Kendall usually being one of them. Frequent quizzes were given in all sections, and so there was the inevitable competition regarding which section achieved the highest average quiz score. Kendall's section almost always won. In addition to the core circuits courses, Kendall developed and taught courses in network synthesis and analog filter design.

The material from the analog filters course was the foundation for his last book, Analog Filters. This book was written later in his career after Adrienne and Jonathan had finished their undergraduate studies. He later told Jonathan that he had become focused on putting his children through college rather than advancing his career.

When he embarked on this project, he was very excited about writing again. Roger Webb, who as a graduate student took most of Kendall's graduate courses, describes Kendall as, "without a doubt the best instructor I had in my many years taking engineering courses. His lectures provided no entertainment value, but what they did provide was truly remarkable conciseness and clarity. He was a master at elucidation."

David McElroy, another of Kendall's graduate students who eventually did his Ph.D. thesis under Kendall, remarks, "Dr. Su was an excellent teacher with unique ability to clearly and concisely explain complex material. His thesis supervision style was to suggest various research topics and approaches, then allow the student freedom to discover, and flounder, providing periodic guidance as necessary. The training and guidance I experienced under Professor Su prepared me well for what is now a 47-year-and-counting successful career at MIT Lincoln Laboratory. I appreciate having him as my Ph.D. advisor, my mentor, and my friend."

Kendall's first publication of note was his doctoral thesis, which won the Georgia Tech Sigma Xi Best Thesis Award, of which he was very proud. Several IEEE publications based on his thesis research followed, some co-authored with Ben Dasher. Kendall's overall publication record, including his books, is well-recognized for the significance of his contributions and the quality of his scholarship. Kendall's book, Fundamentals of Circuits, Electronics, and Signal Analysis, published in 1978, was utilized for many years in the electrical engineering circuit courses. Fellow faculty member Dave Hertling, while visiting his alma mater, University of Illinois, encountered Dr. Mac Van Valkenburg, then dean of engineering at Illinois and himself an icon in the circuits world. Van Valkenburg, upon learning that Dave was at Georgia Tech spontaneously expressed his admiration of Kendall Su, remarking that he would recommend Kendall's books to anyone interested in circuit theory. This appreciation, coupled with President Pettit's earlier recognition of Kendall, confirms Kendall's stature and the significant role he played in enhancing recognition of Georgia Tech's electrical engineering program.

Kendall, a quiet, self-effacing, and friendly person, was genuinely liked and admired by colleagues. His devotion to scholarship and the quality of that scholarship are well-recognized and admired. His classroom teaching and student mentoring were truly exceptional. When he finally "hung up the chalk" in 2003, he left behind an enduring standard of educational excellence.

Conversation with Jim Carreker

Jim Carrecker

Jim Carreker 'got out' of Georgia Tech in 1969 with his bachelor's degree in electrical engineering and embarked on a remarkable career, not only for its success, but also for some unexpected twists in its trajectory.

Jim's early career was fairly typical. He first went to work for a large telecommunications technology firm, took a year off to earn a master's degree in electrical engineering at Stanford, went to work at a small technology firm in Texas, and then moved back to California to work at a market research firm. After researching large business firm's call distribution operations, he decided that his entrepreneurial itch needed scratching. He started his own technology business, Aspect Telecommunications, in 1985 — a company that provides software to affect efficient operation of call centers which were rapidly becoming a significant factor in the operation of large businesses.

Aspect operated on venture capital funds until Jim took it public in 1990. As CEO of Aspect, Jim grew the business into not only the largest provider of call center software systems, but also a provider of consulting services to Aspect's international clientele.

In 2000, Jim decided to move on to something else and left Aspect. He entered into a seemingly completely distinct path as a hotelier. Jim and his wife Helen arrived in South Australia in 2004 and opened a boutique hotel and restaurant in Barossa Valley, Australia's equivalent of Napa Valley. They grew that into a very successful business based on the same principles that governed Aspect, according to Jim.

In 2020 Jim launched the next phase. He and Helen retired, returned to the U.S., and embarked on spending quality time with their daughter Lauren and her family.

Throughout his career Jim has remained involved with Georgia Tech by giving generously of his time to serve on advisory boards, as well as his resources to provide funds for ECE to create an endowed chair and programmatic funds to support that position. The Carreker family connection to Tech has continued. Their daughter Lauren earned a master's degree in city planning and a master's degree in civil engineering and their son-in-law graduated with a B.E.E and M.S.E.E.

Suzy Briggs worked a great deal with Jim when she was the School's development officer from 1995-2005, becoming close to him and his family. She conducted the following interview.

SB: Hi, Jim. Thanks so much for being amenable to this interview. Although I am no longer directly affiliated with ECE, I'm honored to be able to talk to you.

JC: Suzy, I am always happy to visit with you and am pleased be part of the School's newsletter.

SB: Why don't we start with a bit of background. Where did you grew up, how did you decide to become an engineer, and why did you chose to come to

Georgia Tech?

JC: I grew up and attended public schools in Athens, Georgia. We lived literally just a few blocks off the University of Georgia campus. I was certainly aware of Georgia Tech, having visited Atlanta many times during my growing up years. By the time I was in junior high school, I was interested in all things technical, and when I entered high school, it was clear that I would take all the science and math classes available in my high school, and that I would be interested in pursuing an engineering degree in college.

I began looking at colleges and focused primarily on Auburn, Duke, and Georgia Tech. Tech had a lot of strong things going for it. It was far enough away to leave home, but not too far away, and the value proposition was very compelling, as it still is. The cost of going to Georgia Tech versus the value of the degree was a very strong equation. I had narrowed my focus to electrical engineering, and the reputation of Tech's School of Electrical Engineering was very high and well recognized nationwide. By the time I was a rising senior in high school, I knew that I was headed to Georgia Tech. There were over 200 students in my graduating class at Athens High School. Eight of us went to Georgia Tech and over 100 went to the University of Georgia. I was happy to have taken the step to enter Georgia Tech.

SB: Well, you clearly excelled as a student at Georgia Tech and 'got out' feeling good about the experience. Perhaps you can share some highlights of that experience and aspects that influenced your career?

JC: I knew from the first quarter that I had made the right choice of school and major. I think in the mid-sixties many students entered Tech with anticipation that by the end of the first year they might change schools or majors, not having a clear idea of what career path they might choose. That was not the case for me. I was happy to be in EE and wanted to move forward.

During my sophomore year, I took a course in digital systems design from (now Professor Emeritus) John Peatman, which I found very appealing. John encouraged students to think about design and to ask the key questions about the design at the outset of the design process. In my junior and senior years, I took many more courses from John and developed a close connection with him. I encountered many outstanding professors and enjoyed my interactions with them, but John had a unique way of engaging students outside the usual faculty/student context. One such engagement ultimately had a significant influence on my career. With John's encouragement and help, I and two other students of his initiated and operated a program that came to be known as the EE Senior Seminar.

The concept was to bring in outside speakers to help raise the perspective of students about the many and varied career paths available to graduates in engineering, business, academics, medicine, etc. We were successful in attracting outstanding speakers, I think largely because it was a student run operation. I think it was useful for many soon-to-be graduated students. I know it was for me. I remember thinking 'Gee, with this degree I have the keys to go in many different directions.'

SB: So, what directions did you take?

JC: I graduated in 1969 and took a job with a large telecommunications technology company in California. Then I took a year off to get a master's degree in electrical engineering from Stanford University. After completing that in 1970, I took a job with a small technology company in Texas.

By the early 1980s, my wife Helen and I decided to return to California and moved into a home very near to where we lived the year I was at Stanford. I took a job with a market research firm helping others understand technology trends. During that phase, the entrepreneurial itch that started at Tech was rekindled.

In 1985, I decided to see what that meant and give it an opportunity to play out by starting a technology company. I had formulated the technical idea and wrote a business plan. My previous experiences enabled me to understand company financing. Furthermore, I understood the need for a company culture that enabled creating value for customers, for employees, for investors, and for vendors. Also, thanks to Helen's insight, I came to understand that successful companies have a responsibility to create value for the community in which they reside. My business plan, in addition to the financial aspects, presented a matrix showing how we would create value in each of those five areas. I engaged the venture capital community in northern California to secure private funding sufficient to carry the company through the first and second development stages. After five years, we created the exit strategy for the venture capitalists by taking the company public. I led the road show and with two New York banking firms had an underwritten public offering.

Following that, I was the company CEO for the next 10 years. By year 2000, I had been intensely focused on developing and running that business and decided it was time to pass the baton and move on to something else. The something else turned out to become a hotelier, not an obvious choice.

SB: That must have been a challenging transition moving from a technology business to the hotel business?

JC: Well, our technology business had been one in which our customers were dealing with their customers 24/7, and I had observed that the companies that did the best job of meeting and exceeding their customers' expectations seemed to thrive. We thought that the hospitality industry provided a great way to engage with people and create the value of the enjoyment provided. It's a very different field, but the same principles of understanding your customers/guests and creating value for them and the employee team and becoming the preferred employer in the area applied. Also, since we were able to do the financing ourselves without investors, etc., the cost of entry into the hospitality business in terms of time and capital would be relatively modest.

We decided to model our business along the lines of the great hospitality operations we had visited in Napa Valley, southern France, and northern Italy and create a small luxury boutique hotel with a great restaurant in a wine region. So, having the business strategy well defined, the remaining question was where to locate. We spent 2002 doing worldwide market research and settled on a wine valley in southern Australia called the Barossa Valley which is to Australia like what Napa Valley is to the U.S. It was a well-established and highly regarded wine region but did not have a destination hotel or a great restaurant. So, we decided 'if we built it they would come,' and by 2004, we were there and on our way. Helen and I built a very successful business and operated it for 16 years.

In 2020, we decided to move on to the next phase of our lives, a much more obvious transition of retiring, returning to the U.S. and spending much more time with our daughter Lauren and her family.

SB: You've had a fabulous career and used the 'keys' creatively and well. I can imagine that building and operating two successful businesses was very time and energy consuming. But, through it all, you've managed to very generously give back to Georgia Tech, serving on advisory boards and providing endowments. Perhaps you could speak a bit about that?

JC: I stayed engaged with Georgia Tech throughout my career. The EE Senior Seminar continued year after year, and I was invited as a guest speaker several times, enabling renewal of my relationship with John Peatman and other faculty.

When Roger [Webb] became School Chair in the late 1980s, he set about establishing an external advisory board and asked me to join. The board, which met twice a year, was comprised largely of EE alumni who had gone on to establish successful careers in a variety of fields. Roger expressed the view that the School had the potential to become recognized as a member of the top echelon of electrical engineering programs in the country. He defined the metrics for school ranking and recognition and challenged the advisory group to help advise him on a multi-year pathway to enhance the School's visibility locally, nationally, and internationally. Very many different approaches and experiences were brought to those discussions. I felt like Roger received great advice from the group, was open to the advice, and followed and enacted upon it. I think it had an early and positive result. I found all that to be a fascinating experience and think it had a lot to do with my decision to establish an endowment for the School.

Later, I was asked to become a member of President Clough's advisory board, GTAB [Georgia Tech Advisory Board]. I also found that to be fascinating. That was at a time when Tech was expanding across the expressway and spirited discussions were held about that and how to avoid dividing the campus.

There was also consideration regarding broadening the student population to include more women. Encouraging entrepreneurship was also a consideration. One of the most satisfying outcomes of my service on GTAB was the opportunity for Helen and me to become personally acquainted with Wayne and Anne Clough. We remember fondly when Wayne and Anne invited Helen and me, our daughter Lauren and husband Jay, and my parents to a private luncheon at the president's home.

Circling back to the endowment thing; I did not expect the outcome of starting a company would provide resources in excess of what we needed. So, by the time we reached age 50, Helen and I felt like we had the opportunity to give back and it was natural to begin discussions with the ECE School development team.

There were many open pathways and we to fund an endowed chair, and with the Georgia Research Alliance, to co-found a center known as the Arbutus Center. Our intention was to name the endowed chair the John Peatman Chair, thinking it would be a great way to honor John for his 40 years of teaching and working with students beyond the classroom, but John would have no part of that. He felt that while he was still an active faculty member it would be uncomfortable to have a faculty colleague holding the John Peatman Endowed Chair and requested that the position be named something else until he retired. We initially named it the Arbutus Chair. But when John retired we, with John's agreement, had a small ceremony and announced that the Chair would be henceforth be the John Peatman Chair and tied it back to my student experiences with John and my desire to recognize him for that.

The John Peatman Chair was utilized to attract Ed Coyle to join the faculty. Ed had previously been at Michigan and Purdue, where he had successfully initiated programs to enable students working in teams to engage in creative activities. Ed brought that idea with him and, through the Arbutus Center, initiated the VIP program, which has flourished.

SB: Yes. I worked a bit with Ed on a Department of Energy solar decathlon project. It was proving difficult to get students to commit to participate. Working with Ed, we were able to integrate the project through VIP (Vertically Integrated Projects), enabling students to get academic credit for participation, and it made a huge difference. I think the same notions of teams of students working together on creative projects and getting academic credit have also been incorporated in the Create-X program, which is also flourishing.

JC: I can't imagine a better way to engage faculty and student teams in real-life problem-solving activities that cut across disciplines, and I do think a key element in the success of such programs is the academic credit thing. I give a lot of credit to Roger Webb's leadership of the School of Electrical and Computer Engineering in pushing that concept and finally obtaining Board of Regents approval.

SB: I thank you so much for taking the time to talk with me, Jim. I wish you and Helen success in this new phase of your lives.

JC: Suzy, it is always a pleasure to visit with you and I thank you for taking the initiative. Being a part of the lives of Lauren and her family as opposed to being the grandparents who showed up at Thanksgiving is already making a world of difference. This new phase is an important and very rewarding change for us.

Georgia Tech College of Engineering

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