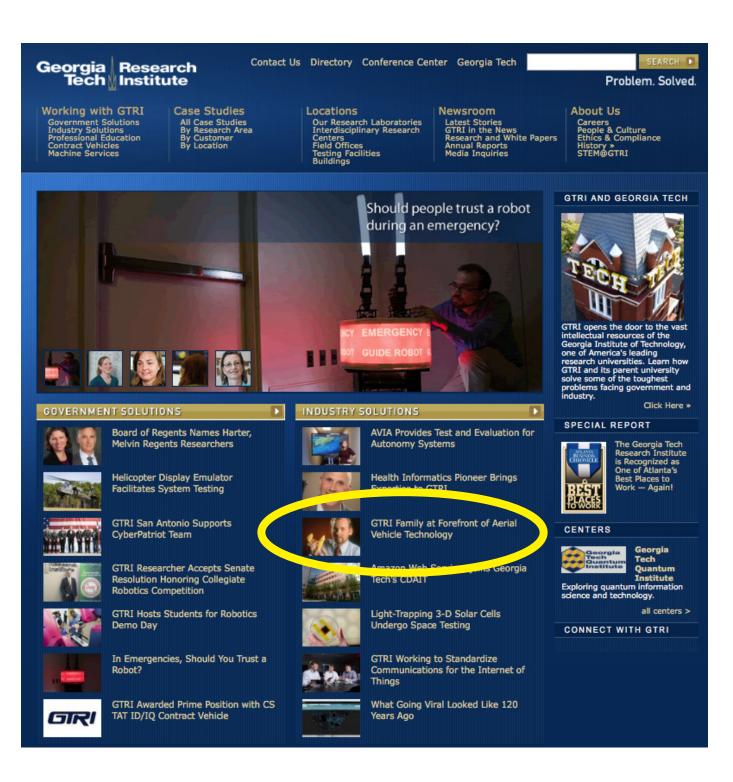# GTRI HOME PAGE: Retrieved 10 September 2016
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Georgia Tech Family Members at the Forefront of Aerial Vehicle Technology

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Former Georgia Tech Research Institute (GTRI) researcher Robert Michelson has created quite a legacy.

A pioneer in both radar and unmanned automation, Michelson developed a series of advanced autonomous flight systems, and the patents filed ultimately led to creation of the "Entomopter," a flapping-wing, "insect robot" that was funded by NASA, DARPA and the Air Force Research Laboratory for both a potential Mars explorer and intelligence gathering, respectively.

Michelson, credited with coining the phrase "aerial robotics," initially started his career at GTRI in the research of radar systems and remote sensing. But, he said, he worked to direct projects that combined these core competencies with his initial interests of digital automation, control of systems, and sensors, which all used radar.

A legacy of technology

"The burgeoning field of unmanned aerial vehicles (UAV) was receiving a lot of attention during the late 1980s, so my attention shifted toward the automated control of flying things with an emphasis on total autonomy of flight," Michelson said. He then transferred to the newly formed Aerospace, Transportation and Advanced Systems (ATAS) Laboratory, where he worked on projects pertaining to future vehicle technologies, electric vehicles, and automated rotary wing vehicles.

Former GTRI researcher Robert Michelson speaks on the future of unmanned systems at the 24th IARC in Beijing.

"My primary interest was the development of advance autonomous flight systems, as the technical area manager for Battlefield Robotics and Unmanned systems within ATAS," he said. This work culminated in the Entomopter design.

His research expertise led to his election as President of the board of directors of the Association for Unmanned Vehicle Systems International (AUVSI), where he had also been named the technical chairman. More than two decades ago, through his work with AUVSI, he then established a unique, first-of-its-kind, college-level robotics competition, the International Aerial Robotics Competition (IARC).

Started in 1991 on the Georgia Tech campus, the IARC is the longest running collegiate robotics competition in the world. The competition changes venue from year to year, and in 2012 the competition grew to two different venues a year.

"As the new technical chairman for AUVSI I had the opportunity to do something that I had hoped to do at Georgia Tech, but for which there was no funding," he said. "I wanted to create the world's first aerial robotics competition with a mission that was impossible at the time, but technically feasible, and then let university teams from around the world attempt to master the challenge."

The family business

While Michelson retired with 30 years at GTRI, his legacy lives on—not only because of his work—because of the work of his children. Christian and Stuart Michelson are not only both researchers at GTRI, but they work diligently to continue IARC's legacy: to present state-of-the-art challenges and provide a global stage for college students to find unique solutions.

Both researchers recall time with their father as children with providing them a foundation to seek work in a technology-related field. Stuart is a researcher in the Human Systems Engineering Branch of the Electronic Systems Laboratory (ELSYS). A full-time employee since 2013, he started as a Georgia Tech co-operative student in 2007 and continued as a graduate research assistant in 2011. Following in his father's footsteps, he was nominated by the Atlanta Chapter to the Board of Directors of AUVSI in 2015.

"Our father knew exactly how to foster interest in technology by spending time with us," Stuart said. "Childhood involved spending lots of time at GTRI's Cobb County Research Facility, where on Saturdays we would often visit and learn about aircraft, science, and the tools with which he worked."

Stuart recalls building rockets, anthropomorphic robots, and using the tools available in the laboratory.

"He instilled perhaps the most important trait in us both: To strive for excellence in all that we do," he said. "That mindset has always attracted me to Georgia Tech and GTRI, where excellence is expected and fostered."
Christian agreed, adding that he knew he wanted to work for GTRI at an early age.

Robert Michelson, above, continues working on the IARC with his sons Christian, left, and Stuart.

"I always had an interest in science, technology, robotics, radio, and military history," he said, recounting the days spent at CCRF with his father. "I was always attracted to the idea of conducting work that has an actual impact on the world. As soon as I enrolled at Georgia Tech, I looked into the co-op program and sought a position at GTRI."

Christian's first job as a co-op in 2005: working in ELSYS on EO/IR missile warning systems. He continued on as a GRA in 2008, and became a full-time researcher in 2010. In 2013, he earned the title of Researcher II.

"As a teenager, my father taught me the fundamentals of radar and electromagnetics," he said. "I continued electromagnetic studies in graduate school, and gained even more interest in the field. Ever since I have focused on this area, and am currently the associate head of Advanced Jammer and Decoy Branch within ELSYS, which focuses heavily on RF-centric electronic warfare."

The elder Michelson retired from GTRI after 30 years of service at only 53, while his sons were still working on their advanced degrees at Georgia Tech.

"I had moved on into the world of private consulting and other lifetime endeavors," he said. "But, they both applied and were hired into GTRI. I guess they saw the fun nature of GTRI's work over the years."

Inspiring the next generation

While they didn't work together at GTRI, the family has continued to make the IARC a success.

"Even before they were full time at GTRI, they continued to assist me with the competition in various capacities," he said, adding that Stuart has taken over responsibility for the American venue of the competition, hosted annually on Georgia Tech's campus. "Now that there are two international venues (Atlanta and Beijing), I decided to hand off the American venue. I've many more projects to tackle beyond the IARC."

Christian, the oldest, has attended all but one of the competitions.

"I was 6 during the first year of the IARC in 1991," he said. "Initially I was a spectator, but in my teenage years I began to help with logistics and operations." Currently he serves as a line judge, technical arena designer, and IARC Webmaster. He has served in the roles of waypoint judge, cameraman, frequency control operator, and robot operator. "The majority of my tasks are done on evenings and weekends, and slowly ramp up prior to the competition each year."

The IARC has been part of Stuart's life for as long as he can remember.

Robert Michelson presents the award to winners of Mission 6 of the IARC.

"It didn't matter how young I was, I always had an important role to play," Stuart said. "It is satisfying to see many of the iconic attributes of IARC and know that I had a hand in them from the beginning. As the venue organizer for the American venue on the IARC, I have deep appreciation for all the moving parts that have to be in place to make an international event successful."

The siblings' life-long interest fostered by their father has not only helped them work in a research capacity with others, but also helped them to work together.

"Having extensive electrical, computer, human systems, and mechanical engineering strengths within the family allows us to take most tasks from start to finish 'in-house,' Christian said. "Since we are all very close we know whose skills are best suited to a given task."

From Aug. 2 to Aug 4, 2016, the family members worked this year's event, organizing the 40 teams representing eight countries at Georgia Tech's McCamish Pavilion.

"We are a good team, and we know how to apply our individual strengths," Stuart said. "Each of us has specialized professionally in different areas of engineering and science, and just like projects at GTRI, we are a multidisciplinary team.

"When we combine this with an uncompromising dedication to accomplishing tasks with excellence, you'll never cease to amaze yourself at what you can accomplish."