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## They Took What Was Possible – And Pushed It

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# THEY TOOK WHAT WAS POSSIBLE—AND PUSHED IT

A vision, a “what if,” a breakthrough – sometimes life depends on it. Other times, it’s life as we know it but with culture-defining flavor. Meet four of Furman’s greatest – **Herman Lay ’30, H ’67, Fran Smith Ligler ’72, H ’18, Thomas Goldsmith Jr. ’31, H ’59 and Charles Townes ’35, H ’60.**

BY KELLEY BRUSS

**F**

URMAN STUDENTS leave campus every year ready to make a mark in their careers and cities. And over the years, a handful have left to achieve things so significant the effects have been felt around the world.

Some of their names you may know. Some of their work you may use every day, without even knowing it. Their paths are unique. But they have shared a remarkable commitment to those paths, a confidence that more was possible and that they were the ones to reach for it.





## HE SEIZED AN OPPORTUNITY – AT AGE 10

His last name is a potato chip icon – thick, white letters on a waving red banner. But the legacy of **Herman Lay '30** extends far beyond the snack aisle, and into philanthropy and cultural ubiquity.

Lay, who attended Furman in the 1920s, was the first CEO of PepsiCo, the company formed in 1965 through a merger of his Frito-Lay with Pepsi-Cola. Today, PepsiCo is a multibillion-dollar blue chip company, selling food and beverages around the world. And it's not just Pepsi, Fritos and Lays. If your pantry holds Quaker, Gatorade, Tropicana, Ruffles, Cheetos or Aquafina products, to name a few, Lay's company is in your life.

His story has a suggestion of destiny: As a 10-year-old, Lay reportedly sold peanuts and soft drinks at Greenville Spinners baseball games. In 1926, he started at Furman but left in 1928 to earn money to continue his education. After a series of short-term positions, he took a job as a distributor for a potato chip company.

But instead of returning to college, he bought out his employer in 1939 and reorganized as H.W. Lay and Company, selling Lay's Potato Chips for the first time.

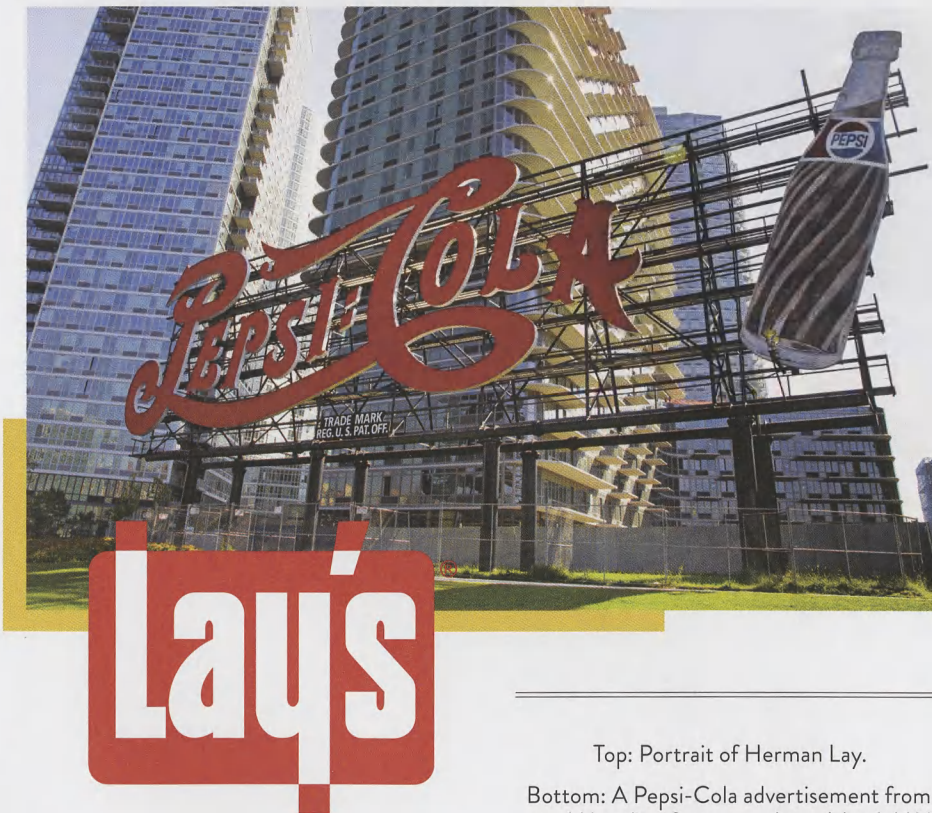
Anthony Herrera, executive director of Furman's Office for Innovation and Entrepreneurship, says people who operate like Lay are game changers.

"He seized an opportunity by developing a product customers want," Herrera says.

After becoming one of the largest snack food companies in the Southeast, Lay merged with a Texas businessman selling Fritos corn chips. Just four years later, Frito-Lay and Pepsi-Cola formed PepsiCo.

In its online overview, the company reports operating today in more than 200 countries and territories. Its brands include 22 that each generate more than \$1 billion in annual retail sales. Furman awarded Lay an honorary doctoral degree in 1967. He retired as chairman of PepsiCo in 1971 but maintained an active role in the company until his death in 1982.

"It's not every day that a university can claim that they have an entrepreneur at that scale," Herrera says.



Top: Portrait of Herman Lay.

Bottom: A Pepsi-Cola advertisement from an old bottling factory on Long Island, N.Y.



## LIVES DEPEND ON IT

**Fran Smith Ligler '72** was working at the U.S. Naval Research Laboratory in the 1980s when she started having trouble sleeping at night. Homeland security was a hot topic and she intimately understood the destructive power of biochemistry.

"I realized that I had the expertise to wipe out the city of Washington; that scared me," Ligler says.

But fear didn't paralyze her. It sent her to the lab, where her team designed portable sensors to detect agents used in biological warfare. Ligler developed the biochemistry for the sensors: "How do you put ultrasensitive recognition molecules in a piece of hardware and keep them alive and functioning?"

Some of her early sensors, constructed for Operation Desert Storm, weighed 150 pounds. Within a few years, they were less than 10 pounds and fully automated, small enough to be carried by a small drone. Today, one version can be stowed in a soldier's backpack.

In 2017, portable optical biosensors for a wide variety of applications earned Ligler a place in the National Inventors Hall of Fame, alongside the likes of Thomas Edison and his electric lamp and Orville and Wilbur Wright and their airplane.



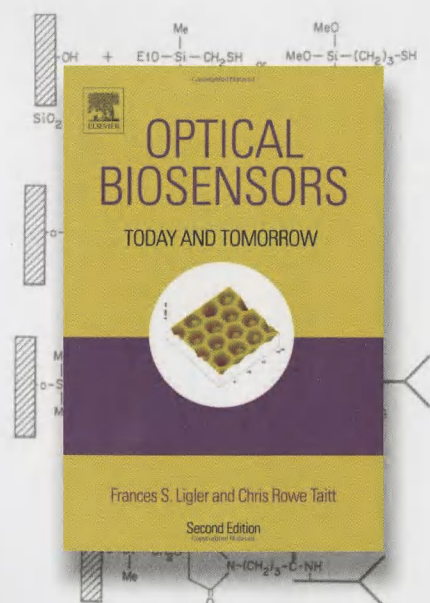
**Fran Smith Ligler '72** speaks during her induction into the National Inventors Hall of Fame in 2017. (Bottom left) A copy of Ligler's publication "Optical Biosensors."

As of 2019, Ligler was one of 39 women and 581 total inventors in the Hall of Fame, which honors American patent holders who have demonstrated outstanding ingenuity and persistence. (**Charles Townes '35** was inducted in 1976.)

Over her career, Ligler has patented and commercialized 11 biosensor systems. Six remain on the market and are used in tasks as varied as detecting and identifying biological warfare agents, sampling for contaminants in groundwater, scanning for explosives in harbors, and testing new mothers in developing countries for diseases such as AIDS and hepatitis.

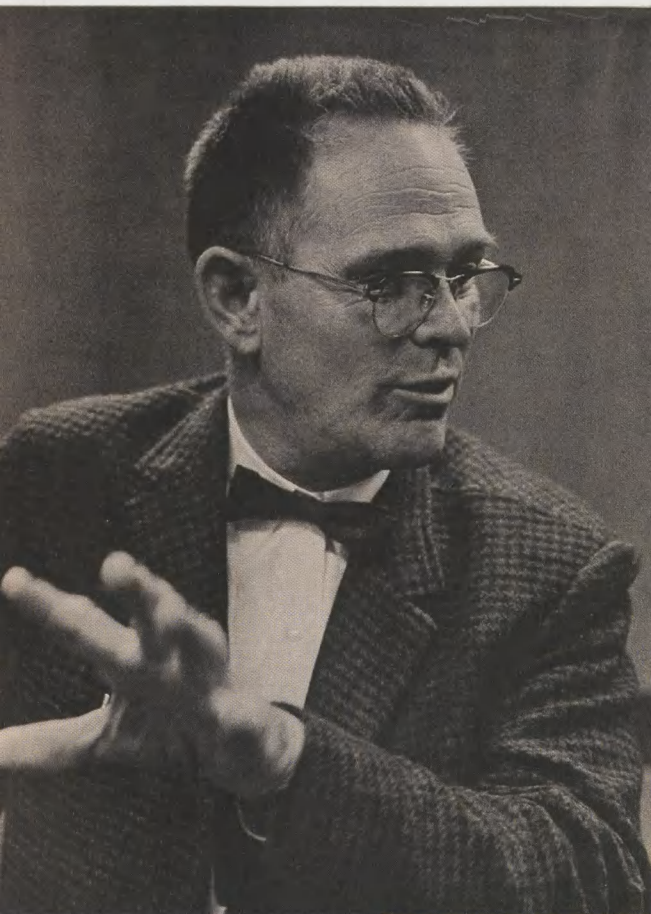
Ligler came from Louisville, Kentucky, to study biology and chemistry at Furman. She finished degrees in both sciences in three years and went on to earn a doctoral degree in biochemistry from Oxford University. She is now a professor in the Joint Department of Biomedical Engineering at both the University of North Carolina-Chapel Hill and North Carolina State University.

"I feel very fortunate that I have had a chance to work on very hard problems," she says.

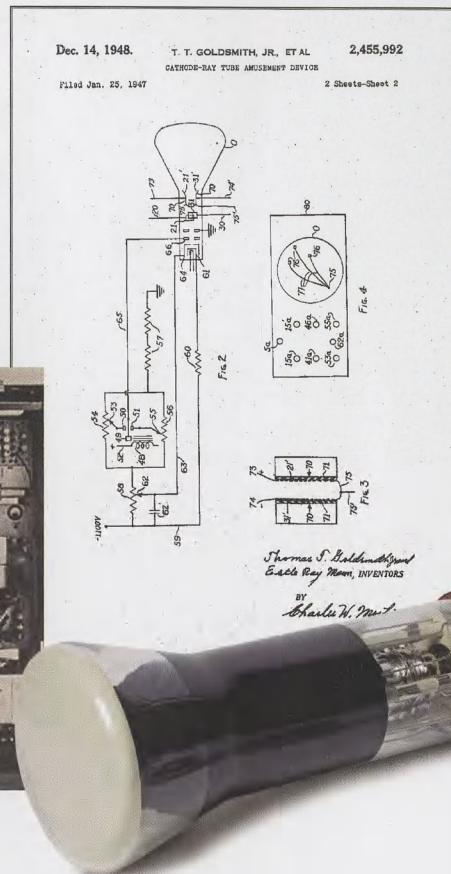
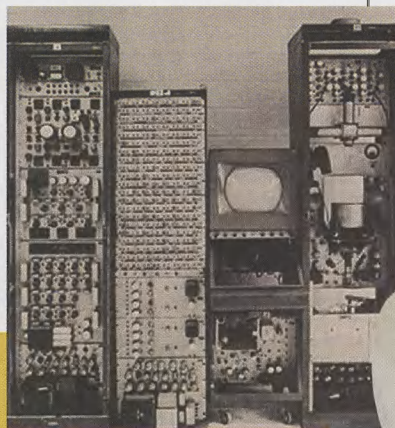


**FIG. 1**





Thomas Goldsmith '51, a cathode ray tube and the schematic for Goldsmith's patent.



**AN 'AMUSEMENT DEVICE' THAT DID SO MUCH MORE**

In 1966, **Thomas Goldsmith Jr. '31** left the television industry and returned to Furman as a physics professor. He moved a truckload of equipment into the science building and later invited his new colleague Bill Brantley to come see the collection.

One of the devices echoed Goldsmith's radar work during World War II. Brantley, a physics professor at Furman, describes it as a mounted cathode ray tube that allowed a user to aim an electron beam at targets pasted outside of a screen.

With simple dials "you could control where the

electron beam landed," Brantley says. "My grandchildren could have mastered it. Not me."

While the scientific world largely remembers Goldsmith for his contributions to television and broadcasting, some say he also deserves credit as father of the video game.

Goldsmith and a partner filed a patent in 1947 for a "cathode-ray tube amusement device." In 1948, it became the first patent granted for an electronic game.

"He liked experimental work," Brantley says. "He was always making things. He could take the proverbial chewing gum and string and make something or fix something."

At 10, Goldsmith built an amplifier for his grandmother, who was hard of hearing.

Decades later, he was part of a DuMont Television team working in a Washington, D.C., hotel. That experiment resulted in WTTG (for Thomas Toliver Goldsmith), the nation's second television station, which still broadcasts today as part of the Fox network.

Goldsmith, a Greenville native, earned a bachelor's degree in physics from Furman and a Ph.D. from Cornell University. He was research director for Alan B. DuMont Laboratories before returning to Furman as a professor. He died in 2009 at 99.

Goldsmith was remembered in his New York Times obituary primarily for his role in the development of television, particularly color TV. But the Times also nodded to patent No. 2,455,992, his "amusement device."

DuMont labs struggled financially, and Goldsmith's prototype was never developed commercially.

That didn't stop Popular Mechanics from writing in 2016 that "few recognize Thomas T. Goldsmith Jr. as inventor of the first video game system. But they should."



**'THE TECHNOLOGY  
UPHOLDS OUR WHOLE  
ECONOMY'**

**Charles Townes '35**

set out to verify one of Einstein's theories and give laboratory scientists a better way to probe matter, a heady project with a highly specialized application.

But the device he built to create an intense beam of microwaves – the first of what we now call lasers – has had implications far beyond the laboratory. In fact, most people would find it difficult to go through even a single day without using one.

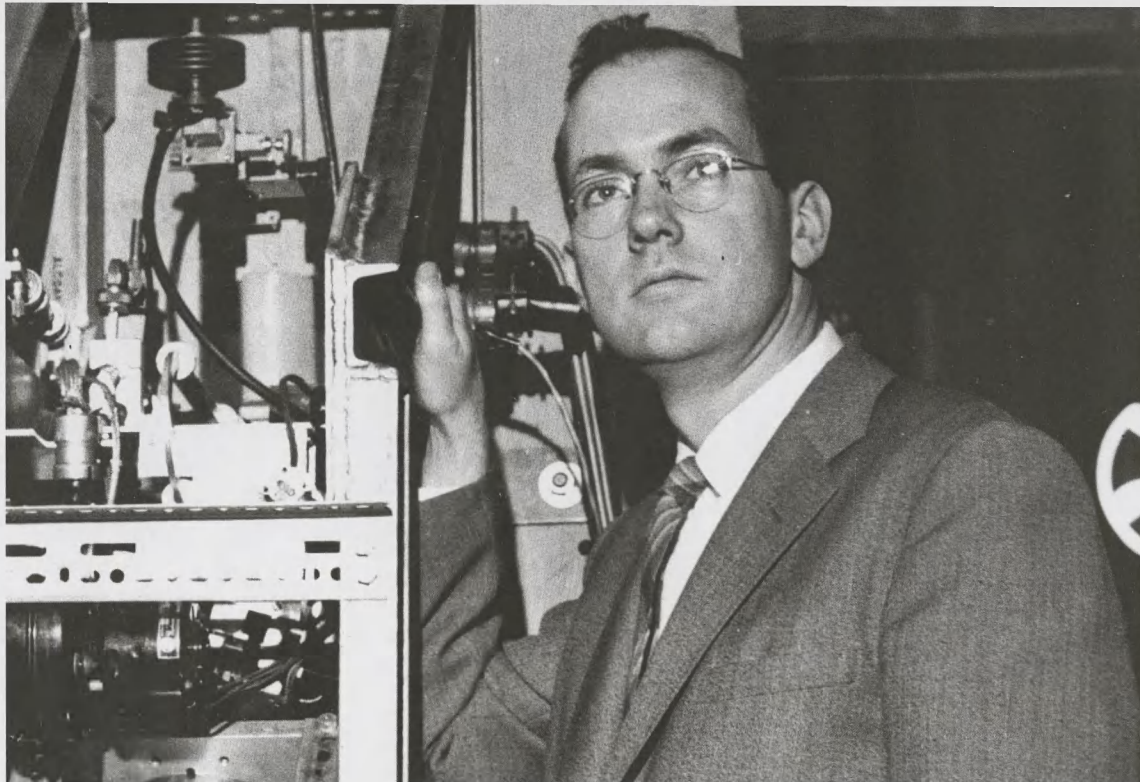
"They're ubiquitous," says George Shields, a chemistry professor and former provost at Furman.

Cash registers, CDs/DVDs, eye surgery, tattoo removal, MRIs, satellites, phones—in fact, the entire field of communications.

"It had a niche use when it was invented, and now the technology upholds our whole economy," Shields says. "It's a testimony to how investment in basic research is so, so important."

Townes, a Greenville native, earned bachelor's degrees in physics and modern languages from Furman, graduating summa cum laude at 19. After graduate school, he spent the years leading up to and through World War II working on radar systems for Bell Labs.

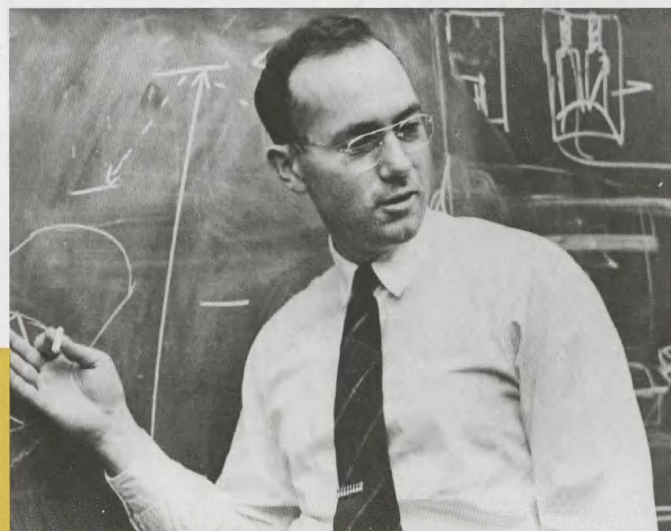
After the war, as a professor at Columbia University, Townes began work on the idea that became the maser, Microwave Amplification by Stimulated Emission of Radiation. The maser led to the laser, using the same principle but in a broader application.



Townes and two Russian scientists shared the 1964 Nobel Prize in physics for the maser-laser principle.

Townes, who died in 2015 at 99, stayed connected to Furman throughout his life, including as a trustee and donor. Students today walk through the halls of the Charles H. Townes Science Center, which houses the university's science departments.

"Some inventions turn out never to have great impact – and some do," says Shields. "And you just never know." ♦



Townes (above) posing in 1957 with the ruby maser amplifier for radio astronomy that he invented, and (below) teaching in the physics department at Columbia University in the mid-1950s.