*John Lienhard records an episode of* Engines of Our Ingenuity. *He provides new presenters a document with twenty practices for research, writing, and presentation on the radio, including word choice, speech habits, and staying within the three-minute time limit.*

Photo courtesy of the University of Houston Cullen College of Engineering.

# John Lienhard

## *An Engine of Our Ingenuity*

*By Cameron Thompson*

One cold October night in Minnesota, a boy and his father sat by their radio, like they always did, listening to the "grownup [sic] stuff" that aired in the evenings. At 7:00 p.m., listeners caught the start of the night's production. The boy and his father, however, tuned in a few moments later – just in time to hear that a meteor had crashed in New Jersey, and something had come crawling out![1]

Along with millions of Americans, the young John Lienhard listened to Orson Welles and his team as they "reported" on the fictional alien invasion on October 30, 1938. Lienhard recounted how that broadcast, a production of *The War of the Worlds* by H. G. Wells, "stretched our minds … and let our imaginations fill in the details."[2] Listeners tried to make sense of the "report," some even mistaking the fictional event for fact.

Lienhard later realized how influential a single piece of technology could be. It was a testament to human ingenuity that a story on the radio could send some listeners into a panic because they missed the warning at the top of the hour; people who heard the broadcast still remember that day nine decades later.[3]

At the University of Houston, hundreds of important technological, scientific, and historical developments have a voice in Dr. John Lienhard. For over thirty-five years, he has combined his phenomenal storytelling ability with decades of academic research to bring over three thousand

*Orson Welles, upper left, and the CBS Radio crew prepare for their infamous* The War of the Worlds *broadcast on October 30, 1938.*
Photo by Acme Telephoto now in public domain, courtesy of Wikimedia Commons.

stories of the *Engines of Our Ingenuity* to life. His passion for technology has inspired generations of listeners, made up of professionals, students, commuters, and more, to tune in to hear the next installment.

## The Man Behind the Microphone

John H. Lienhard was born August 17, 1930, in St. Paul, Minnesota, and moved with his family to Roseburg, Oregon, at age fifteen. Graduating a year later, John did not expect to become a teacher or a radio host; instead, he bounced between jobs, from dishwashing to surveying roads. Growing up in a town where "most of the kids [would] get a job in a lumber mill" after graduation, he could have pursued a similar career but did not.[4]

With a keen eye for draftsmanship – drawing up blueprints – Lienhard decided to study engineering. He worked his way through college, earning a bachelor's degree in mechanical engineering from Oregon State University in 1951. From there, Lienhard's career path took many turns.

*John Lienhard played Rackstraw in a production of* H.M.S. Pinafore *by Gilbert & Sullivan. Though much of his career and life is centered on engineering and history, John Lienhard has always loved the arts.*
Photo courtesy of John Lienhard.

In 1952, he joined Boeing where he worked in the company's "educational unit." There, in his first classroom teaching experience, he instructed newer draftsmen. By the end of the following year, Lienhard left Boeing and completed a master's degree in mechanical engineering at the University of Washington (UW).[5]

Fresh out of graduate school, Lienhard was drafted by the Army where he worked in the Signal Corps Engineering Labs. Throughout all of this, it became increasingly clear to Lienhard that he wanted to teach at the college level, and he soon returned to teaching. After moving from UW to the University of California, Berkeley where he got his Ph.D. in engineering, Lienhard found teaching positions at Washington State University followed by the University of Kentucky. He had become a distinguished professor with decades of experience when the University of Houston (UH) offered him a position at its College of Engineering in 1980.[6]

## "The Way Inventive Minds Work"[7]

After thirty years of classroom teaching, laboratory research, and lecturing for industry and engineering organizations, Lienhard recognized two intertwined problems were emerging between science and the public's understanding of it: engagement and literacy. The lack of scientific literacy, created in part by the jargon and dry language of

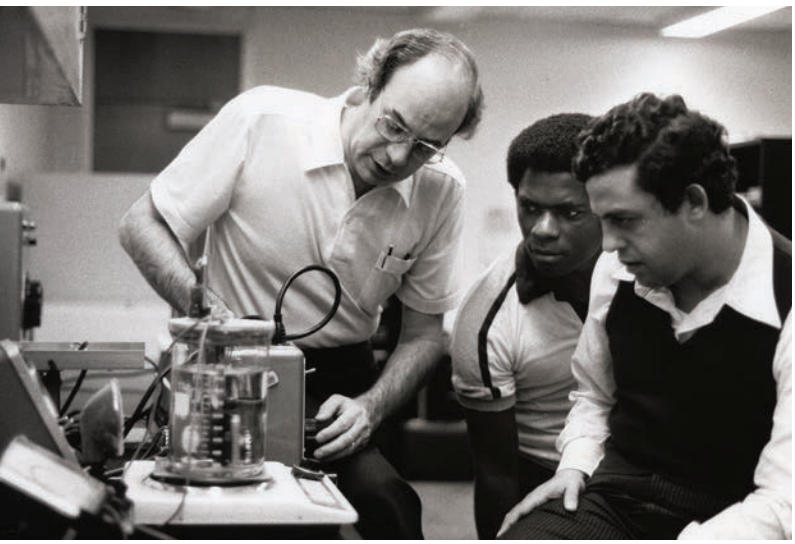
*John Lienhard standing at parade rest during his tenure in the Army Signal Corps Engineering Lab.* Photo courtesy of John Lienhard.

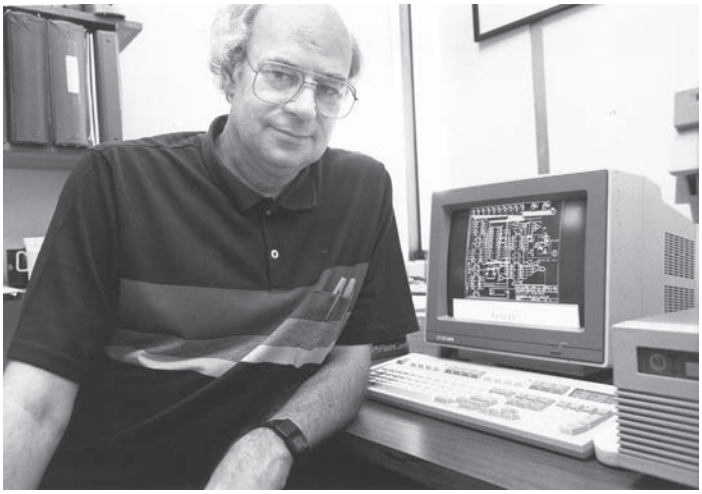
scientific writing, dissuaded public engagement in science. Furthermore, the lack of public engagement meant that scientific authors had no incentive to change their writing style. Therefore, over the course of the twentieth century, more and more people failed to hear what scientists had to say. Lienhard argued that if scientists wanted to renew public engagement, they "[had] to tell the lay public that engineering, science, and math are the work of human beings."[8]

Lienhard, a professional scientist and college lecturer, summed up the problem in how each group responds to what it does not understand. The professional reader, "hungry for a well-told account of what we're doing," can dig into archives and journals for answers; likewise, the student in the lecture hall can raise their hand and ask for more details. But the public "simply switches channels" or walks away. As Lienhard understood it, scientific professionals had reacted incorrectly by turning inward and looking down on the public audience, a practice he called "peculiar mischief born of the noblest intentions."[9] They packed their journals with jargon-filled language and passive voice, so detached from everyday language that the "facts [became] untouched by human hands." At the same time, they wondered why the public tuned them out.[10]

In the summer of 1987, Leinhard created a radio program. He thought The University of Texas McDonald Observatory's *StarDate* oversimplified the information and had a style that was too detached. As an educator, Lienhard had spent years creating and delivering lectures that combined knowledge in the field with respect for the audience and their intelligence. His program would make technology and science "a source of absolute wonder and delight" once again.[11]

Lienhard understood that "people wanted to hear about technology from inside a technologist's head," and he had an influential ally in John Proffitt, the director of KUHF, Houston's public radio station headquartered on the UH campus.[12] Proffitt, whom Lienhard knew from church choir, encouraged him to make the show the way he wanted to make it. If Lienhard filled the station's daily program slot, Proffitt would broadcast it.





*Lienhard, seated in his office, examines a diagram on his computer.*
Photo courtesy of Digital Collections, University of Houston Libraries, ark:/84475/do269674768.

That fall was "hell on wheels" for Lienhard, given the sheer volume of work required. After three months, he emerged with sixty-five episodes, each roughly three minutes long, and the program's musical theme composed by his son Andrew. On January 4, 1988, the first episode of the *Engines of Our Ingenuity* aired on KUHF, and to the surprise of "all the naysayers," the program was a success. By March 1, KUHF submitted it to the National Public Radio (NPR) distribution system, offering it to any of its member stations around the United States. Lienhard and the collaborative collective behind *Engines* continued to produce engaging stories of technology about – as his tagline says – "the machines that make our civilization run, and the people whose ingenuity created them."[13]

*Engines of Our Ingenuity*, like the machines from its stories, emerged from the circumstances of the era. The radio of the 1980s lacked the magic he remembered from his childhood when Orson Welles could incite a frenzy of imagination with a single broadcast. Modern audiences looking for that kind of magic went to the movie theaters. Fictional films such as *Star Wars*, released in 1977, did for contemporary audiences what *The War of the Worlds* had done for children of the 1930s. As for nonfiction, the televised evening news with Walter Cronkite eclipsed radio reporting on the national scale. Lienhard wanted to recreate the magic with his program, but in a new era "with a different public … [and] a different sense of language," but he knew he could not.[14] His target audience ranged from ages thirty to fifty, mostly academics and professionals, some of whom listened to the program with their children on their way to school. *Engines* served to bring technical knowledge to a wider audience and to recreate the magic for new generations.

*Lienhard shows two UH students a laboratory experiment.*
Photo courtesy of the Digital Collections, University of Houston Libraries, ark:/84475/do1979h5046.

*In some ways* Engines *has always been a family affair. John, left, was aided by his wife, Carol, third from right, who helped with editing, and his son Andrew, far right, who composed the theme song.*

Photo courtesy of John Lienhard.

## "The People Whose Ingenuity Created Them"[15]

When writing episodes, Lienhard reminds himself of his goal to bring technical knowledge to his audience, but the task is not a solitary endeavor. Even in the early days, he sent his scripts through multiple rounds of editing. His wife, Carol, always took the first look, followed by his UH colleagues. After more than three thousand episodes, Lienhard knows his own expectations and those of the listeners. While production is always a collaborative effort, "you know that the voice you're hearing" bears the responsibility, and the listeners will comment if an episode is not up to their standards.[16]

Those rigorous standards of *Engines of Our Ingenuity* extend beyond those set by Lienhard. He described the behind-the-scenes work on *Engines* as a "leaderless collective," one in which each contributor writes and records their own episodes, but the success of the show depends on the group working together.[17] Of the total catalog of *Engines* episodes, Lienhard estimates that he wrote around 2,500 of them, but numerous guest contributors have written and recorded their own episodes during the last twenty years. Guest contributors maintain the show's variety in topic selection and the voices listeners hear.

*Andrew Boyd, left, is a frequent guest contributor to* Engines, *while Paul Pendergraft, right, worked at KUHF for over twenty years, including as the senior producer on* Engines.

Photo courtesy of *Engines of Our Ingenuity.*

Every guest presenter brings their unique perspectives and expertise to the show. Some are fellow scholars like Dr. Andrew Boyd, the show's most credited guest presenter. Still others make guest appearances from across the nation and around the world to discuss topics in their field, including one special episode, no. 2693, that featured Dr. Michael Barratt from the Space Shuttle *Discovery* in orbit.[18] Regardless of who is presenting, *Engines* remains the same show at its core, whether the listeners hear a voice for the thousandth time or the first.

## The Engines of Tomorrow's Ingenuity

For a show about the history and culture of technology, the emerging technologies over the past four decades presented significant challenges and opportunities for the *Engines* group. Lienhard intended the show to bring scientific knowledge and literacy back to the public, and *Engines* has succeeded at that goal. But I had to ask Lienhard where *Engines of Our Ingenuity* fits in the age of the internet.[19]

The internet, Lienhard contends, serves the same purpose as *Engines*: bringing knowledge to the public. Just as *Engines* overcame the barriers to scientific knowledge created by jargon and journals in 1988, so did the internet by the turn of the twenty-first century. The internet is "today's cocktail party … a mixed and stirred world, where science and the humanities are forced to engage one another," he explained.[20] Not only does the internet bridge the language gap, which *Engines* sought to remedy, but the technology also exponentially increases the speed of communication, connection, and transaction.

*Mark DiClaudio, production engineer for* Engines of Our Ingenuity *and other Houston Public Media programs, helps connect the station's content to younger generations with podcast feeds.*
Photo courtesy of *Engines of Our Ingenuity.*

Houston Public Media (HPM) and Lienhard have now adapted *Engines* to the age of the internet, while retaining the fundamental style of the show. Lienhard has personally maintained a program website since 1997, a critical step in adapting to the digital era. Twenty years later, when HPM began releasing its programming as podcasts, Mark DiClaudio, the current production manager for the show at HPM, added *Engines of Our Ingenuity* to the network's early podcast lineup. In a way, podcasts are where the radio and the internet collide. The two media compete for the same audience, but podcasts hold a significant advantage. Listeners can download and play podcast episodes at any time, rather than waiting for the exact airtime of a radio program. Of Americans ages twelve and older, 83 percent listened to the radio on a weekly basis in 2020, while only 41 percent listened to podcasts. Although general radio audiences remain high, podcast audiences are steadily growing, and radio audiences are shrinking, albeit at a slower pace.[21] But thanks to the efforts of the *Engines* collective, the show now reaches both audiences.

Today, the program faces the same challenges it always has in finding a way to capture the magic. Advances in technology, particularly the internet, mean that everyone is connected to each other and to vast quantities of information; but that hardly means *Engines* is running out of material. With all the "black boxes" in the modern world – pieces of technology which, while important, are not well understood by the public at large – the story-telling nature of *Engines* remains relevant.[22] Plus, newer technology means there will always be more stories to tell.

John Lienhard has informed audiences around the nation about "the machines that make our civilization run, and the people whose ingenuity created them" for over half a century and counting. From his early lectures to the program they inspired, the storyteller from Minnesota has brought humanity back into science and science to humanity.[23] Public understanding of science and its history would not be the same without the inventive mind of Lienhard, who, like the technologies featured in his program, is an engine of our ingenuity. HH

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*Here Lienhard demonstrates a theremin, a musical instrument that is played not by touching but by moving one's hands to interrupt the magnetic fields to control its volume and pitch. The theremin is discussed in episodes 1818 and 3070 by Andrew Boyd.*
Photo courtesy N99a99 and Wikimedia Commons.

To access all the *Engines of Our Ingenuity* episodes, visit **https://uh.edu/engines/**.