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Carnegie Mellon University: A New Ideal 100 Years in the Making

The Pittsburgh-based school has become a model for what institutions must do to maintain their relevance now and into the future.

BILL SAPORITO, EDITOR-AT-LARGE, INC. | SEPTEMBER 23, 2024

From the start, Carnegie Mellon University in Pittsburgh was a different place. Actually, it was two places.

As the name implies, Carnegie Mellon is the product of a 1967 merger that brought together two institutions sharply focused on manufacturing and the technologies behind it. Carnegie Tech was funded by steel's famous robber baron, Andrew Carnegie, in 1900, and dedicated to educating men — and women — in the industrial arts needed to advance the steel business that had made him fabulously wealthy.

The Mellon Institute of Industrial Research and School of Specific Industries was founded in 1913 by the city's famous Mellon banking family whose company, founded in the 19th century, was an archetype for venture capital firms that would flourish in the 20th. It was Mellon money, old money, that in 1901 backed the formation of U.S.

Steel — America's first \$1 billion corporation and the successor to Carnegie Steel. And it was Mellon money that helped create the aluminum giant Alcoa and petroleum giant Gulf Oil.

That the combined institution has contributed to the creation of modern startups such as autonomous vehicle technology maker Aurora Innovation and aerospace company Astrobotics is a testament to its early charter: It was conceived as a learning center where industry went to school — and where school created industries.

Carnegie Mellon isn't the only university subscribing to that latter ethos. Many of our great universities evolved into innovation hubs — Stanford rather famously nurtured the semiconductor revolution that built Silicon Valley, while Harvard helped spur the social-media craze. But they did so long after

establishing themselves as centers of classical education in the arts and sciences.

Carnegie Mellon's current prowess in AI and robotics, however, was built into the very fabric of the institution, which today serves as a new ideal for ecosystem building. It's also a big reason why Carnegie Mellon found itself near the top of Inc. and Fast Company's inaugural list of Ignition Schools, 50 global institutions that maintain high marks for nurturing entrepreneurs and innovation.

The old ideal, the industrial power that was early 20th-century Pittsburgh, was reflected in its powerful leaders: George Westinghouse, Andrew Mellon, Charles Schwab, Henry Clay Frick, H.J. Heinz. At Pittsburgh's peak in the early 1980s, 15 Fortune 500 companies were headquartered there. These companies also generated a ton of institutional wealth looking for a place to go.

And it did: to museums, the arts, hospitals, sports and schools such as Carnegie Mellon.

Then globalization nearly killed this town: steel, aluminum and coal, and the industries that fed them, were devastated.

CMU, and specifically its Robotics Institute, founded in 1979 with a grant from Westinghouse — then a powerful tech and nuclear engineering company — helped stop the technological bleeding and reinvent the Steel City for the 21st century.

But this might not be the robotics that readily comes to mind. At the time, and even today, robotics mostly conjures up factory robots used in places like auto plants and automatons navigating the lunar surface. The view at CMU was not locked in on the mechanical.

“The vision was that robotics was much, much further than this. The Robotics Institute was created as part of an environment which included the computer science department, which was created much earlier, in ’65,” says Martial Hebert, dean of the School of Computer Science.

And that department was also conducting the initial research on something that, to most people, was the stuff of science fiction: artificial intelligence.

In the computer science department, researchers including Alan Newell, Herb Simon and J.C. Shaw created something called a

logic theorist, which Hebert says was the first time that a computer was doing symbolic reasoning, as opposed to calculating or data manipulation. That would lead to other research into computer vision and speech recognition — things you might find handy if, say, you wanted to create an autonomous vehicle.

Making robotics part of the computer science department was the springboard, and a big reason why the institution has stayed relevant, says Hebert. Maintaining this very early vision of robots, not just as physical systems or machines, but as things that have intelligence, has been foundational. “It’s that vision that led to the growth of the Robotics Institute and what we do now,” he says.

So did the establishment of the National Robotics Engineering Center in 1994. Through the project, which was originally funded with the help of a \$5 million grant from NASA, CMU developed Mars rovers and aimed to commercialize the research coming out of the university. According to an economic impact study released in December 2021, the NREC had been awarded 121 patents. To put that into perspective, “the average U.S. university would have produced only 59 patents. The NREC, through Carnegie Mellon University, has licensed 457 technologies to 38 unique companies,” according to the university-funded study.

And just as important was the city’s and CMU/NREC’s ability to keep these startups and developments local, establishing Pittsburgh as a center for not only robotics but also autonomous driving and what the Pittsburgh Robotics Network has labeled the AI ecosystem. According to the PRN, there are more than 125 such companies in the area, including GEBC Robotics, Near Earth Autonomy, Proud Automation and Agot AI. It also includes old/new tech players such as Westinghouse, as well as Silicon Valley names such as Waymo.

The roster includes a number of companies located on what’s now called Robotics Row, anchored by CMU, in Lawrenceville and the Strip District of the city along the Allegheny River. These were once industrial areas that have gone back to school and been revitalized, with higher-paying jobs.

CMU’s offspring have not been able to — and never will — replace the tens of thousands of job losses and the damage done by Pittsburgh’s de-industrialization. But without CMU’s investment in computer science and robots, and its vision for their use in the future, Steel City could have well rusted away.
