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In Milan, a Subtle Artisan Finds a Medium in New Analog Chips

By JOHN MARKOFF Published: July 27, 1998

If there is a Lost Tribe of Silicon Valley, it resides here on a broad industrial plain on the outskirts of suburban Milan.

And the tribe's leader is 62-year-old Bruno Murari, head of a semiconductor research laboratory for one of the world's leading chip makers, ST Microelectronics.

Until recently, the company was known as SGS-Thomson Microelectronics. And, like many of Silicon Valley's most legendary chip makers, it is one of the "Fairchildren," a descendant of the Fairchild Semiconductor Corporation, the California company that helped ignite the global semiconductor revolution more than 30 years ago -- by, among other things, owning an early stake in Mr. Murari's company.

Yet, the culture here isn't like the restless one in the American chip companies that can trace their lineage to Fairchild, the Intels, Advanced Micro Devices and National Semiconductors. There, engineers frequently change jobs to work on the latest chip. Here, at the ST Microelectronics lab, the folkways are more akin to those in a Renaissance craftsmen's guild.

Mr. Murari has passed up many offers to leave Italy and go to the United States. But, he explained, "We had a team, and I found I was committed to the team."

Yet traditional does not mean old-fashioned. Indeed, Mr. Murari is considered the grandmaster of analog circuit design, a subordinate field of electronics in which ST Microelectronics is the world leader -- and which is about to enter a new and potentially more important era.

Analog chips translate real-world phenomena -- like motion, sound, temperature, pressure and light -- into analogous electronic or mechanical patterns.

And compared with digital chips, which define the world in black-or-white absolutes, understanding only a binary code of ones and zeroes, analog chips function as the eyes, ears and muscle that connect the clinically precise world of digital computing to the subtler, more textured world that is perceived by human beings.

It is analog circuitry, for example, that converts the human voice entering a microphone into an electronic signal that a digital chip can reduce to the binary code stored on an audio CD. And it is analog circuitry in the CD player that turns the digital code back into an electronic speaker signal that a human ear can hear.

It is also analog chips that tell an automobile's transmission when to shift, signal a car's air bags to inflate during a crash, and handle numerous other automotive tasks.

The difference between designing analog and digital electronic devices has long been viewed by many engineers as the difference between an art and a science.

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"Digital design is like building with Lego blocks," said Richard Chesson, a Canadian engineer who works under Mr. Murari in the Castelletto laboratory. "Analog design is more like wood carving."

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And certainly Mr. Murari, as the soft-spoken leader of this effort, has carved out his niche. In his 37-year career, he has designed 10 major analog integrated circuits and has supervised the design of 1,000 more.

And he has helped create a series of unique semiconductor processes that have made ST Microelectronics, which last year had revenue of more than \$4 billion and was the world's 12th-largest semiconductor company, the No. 1 analog chip maker in the world, surpassing such American competitors as National Semiconductor and Analog Devices.

Now Mr. Murari is preparing his laboratory for what he considers to be the final challenge of his long career. Later this year ST Microsystems will announce that the company plans to become a major player in the emerging market for micro-electro-mechanical systems, or MEMS chips.

These are perhaps the ultimate analog circuits, consisting of microscopic mechanical structures that are etched into the surface of silicon chips.

Already the MEMS market is a multibillion dollar business, based largely on use of the chips in silicon accelerometers that are now standard equipment used as sensors for air bag collision systems in cars.

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