Artifical intelligence for the quintessential twin

A digital graph devised by Arquimedes Canedo automatically links different digital twins with one another.

Digital twins are generated when products or systems are being planned, and up to now they could not be automatically linked and synchronized. But the research scientist Arquimedes Canedo from Corporate Technology in Princeton, New Jersey, has devised a digital graph that can do exactly that.

For this and other inventions, Canedo was awarded Inventor of the Year in the Talent category.
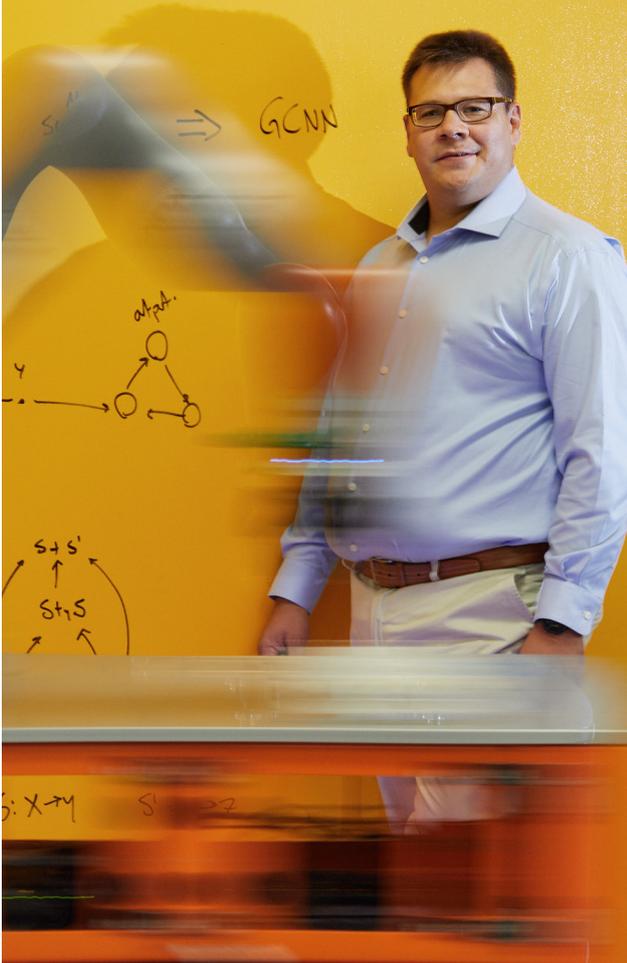
Dr. Arquimedes Canedo

Principal Key Expert Scientist in Princeton, New Jersey (USA)
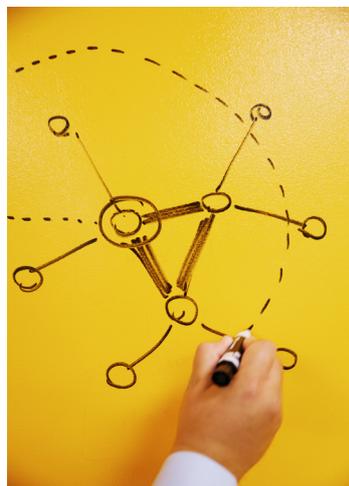
Dr. Arquimedes Canedo

Inventor of the Year 2017

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A product's digital twin offers several advantages for automation and control: The twin, in virtual form, accompanies the product throughout its life cycle, starting with the idea and extending through production, maintenance and even disposal, which creates more efficiency on all levels. "We receive all the data from the engineers or the product itself and feed that into our software systems," Canedo says in describing the first step. His job is to create software for engineering and designing digital twins for new products or systems. In this work, he places particular focus on making these models compatible as well as on synchronizing them.

This is necessary because a product or an installation consists of such items as electronic, mechanical and software-specific systems, and each has to have its own digital twin. Different models and diagrams are generated for electronic systems than for those used in the mechanical design of the same products, where, for example, many 3D models are used. Digital twins of the same products generally share few similarities, and until now it hasn't been possible to automatically link them.

The same is true for complex industrial systems that consist of many components such as drives and valves. In the past, all digital twins had to be manually linked in order to, for example, test the system before it would go into operation. With his invention, Canedo has now made this very complex programming work unnecessary.

In his work, Canedo developed a digital-twin graph that, similar to a knowledge graph, links information. Canedo draws on the digital models of a product to feed the digital-twin graph and then analyzes this massive amount of data using algorithms he developed. This ultimately makes it possible to create automatic linking. The digital-twin graph employs artificial intelligence methods to then provide new insights about the product. "I'm interested in seeing what the data can deliver in terms of new facts that exceed our current knowledge," Canedo states, adding that Siemens gives him the freedom he needs to explore this interest. Having worked at the company for seven years now, Canedo especially appreciates having a chance to work on various challenges found in different industries: "As research scientists, we can delve deeply in our research work and solve real-world problems."

If you're already a principal key expert scientist by the time you're 36, then research runs in your blood. **Dr. Arquimedes Canedo** is such an exceptionally talented person. The Mexican scientist needed just three years to earn his doctorate with honors from the University of Electro-Communications in Tokyo in 2008. That was the same year he received his first award from an international company for his initial four patents. Since beginning to work at Siemens in 2010, Canedo has received numerous other honors, including the Siemens Process and Drives Werner von Siemens Award 2016 in the Innovation category. He holds 89 inventions that have led to 13 patents in 65 patent families and he has published more than 50 technical papers in top conferences and journals. Canedo is married and has two children.

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