# Digital-twin technology transforms agriculture in South Texas



In South Texas, crop farmers are experiencing significant advancements in agricultural technology, particularly through the innovative application of digital-twin technology. This initiative is being spearheaded by Texas A&M AgriLife Research, which harnesses the power of remote sensing, big data, and artificial intelligence (AI) to simulate and predict real-world crop production scenarios.

Leading this multidisciplinary effort is Juan Landivar, Ph.D., who is the director of the Texas A&M AgriLife Research and Extension Center in Corpus Christi. He, alongside a team comprising agronomists, computer engineers, and electrical engineers, presented their findings at the recent Texas Plant Protection Association Conference. The research results have been published in the peer-reviewed journal, Computers and Electronics in Agriculture.

The concept of digital-twin technology was born from a discussion six years ago between Landivar and his colleague, Jinha Jung, Ph.D., who is currently an associate professor at Purdue University. "We were returning from a meeting when the idea clicked,” Landivar recounted. “I couldn’t sleep that night. By 3 a.m., I was texting Jinha, realizing the vast opportunities this technology could unlock for agriculture."

This initial idea led to practical trials on a 200-acre farm in South Texas, focusing on cotton and sorghum. The team used drones to collect over 250,000 data points within a single season, examining crucial factors such as canopy cover, plant height, and various vegetation indices, including the normalized difference vegetation index (NDVI). The challenge they faced was how to interpret this extensive set of data.

"The AI-powered web-based modeling comes in at this stage," Landivar explained. “It translates complex datasets into actionable insights for farmers, helping with decisions on yield prediction, biomass estimation, crop termination, and irrigation scheduling.” An example of the technology's efficacy can be seen in a recent success where AI modelling advised a farmer to start harvest preparations earlier than usual. Initially sceptical, the farmer's eventual observation of the field's conditions confirmed the AI’s predictions, saving potential losses.

Digital-twin technology is propelling agricultural practices towards a more data-driven model, termed prescriptive agriculture. Farmers can now access early yield forecasts six to eight weeks prior to harvest, which aids in financial planning and market strategies. “This precision saves costs and maximizes harvest potential,” said Landivar, highlighting not only the economic benefits but also contributions to sustainability goals such as biomass estimation for carbon credit markets.

As technological advancements continue, the accessibility of tools like multispectral cameras has expedited data collection and analysis, turning what was once deemed a luxury into a necessity for modern farmers. "We’ve come a long way," Landivar remarked. He emphasized that as this technology progresses, it holds tremendous promise for the future of agriculture worldwide by equipping farmers with real-time insights and predictive analytics.

The research team includes several notable individuals, such as Jung, Pankaj Pal, Ph.D., Jose Landivar-Scott, Lei Zhao, Ph.D., Mahendra Bhandari, Ph.D., Nick Duffield, Ph.D., and Kiju Lee, Ph.D., among others, all contributing to this groundbreaking work at various institutions affiliated with Texas A&M.

Through these efforts, digital-twin technology is not simply replicating existing farming practices; it is fundamentally transforming how agriculture is understood and managed, heralding a new era in the industry.

Source: [Noah Wire Services](https://www.noahwire.com)

## Bibliography

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