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Physics - Geophysics; Data on Geophysics Reported by Researchers at University of Texas Austin (Enhanced Prediction of S-wave Velocity and Geomechanical Properties Using Depth-ordered Recurrent Neural Networks - a Case Study In West Texas)

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2026 FEB 9 (VerticalNews) -- By a News Reporter-Staff News Editor at Journal of Engineering -- Investigators discuss new findings in Physics - Geophysics. According to news reporting originating in Austin, Texas, by VerticalNews journalists, research stated, "Because pore fluids have less influence on shear waves, Swave velocity (VS) directly measures a rock frame's stiffness. However, direct VS measurements are scarce in the vintage wells of the Delaware Basin."

Financial support for this research came from **Bureau of Economic Geology**, University of Texas at Austin.

The news reporters obtained a quote from the research from the University of Texas Austin, "Although empirical and traditional machine-learning methods have been used to predict VS from conventional well logs, their estimates often depend on specific geologic formations or boundary conditions. In this study, we develop a self-attention, bidirectional long shortterm memory (BiLSTM) model with depth-ordered sequences and automated hyperparameter optimization to overcome these limitations, requiring no prior geologic information. Trained on P-wave velocity, density, total porosity, and gamma-ray logs from 123 wells, the model captures nonlinear relationships in the data, achieving an R2 of 0.85 and surpassing existing empirical and regression-based approaches. Further validation in blind tests with eight wells in different counties demonstrates accurate VS predictions throughout the basin where direct VS logs are missing. To interpret the model's 'black box,' we compute Shapley values to quantify each input's contribution to VS predictions."

According to the news reporters, the research concluded: "In addition, the BiLSTM's superior performance extends to geomechanical properties, such as bulk modulus (K), shear modulus (G), Young's modulus (E), and Poisson's ratio (nu), highlighting its practical utility in seismic applications such as energy exploration and development, geothermal energy, carbon and hydrogen storage, and induced seismicity monitoring."

This research has been peer-reviewed.

For more information on this research see: Enhanced Prediction of S-wave Velocity and Geomechanical Properties Using Depth-ordered Recurrent Neural Networks - a Case Study In West Texas. Geophysics, 2025;90(5). Geophysics can be contacted at: Soc Exploration Geophysicists - Seg, 8801 S Yale St, Tulsa, OK 74137, USA.

Our news correspondents report that additional information may be obtained by contacting Jaewook Lee, University of Texas Austin, Jackson School of Geosciences, Bur Econ Geol, Austin, TX 78713, United States. Additional authors for this research include Yangkang Chen, Robin Dommisse, Guo-Chin Dino Huang, Alexandros Savvaidis and Omar M. Saad.

Keywords for this news article include: Austin, Texas, United States, North and Central America, Geophysics, Physics, Networks, Neural Networks, University of Texas Austin.

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