

## PAU Revolutionizes Farming with AI-Powered Tractor Auto-Steering System



In a significant leap towards modernizing Indian agriculture, Punjab Agricultural University (PAU) on Monday, July 21, 2025, unveiled a cutting-edge Global Navigation Satellite System (GNSS)-based auto-steering system for tractors at its research farm. This innovation places artificial intelligence (AI) firmly in the driver's seat, promising to revolutionize precision farming and enhance efficiency for farmers across the region.

The auto-steering system, developed by an American company and costing approximately ₹3.5 lakh to install on both new and existing tractors, utilizes satellite signals to guide tractors along precise, predefined paths. Vice-Chancellor Dr. Satbir Singh Gosal, who led the demonstration and press conference, emphasized that this technology marks a transformative shift towards digital and AI-based agriculture. "Technology is not a fashion, it's a necessity for making farming sustainable, efficient, and profitable," Dr. Gosal stated.

The system integrates multiple satellite constellations, advanced sensors, and a user-friendly touchscreen control panel. Key components include a high-precision GNSS receiver for accurate positioning, a wheel angle sensor to monitor steering, and a motorized steering unit for automated control. An ISOBUS-compliant console allows for advanced functionalities such as auto headland turns, skip-row operation, and customized turning patterns, giving farmers unprecedented control and flexibility. Operators can easily switch between manual and automatic modes with the press of a button.

Field trials conducted by PAU have demonstrated the system's remarkable performance. Historically, conventional manual steering methods often resulted in 3-12% overlap when operating implements like disc harrows, cultivators, rotavators, and smart seeders. With the new auto-steering system, these overlaps were dramatically reduced to just 1%, and missed areas plummeted from 2-7% to under 1%. The system consistently maintained an impressive pass-to-pass accuracy of  $\pm 3$  cm, leading to improved crop uniformity, optimized resource utilization, and significant cost savings for farmers.

Dr. Gosal further highlighted that such digital tools not only boost productivity but also substantially reduce the physical burden on farmers, allowing them to operate effectively even in low-light or nighttime conditions. Dr. Manjeet Singh, Dean, College of Agricultural Engineering and Technology, also showcased PAU's remote-controlled two-wheel paddy transplanter, another innovation designed to reduce operator fatigue by up to 85% and cut labor costs by 40%.

This GNSS-based auto-steering system represents PAU's ongoing commitment to leveraging advanced technology for a smarter, more sustainable, and economically viable agricultural future. With the Union Agriculture Minister, Shivraj Singh Chouhan, recently reviewing PAU's technological innovations, these advancements are gaining national attention, positioning Punjab at the forefront of agricultural modernization in India.