Harvesting Precision: Innovating Agriculture with Nano sensor RFID Tags for pH and Moisture Monitoring

Abstract:

India, as a nation with strong agriculture foundation, has 57.47% of its population relying on 41.36% of the total landscape dedicated to agriculture contributing 18.2% of its total GDP. This boasts agriculture as a major contributor to the nation's overall development. However, the sector faces persistent challenges, including declining soil fertility, inefficient water use, and inconsistent crop yields. Traditional farming methods and limited access to advanced technologies further complicate these issues, resulting in lower productivity and economic hardship for farmers. Previous attempts at integrating sensor technology in precision agriculture have faced challenges, such as sensor durability, environmental adaptability, and data accuracy across diverse soil types. These limitations have hindered the widespread adoption of precision farming technologies, especially in regions with varying environmental conditions. Our project aims to overcome these obstacles by developing an RFID-enabled MXene-based conductometric sensor designed for precise monitoring of soil pH and moisture levels. MXene, a novel two-dimensional material known for its exceptional conductivity and chemical stability, provides a robust platform for creating highly sensitive and durable sensors. Conductometry, which measures electrical conductivity, offers real-time data on ion concentration in the soil, ensuring accurate monitoring of critical parameters such as pH and moisture. By incorporating these advanced sensors into agricultural practices, we seek to enhance crop growth, optimize resource management, and promote sustainable farming. This technology aims to empower farmers with reliable data, improving decision-making and increasing productivity paving a new path to sustainable precision farming.

Keywords:

RFID, Conductometry sensors, Precision Agriculture.

TEAM DETAILS:

SREE VANI – BU21EECE0100430
PALYAM LOKINI – BU21EECE0100197
MUDE VENKATA TEJA - BU21EECE0100106

PROJECT GUIDE:

DR. LIGNESH DURAI