Democratising precision agriculture through reliable, accessible IoT for smallholders

In the realm of agriculture, precision is key. Knowing when to irrigate, how much water to use, and which areas of a field need attention can make the difference between a thriving crop and a failing one. For large-scale industrial farms, precision agriculture technologies like IoT sensors and AI-driven analytics have become increasingly common. But for smallholder farmers, who work with limited resources and infrastructure, accessing these tools has remained a challenge, and even when they do, reliability is an issue due to power fluctuations and other issues.

The DCM Shriram AgWater Challenge, run by The/Nudge Prize, is a startup contest that aims to discover and enable a range of innovative solutions to India's water crisis, while being financially viable and profitable for smallholder farmers, who account for 86% of farm households in India. The challenge evaluates participating startups based on their ability to improve water use efficiency, scalability, affordability, and profitability for smallholder farmers.

Participants in the challenge included established players like Rivulus and CropIn, who have been working on this problem for years and have made significant strides in developing precision agricultural tools. However, fine-tuning these tools for use by smallholder farmers remains a challenge, one that requires a deep understanding of the specific challenges they face.

This is where startups like Cultyvate and Industill FarmTech come in. These companies are developing IoT solutions that are reliable, affordable, and tailored to the needs of smallholder farmers growing fine cereals, with a keen emphasis on water conservation.

Cultyvate, for example, has developed an IoT-enabled alternate wetting & dry solution that monitors water levels in paddy fields using sensors deployed above and below ground. When the system detects that irrigation is needed, it automatically notifies the farmer via SMS or voice call. What sets Cultyvate apart is its focus on building a resilient, dependable architecture that can withstand the challenges of rural environments, such as power outages and connectivity issues. By creating an automation system that farmers can trust blindly, Cultyvate is minimising the need for manual intervention and reducing water wastage by up to 40%.

Industill FarmTech takes a similar "AutoFarm" IoT approach, using sensors to monitor water levels and automate irrigation. However, Industill heavily emphasises making its system viable for smallholder farmers. For example, the AutoFarm system remembers water amounts released during power failures, resuming application when restored. By tailoring the technology for small operations, Industill brings precision agriculture's water-saving benefits to a widersmallholder audience.

While Cultyvate and Industill are focusing on IoT solutions, another startup in the challenge, Arms4AI, is taking a different approach. Arms4AI uses geo-AI and satellite imaging to provide near real-time insights into crop health and water stress. By analysing high-resolution satellite imagery with advanced algorithms, Arms4AI is able to detect issues like water scarcity or irrigation inefficiencies much earlier than traditional methods. This allows farmers to optimise their water usage and take corrective action before the problem escalates, potentially saving entire crops.

What sets Arms4AI apart is the speed at which it can deliver these insights. While satellite imagery has been used in agriculture for decades, there is often a significant lag between when the images are captured and when the insights are delivered to farmers. Arms4AI's platform, AGRO AI, aims to close this gap, providing actionable intelligence in near real-time, enabling farmers to make data-driven decisions about water management.

As these startups continue to develop and refine their solutions, the potential impact on smallholder farmers is enormous. By providing tools that are reliable, affordable, and tailored to their specific needs, these companies are helping to level the playing field, giving small-scale farmers access to the same kind of precision agriculture technologies that were once the exclusive domain of large industrial operations. More importantly, these solutions are empowe1ring farmers to optimise their water usage, reduce costs, and improve yields, all while promoting sustainable agricultural practices.

As water scarcity becomes a pressing concern in various parts of the country, the innovative solutions being developed by these startups could not be more timely or more important. As the DCM Shriram AgWater Challenge progresses, it will be exciting to see how these companies continue to push the boundaries of what's possible, and how their water-saving precision agriculture technologies impact our nation's water security and the livelihoods of small farmers.

"This article is one part of an 8-part series covering agricultural water utilisation in India."


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